Datacenter Degrowth and Decentralization as a Chance for Europe

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ecoCompute, Berlin

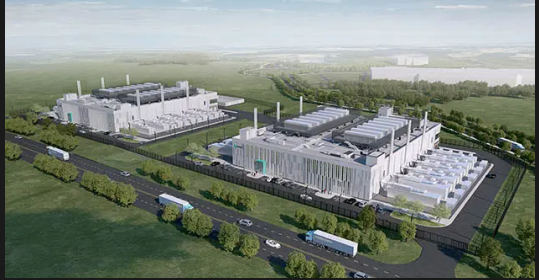
Who am I?

Thomas Fricke

- Kubernetes Cloud Security
  - critical infrastructure
  - architecture
  - examination
- Former life: Statistical Physics
- Disclaimer

  Work for the German Administration
  - Pro Bono: OpenCode, Consulting IT Planning Counsel
  - Payed: OpenDesk, FITKO

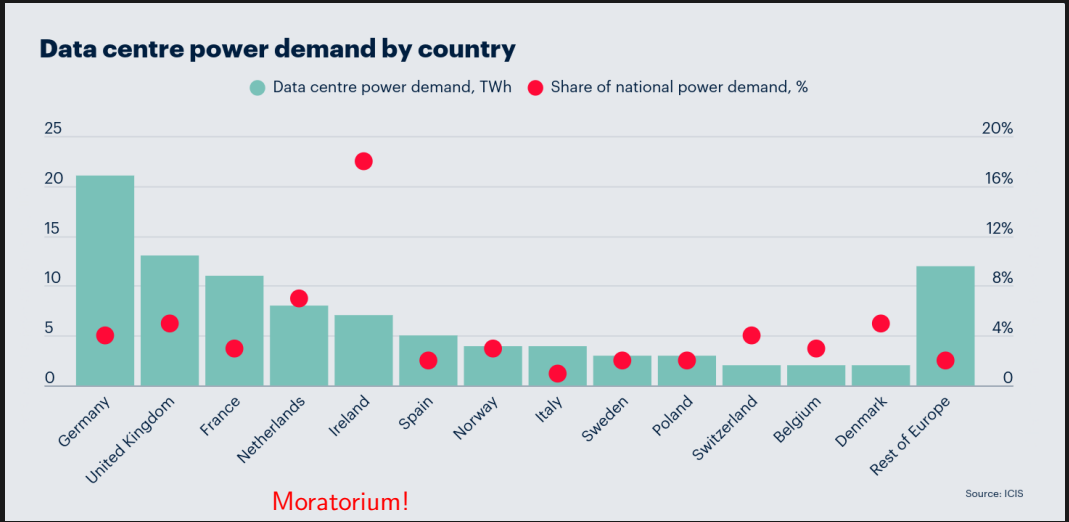
Datacenter



Datacenters are Factories

- Energy consumption
  - 12 MW small German DC
  - 40 MW state of the art German DC
  - ~~300~~ 600 MW planned in Berlin
  - 860 MW planned in Skien, Norway
- Diesel emergency power Generator
  - 1 day onsite
  - transport capacity for longer
  - ship
  - vans
- Access to transmission grid
  - transformer station
  - power lines 110kV
- total consumption
  - Berlin/Brandenburg planned ~~1 2~~ 9 GW
- Water
  - cooling
  - transport
- several Billions € of servers
  - typical rack 900.000€
  - several thousand racks
- access to multiple redundant fiber lines
- German setup
  - 2 x Telekom
  - Vodafone
  - Colt
- access control
  - typical vans
  - Kalaschnikov safe amoured glass entrance
- noisy (90 dB+)
- completely unprotected roof

EU Datacenter Power Demand by Country 2024



Electric Power Research Institute – US Predictions

Electric Power Research Institute
Epoch AI Joint Report Finds Surging Power Demand from AI Model Training August 2025

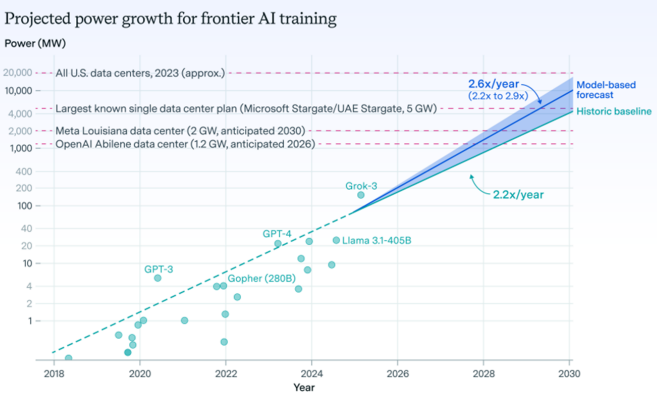


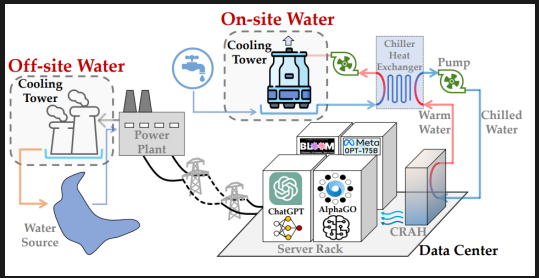
Figure 1. *Forecast for peak power demand required to train the largest frontier models, with historic frontier AI power growth and historic training runs highlighted for context. Graph prepared by Epoch AI.*

Exponential Growth

- explosives
- nuclear chain reactions
- population growth
- infections at the beginning of an epedemy SIR Model
- limited by resources

Water

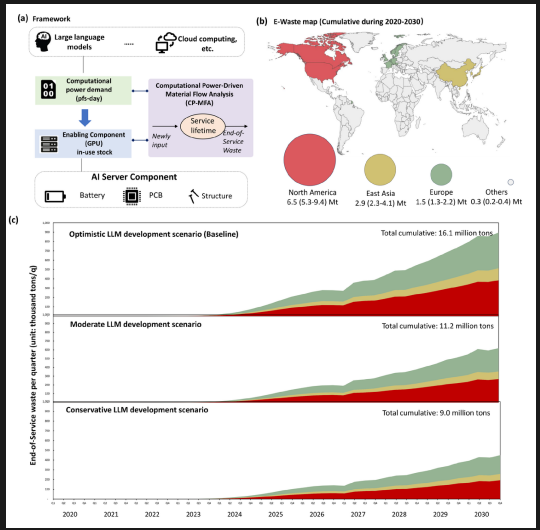
Data Center Dynamics: **How to cut water usage in cloud data centers**



- Its complicated
- 1 – 9 l of water per kWh
- first post
  1 MW consumes 26 Million litres a year
  $\approx$ 3 l/kWh
- variations of efficiency
- weather conditions

AI-Waste

- Life of Data Center Hardware: **3 – 5 years**
- Peng Wang, Chinese Academy of Sciences, Lingyu Zhang, Institut National des Sciences Appliquées de Lyon, Asaf Tzachor, Eric Masanet, University of California, Santa Barbara:
  E-waste Challenges of Generative Artificial Intelligence
  also in **Nature**
- Deutsche Welle
  E-waste from AI computers could 'escalate beyond control'
  - Nature
    E-waste challenges of generative artificial intelligence
    - 1.2-5.0 million metric tons in 2030
- **1,000** fold increase of waste



E-Waste

Chip Production – Taiwan drought 2021

- Phys.org

Taiwan imposes water rationing as drought worsens

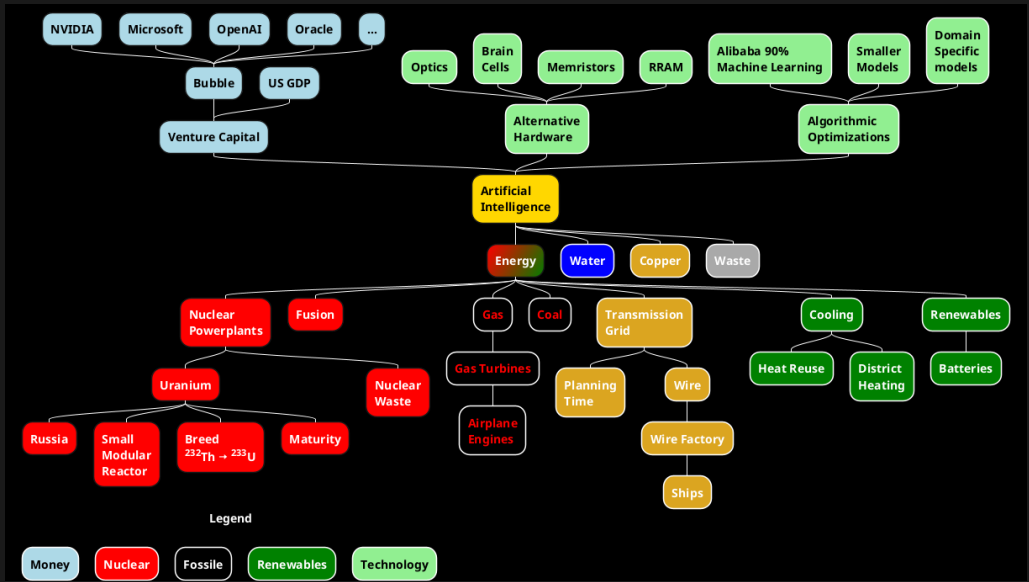
- resource conflict
- rice or 2nm factories

- truthdig

The Ecological Cost of AI Is Much Higher Than You Think

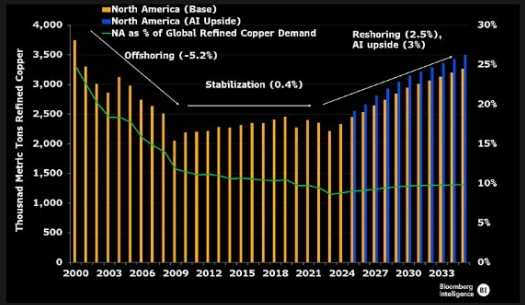
- "acutely carcinogenic, reproductive-toxic and neurotoxic substances."
- 1000 applications of PFAS
- union busting

Bottlenecks



Copper in US data centers

North American Refined-Copper Demand



Source: Data Center Knowledge, Wakefield & Cushman, Wood Mackenzie, ICSG, Bloomberg Intelligence

- 3% increase every year
- 1.1 million tons in 2030

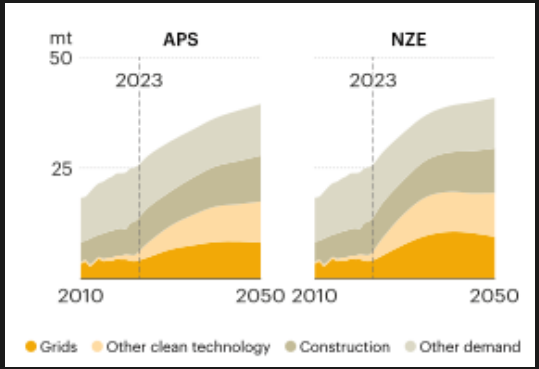
North American Data-Center Copper Demand by 2030

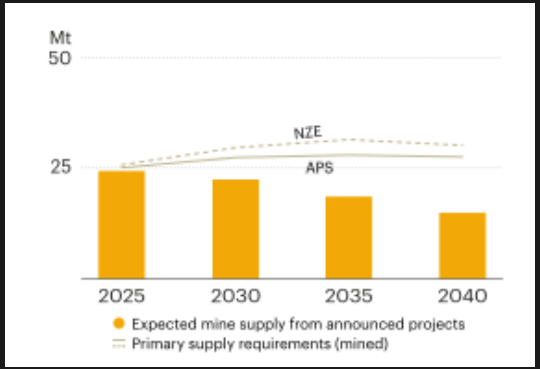
Source: US Department of Energy, US Energy Information Administration, IDC, eMarketer, Data Center Knowledge, Navigant Research, Cushman & Wakefield, Bloomberg Intelligence

- 1 MW $\approx$ 27 -33 metric tons
- Data Centre Magazine
  How the AI Data Centre Boom Could Threaten Global Copper

International Energy Agency (IEA): Copper

Copper Outlook for key energy transition minerals



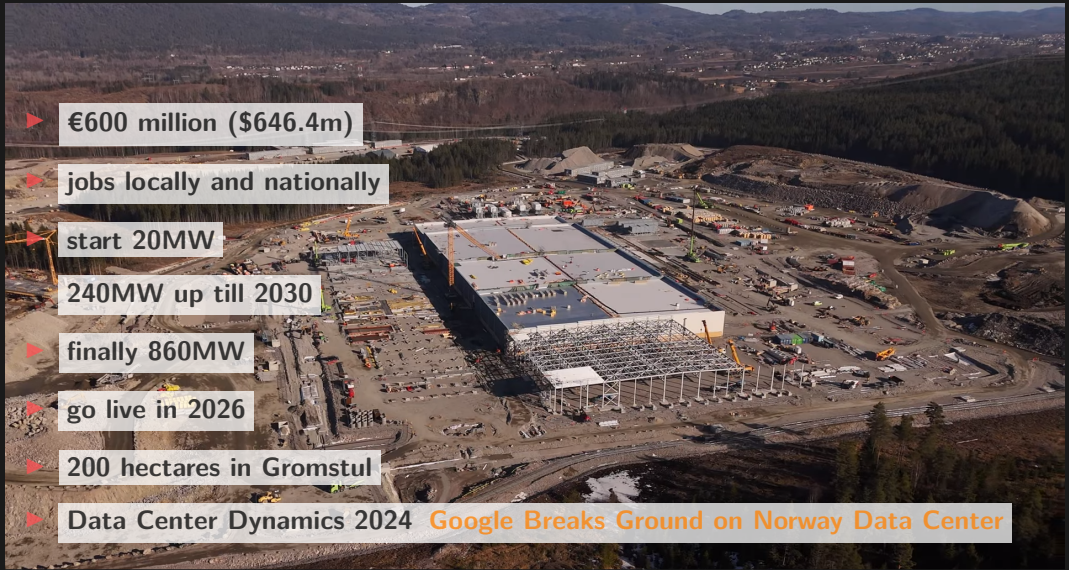


- 3% increase every year
- 1.1 million tons in 2030
- 1 MW $\approx$ 27 metric tons

Thumb Rules

Resource	Unit	Source	Main competition	Impact Blast Radius
Power	1 MW	power plants	industry, households	earth
Transmission		power lines	landscape	
Copper	27 t		mining industry, electric cars	indigenous communities in the mining area
Water	1000 – 9000 l/h	ground water, rivers	farms, households	local to the datacenter

Skien – Gromstulskogen



- €600 million ($646.4m)
- jobs locally and nationally
- start 20MW
- 240MW up till 2030
- finally 860MW
- go live in 2026
- 200 hectares in Gromstul
- Data Center Dynamics 2024 Google Breaks Ground on Norway Data Center

Google in Germany

- **Clandestine behavior meets sycophantic politicians**
- **Absolutely intransparent**
  - Heise

    Amazon Reforestation: Google Deal with Brazilian Startup

    5.5 billion euros: Google's "GDP booster" for AI in Germany

    How Green Are Google Data Centers Really?

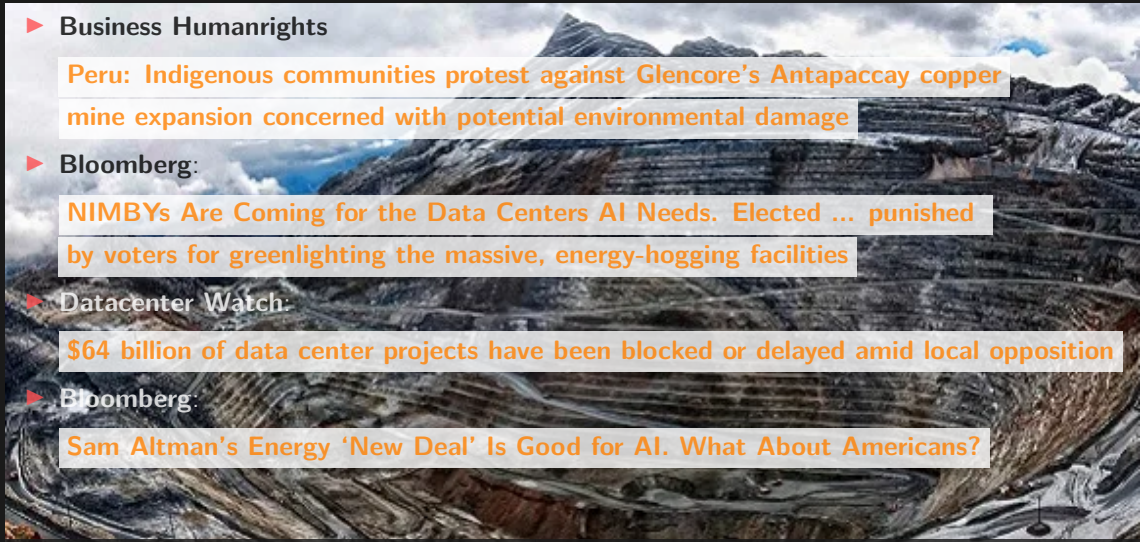
    "high-voltage power has been exclusively laid for operators," including nine 110 kV lines.

    . . . figures for Germany from 2024 show, according to AlgorithmWatch, only 68 percent coverage when viewed hourly; the rest, it claims, came from fossil sources.
  - Algorithmwatch

    Investitionspläne von Google: Nachhaltigkeit und Transparenz in den Blick nehmen
  - Google

    Google . . . €5.5 Billion Investment in Germany, including AI . . . , through 2029

Resistance



- **Business Humanrights**

  Peru: Indigenous communities protest against Glencore's Antapaccay copper mine expansion concerned with potential environmental damage

- **Bloomberg**:

  NIMBYs Are Coming for the Data Centers AI Needs. Elected ... punished by voters for greenlighting the massive, energy-hogging facilities

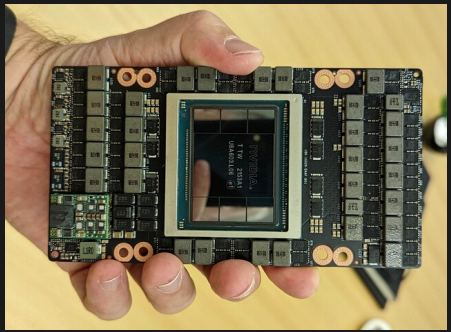
- **Datacenter Watch**:

  $64 billion of data center projects have been blocked or delayed amid local opposition

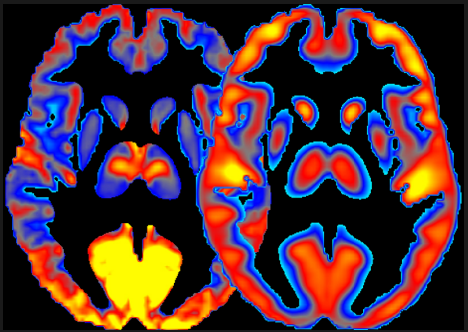
- **Bloomberg**:

  Sam Altman's Energy 'New Deal' Is Good for AI. What About Americans?

Comparison NVIDIA Hopper H100 vs Homo Sapiens[2]



700 Watts



20 Watts

Energy Consumption

- Single Graphics Card
- 700 Watts = 0.7kW
- ~ ~~30~~ 100 kW / rack
- instead of 3 to 6 KW / rack

New method for combining measures of brain activity (left) and glucose consumption (right) . . .

**Dr. Ehsan Shokri Kojori, NIAAA

Misalignement – How to Kill One Industry After the Other

- Maskulinity
  - Rittal 1MW cooling
  - 2 sportcar equivalents
- All money into old technology
- Trillions of Venture Capital
  - Graphic Cards
  - Nuclear
  - **Exhaustion of VC**
- Fewer Billions could trigger **real** innovation
  - Funding for alternative AI technologies
  - Integration into existing Infrastructure
  - Decentralisation to save Ressources

Prediction Recap and FOMO

- never seen before 5 fold increase
- from 3.7% to 5-15% of the 2030 prediction
- adding 10% to the US grid
  - unprepared
  - instable
- FOMO (fear of missing out) propaganda
  - China will lead in 2030
  - at the brink of World War III
  - Retain US leadership in AI
  - US Gov: AI linchpin of our economy
  - AI New Deal
- nuclear power to the rescue – SMR

Touching Limits: Energy, Water, Metal CO_2

- Ireland: AI Data Center Moratorium until 2028 because of Blackout fears
- Netherlands: Inside the data centre moratorium movement
- Tech HQ: Heating up: how much energy does AI use? *What we do know is that training ChatGPT used 1.287 gigawatt hours, roughly equivalent to the consumption of 120 US homes for a year.*
- Moomoo: Chicago data center electricity demand increased by 900%! AI continues to detonate global energy challenges
- Cleanroom Technology: data centers run out of power
- Business Today: OpenAI might go bankrupt by end of 2024
- Business Insider: The AI boom will push America's shaky power grid to its limit
- Wired: AI's Energy Demands Are Out of Control. Welcome to the Internet's Hyper-Consumption Era
- OECD: How much water does AI consume? The public deserves to know
- Substack: The Great Salt Lake is Disappearing. So, Utah Banned the Rights of Nature.
- Straight Arrow News: AI tools consume up to 4 times more water than estimated
- Substack: Material Sacrifices To tackle climate chaos, decolonize the labor movement
- The Driller: Growing Demand for Copper Drives Need for Increased Domestic Mining, Experts Suggest
- Generative AI is reportedly tripling carbon dioxide emissions from data centers
- Odessa American Online: AI to boom natural gas market
- Arabian Gulf Business Insight: Aramco partners with US startup Groq for AI data centre

Impact on the Environment

Neo Colonialism

- Reporter Brasil

  Documents link Amazon and Google to companies investigated for illegal gold mining

- Tucson

  Arizona opinion: Data centers redefine the Copper State

- Dan Watch

  Impacts of copper mining on people and nature

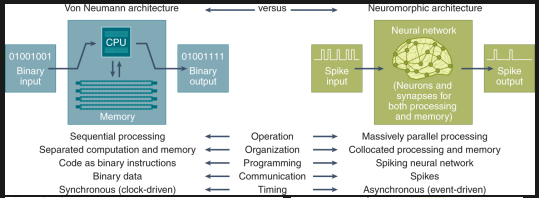
- Monga Bay

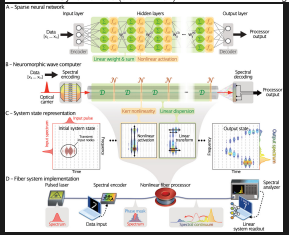
  Renewables won't save us from climate catastrophe, experts warn; what will?

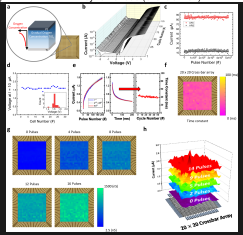
- The Guardian

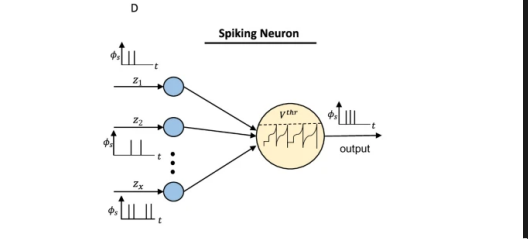
  How the rise of copper reveals clean energy's dark side

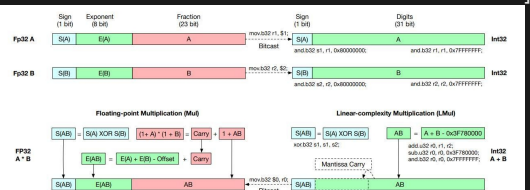
Neuromorphic Computing – Can Tech Save us?







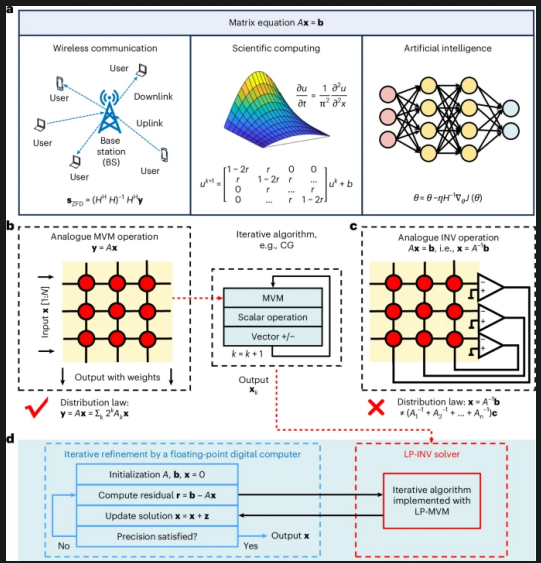




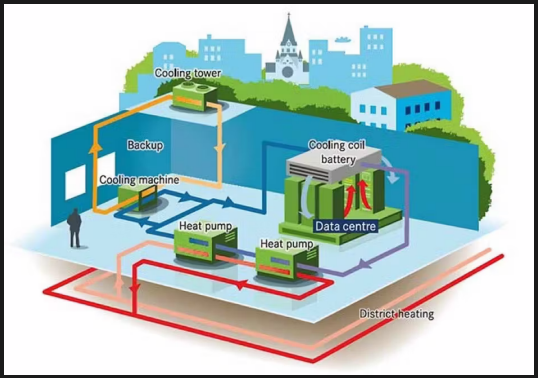
Could save 95% of the energy needed

China FOMO – The Right Way

- Wikipedia
  Solar power in China
- Bloomberg
  Alibaba's Shares Soar After Investors Buy Into Big AI Moves
- Alibaba
  New AI Training Method Cuts Search Costs by Nearly 90%
- Nature
  Precise and scalable analogue matrix equation solving using resistive random-access memory chips
  - NumPy
  - SciPy
  - on an analogue chip



Reusing the heat



- Cloud and Heat Vattenfall
- Integration into district heating
- NTT Berlin 2 – Gasag
  - district heating does not really fit
  - must be planned and implemented together

Reusing the heat – Schwäbische Alp

- Integration into district heating
- Small scale J-H Computers
- better than Geothermal energy
- works from 40kW
- nice from $>$ 240kW

Europe

- Start investing into the **right** technologies
- Cheaper than a single Gigafactory
- Supports local strength
- Decentralisation
  - Resilience
  - Low Latency
  - Robots
  - Technology advantage
- Ecology
- AItad

  KI in Mikrochips: Der Blick in den Abgrund bringt Innovationen hervor
- OpenFlexure

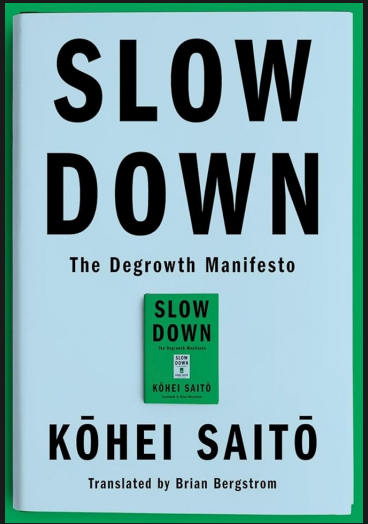
  50$ self printed microscope
  - Europe / Africa
  - AI on a tablet
  - Leukemia
  - Malaria

Conclusion: Optimization

- Increasing efficiency
- Focus on the right part of economy
- But beware
- Factor of 10: buys us 10 years
- Factor of 1000: buys us 30 years
- Insufficient on the long run
- **Degrowth**

Conclusion: Degrowth

- Wikipedia
  Degrowth is an *academic and social* movement aimed at the planned and democratic reduction of production and consumption as a solution to social-ecological crises
- Must become imperative in engineering
- Optimization $\neq$ Degrowth
  - buys time
  - but only a few years



Question? Remarks?

Further reading

- Gerry McGovern
- Paris Marx
- Halloween Talk at SreCon Emea 2024
- Kohei Saito on archive.org: Marx in the Anthropocene

Some Answers

Slides: https://thomasfricke.de/ecocompute2025.pdf

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