CIRRUS

Powering AI: Namibia's opportunity

INQS

July 26

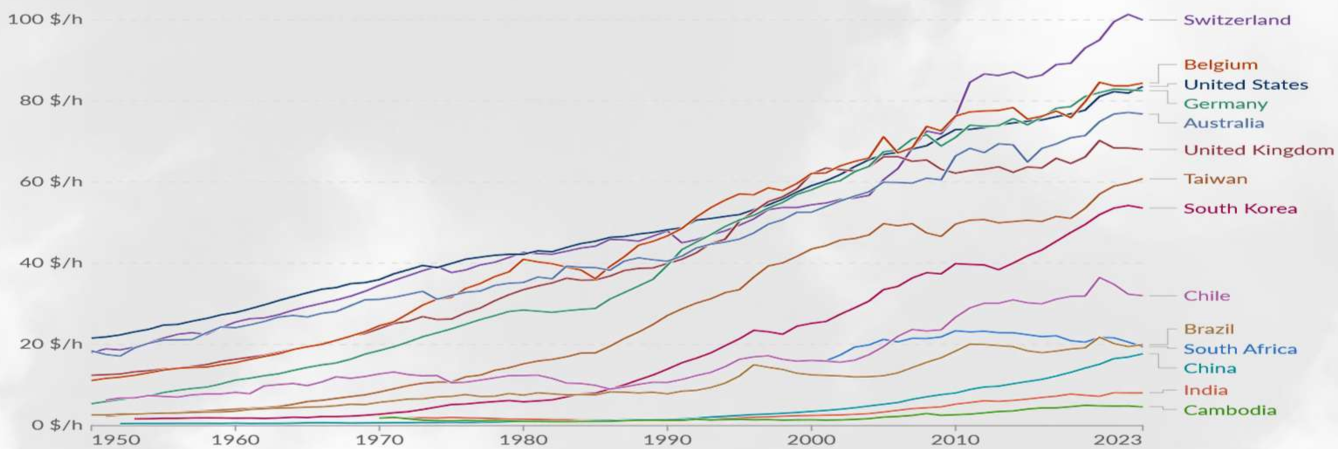
Basic rule 1:

Over the course of one's life, the average person can only consume more or less what they produce

Productivity

Productivity: output per hour worked

Productivity is measured as gross domestic product (GDP)[1] per hour of work. This data is adjusted for inflation and differences in living costs between countries.



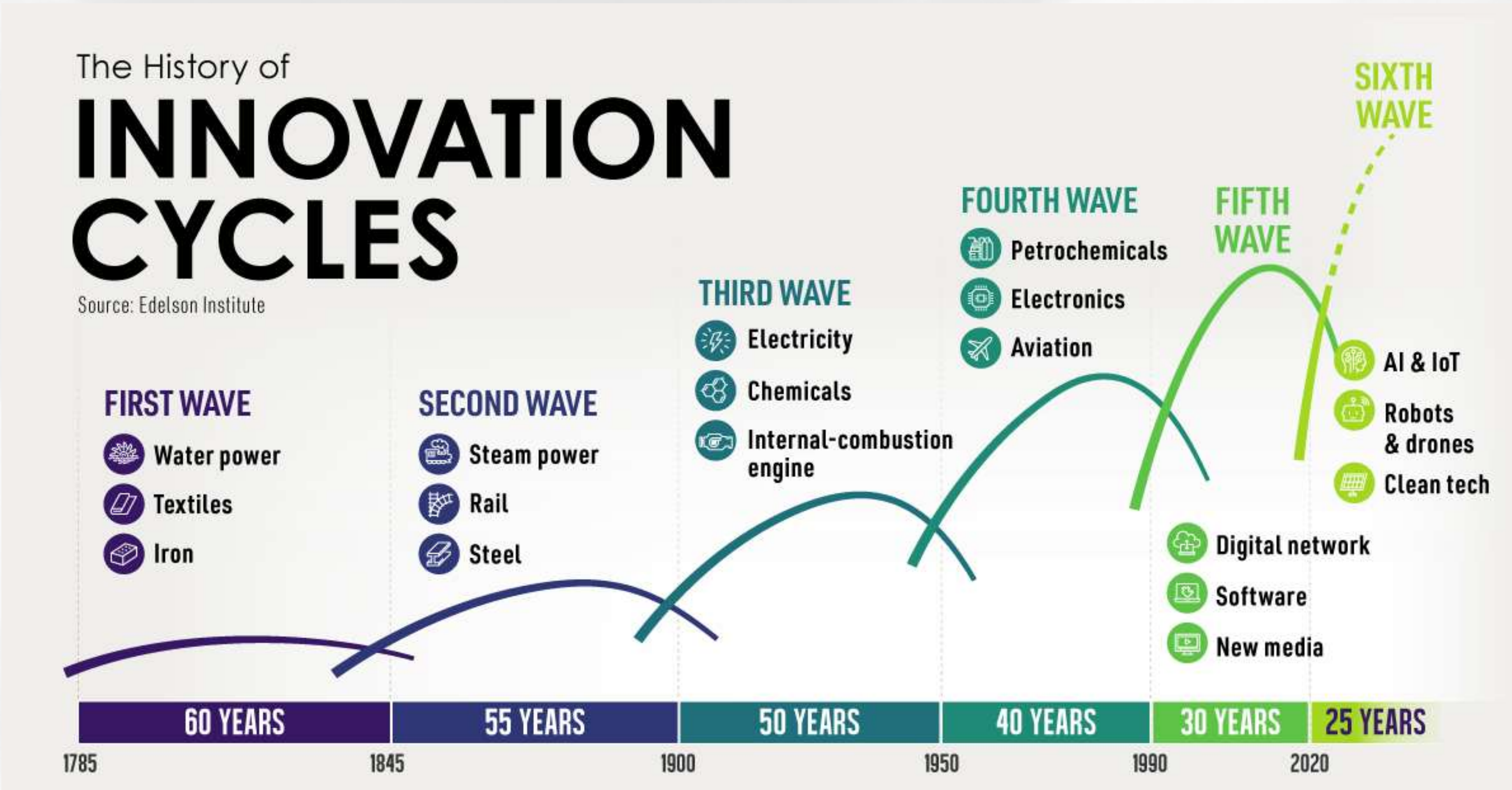
Data source: Feenstra et al. - Penn World Table (2025)

OurWorldinData.org/economic-growth | CC BY

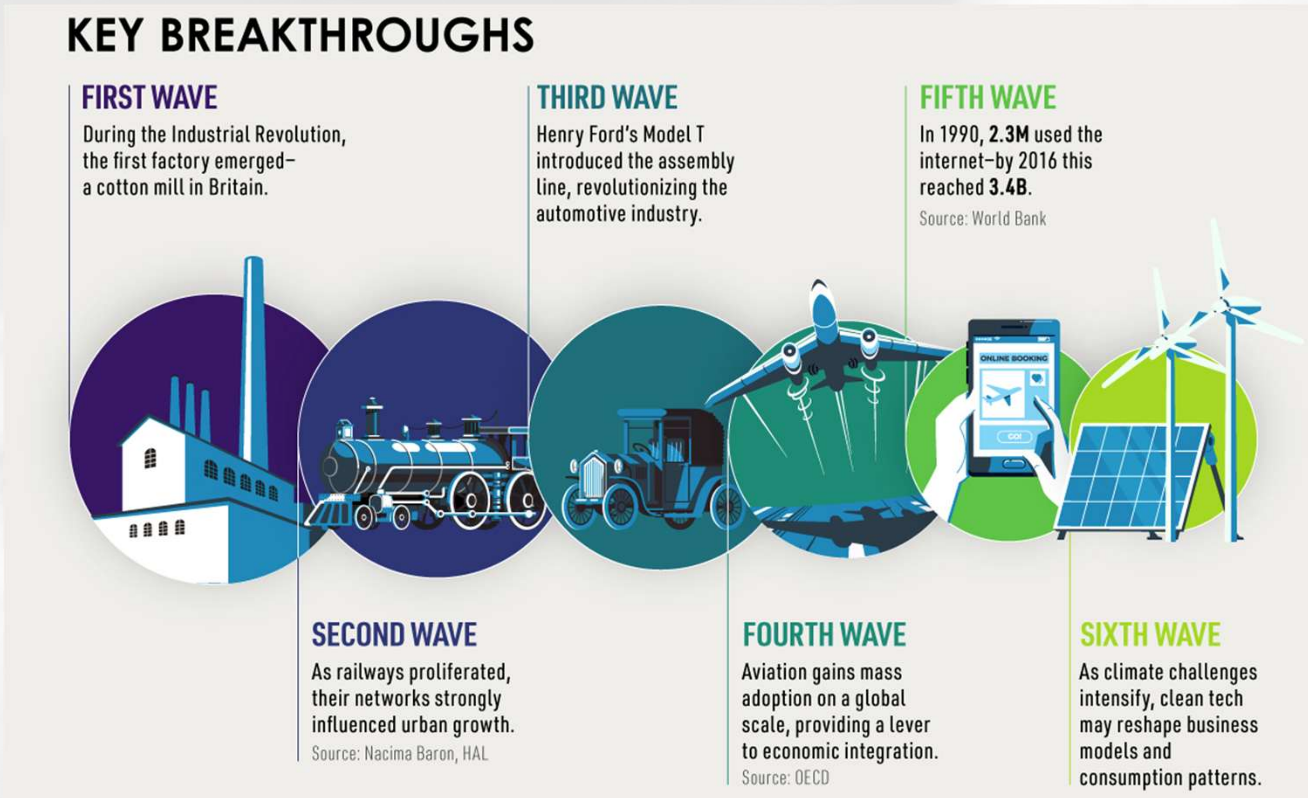
Note: This data is expressed in international-$[2] at 2021 prices per hour, using multiple benchmark years to adjust for differences in living costs between countries over time.

1. **Gross domestic product** Gross domestic product (GDP) is a measure of a country's economic performance. It represents the total monetary value of all final goods and services produced within its borders over a specific time period, typically annually or quarterly.
GDP includes consumption, government spending, investments, and net exports (exports minus imports). It can be measured in current prices (nominal GDP) or adjusted for inflation to reflect GDP in constant prices (real GDP).
GDP is used to gauge the health of an economy, with increases indicating growth and decreases signaling contraction. Policymakers, economists, and analysts use GDP to make informed decisions, track economic trends, and make comparisons between countries.

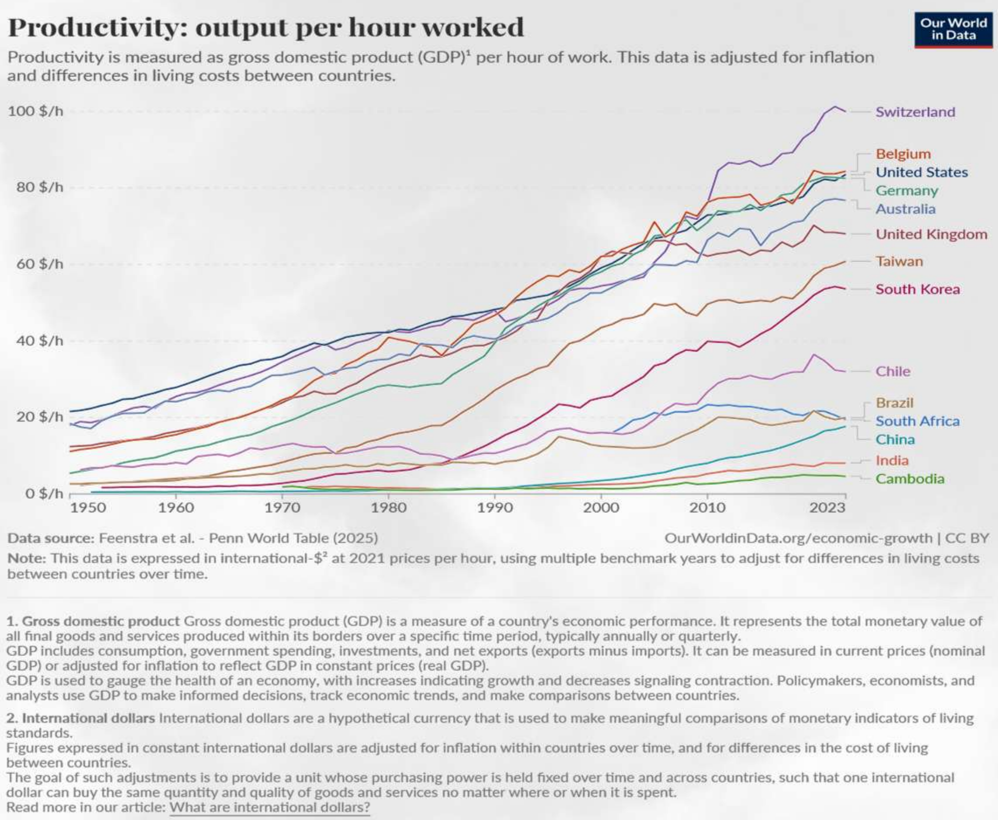
2. **International dollars** International dollars are a hypothetical currency that is used to make meaningful comparisons of monetary indicators of living standards.
Figures expressed in constant international dollars are adjusted for inflation within countries over time, and for differences in the cost of living between countries.
The goal of such adjustments is to provide a unit whose purchasing power is held fixed over time and across countries, such that one international dollar can buy the same quantity and quality of goods and services no matter where or when it is spent.
Read more in our article: What are international dollars?



The History of
INNOVATION CYCLES
Source: Edelson Institute
FIRST WAVE
Water power
Textiles
Iron
SECOND WAVE
Steam power
Rail
Steel
THIRD WAVE
Electricity
Chemicals
Internal-combustion engine
FOURTH WAVE
Petrochemicals
Electronics
Aviation
FIFTH WAVE
Digital network
Software
New media
SIXTH WAVE
AI & IoT
Robots & drones
Clean tech
60 YEARS
55 YEARS
50 YEARS
40 YEARS
30 YEARS
25 YEARS
1785
1845
1900
1950
1990
2020


KEY BREAKTHROUGHS
FIRST WAVE
During the Industrial Revolution, the first factory emerged– a cotton mill in Britain.
SECOND WAVE
As railways proliferated, their networks strongly influenced urban growth.
Source: Nacima Baron, HAL
THIRD WAVE
Henry Ford's Model T introduced the assembly line, revolutionizing the automotive industry.
FOURTH WAVE
Aviation gains mass adoption on a global scale, providing a lever to economic integration.
Source: OECD
FIFTH WAVE
In 1990, 2.3M used the internet–by 2016 this reached 3.4B.
Source: World Bank
ONLINE BOOKING
GO!
SIXTH WAVE
As climate challenges intensify, clean tech may reshape business models and consumption patterns.

Productivity



Just add AI……

AI is the new arms race, space race etc.

He who wins the AI race will have the most advanced army, the most competitive economy.

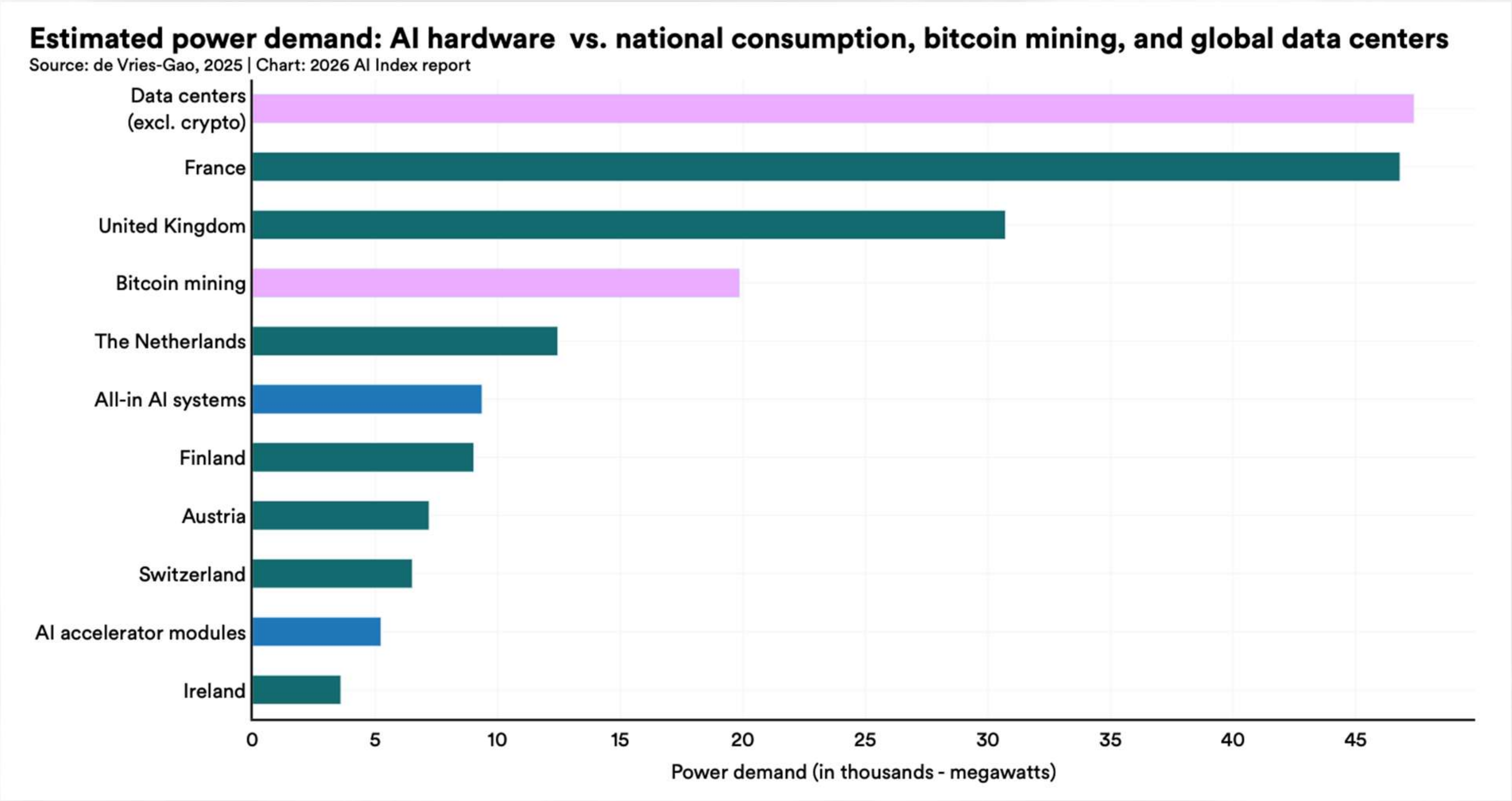
AI could reshape geographical power.

Basic rule 2:

Vast productivity divergence will drive vast living standard divergence (/inequality).

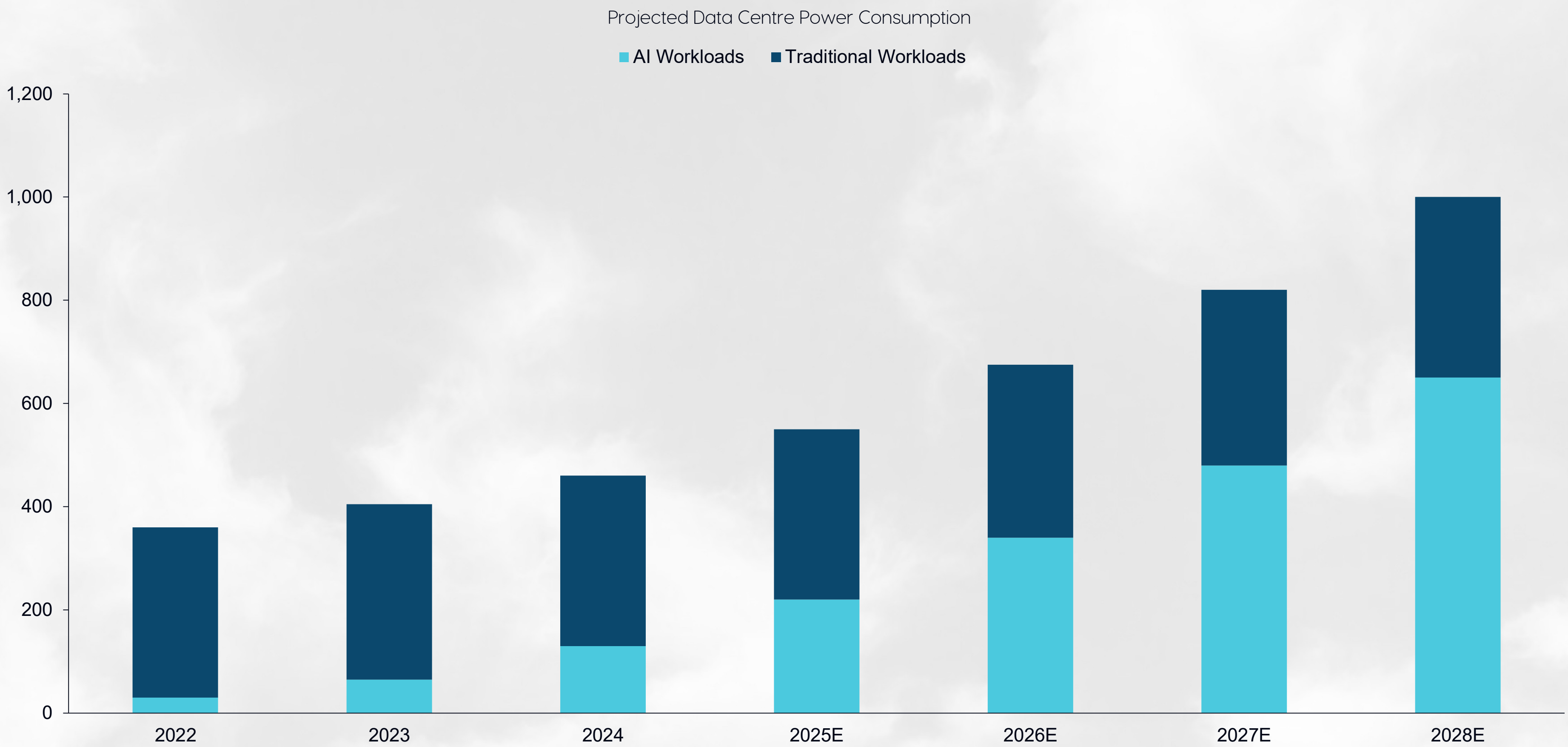
The productive will either have far more money, or far more leisure time, or both.

The AI race is actually an energy race....



AI is still in its infancy.

Global Data Centre Electricity Demand (TWh)



Source: IEA World Energy Outlook, Goldman Sachs, company disclosures. E = estimates.

Big winner of the race to green?

Western industry: no

FINANCIAL TIMES

COMPANIES TECH MARKETS CLIMATE OPINION LEX STOCK PICKING GAME LIFE & ARTS HOW TO SPEND IT

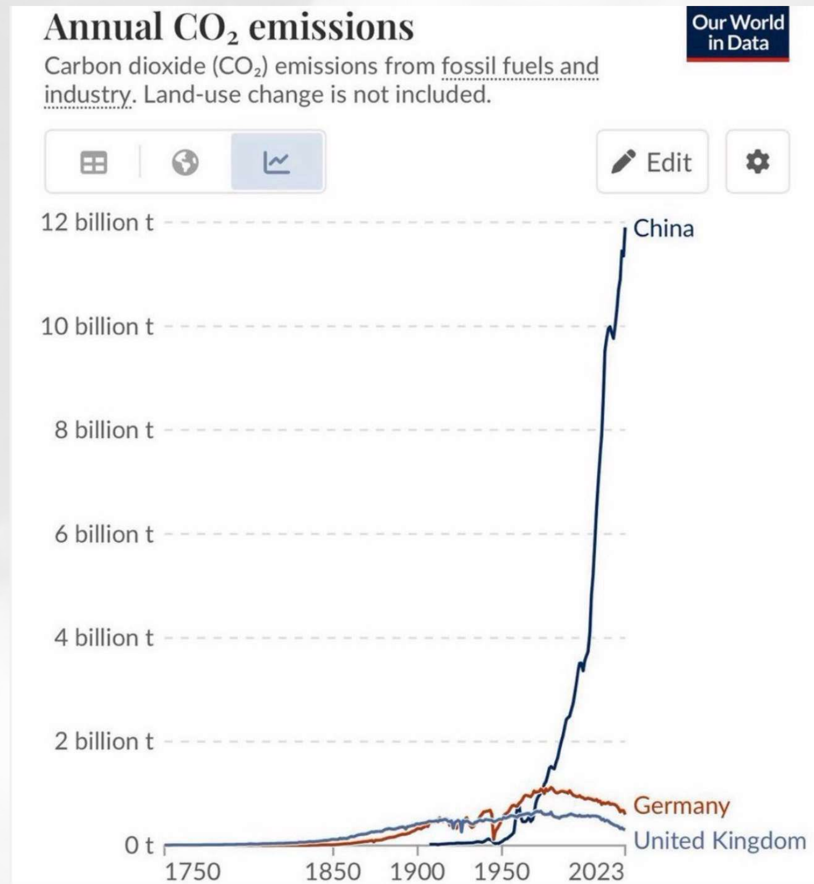
Volkswagen AG + Add to myFT

Volkswagen chief confirms plan to cut 50,000 more jobs

Carmaker's supervisory board failed to agree on proposed staff reduction proposals but talks set to continue

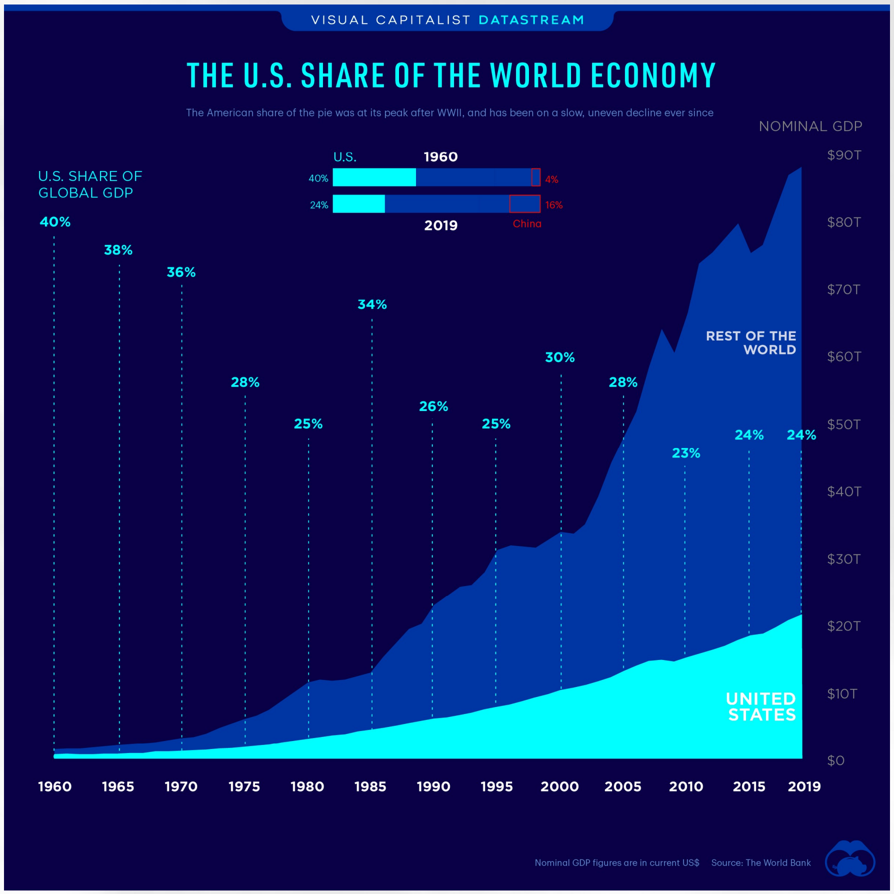
VW had already laid out plans to cut 50,000 jobs by 2030 © Krisztian Bocsi/Bloomberg

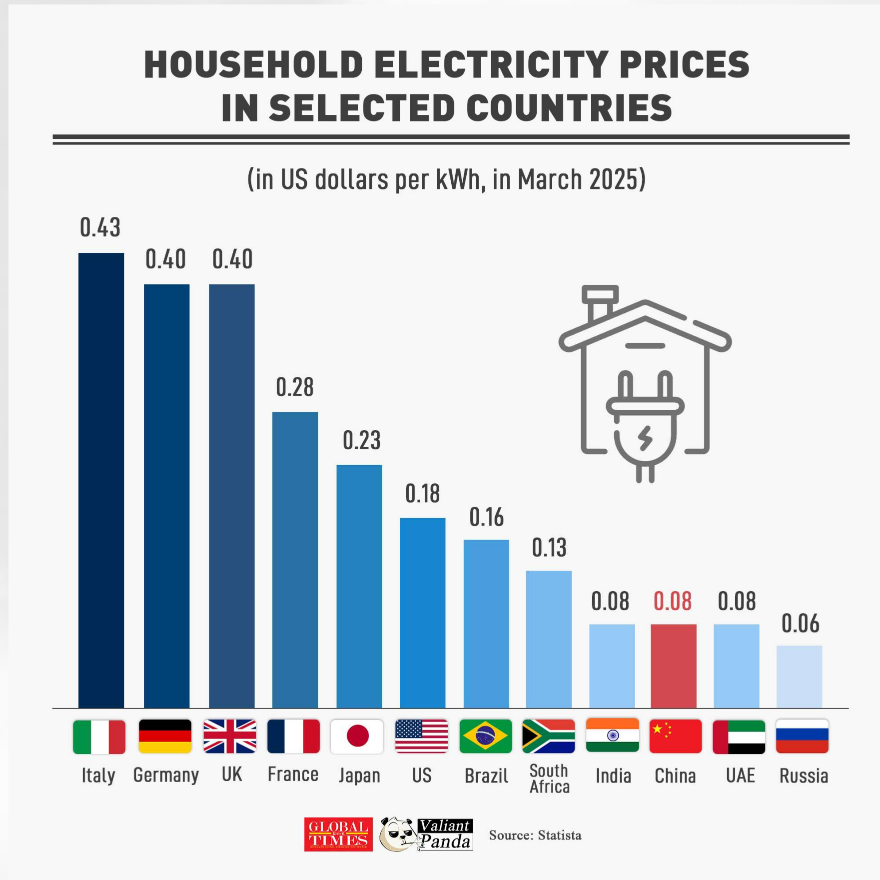
Climate: no



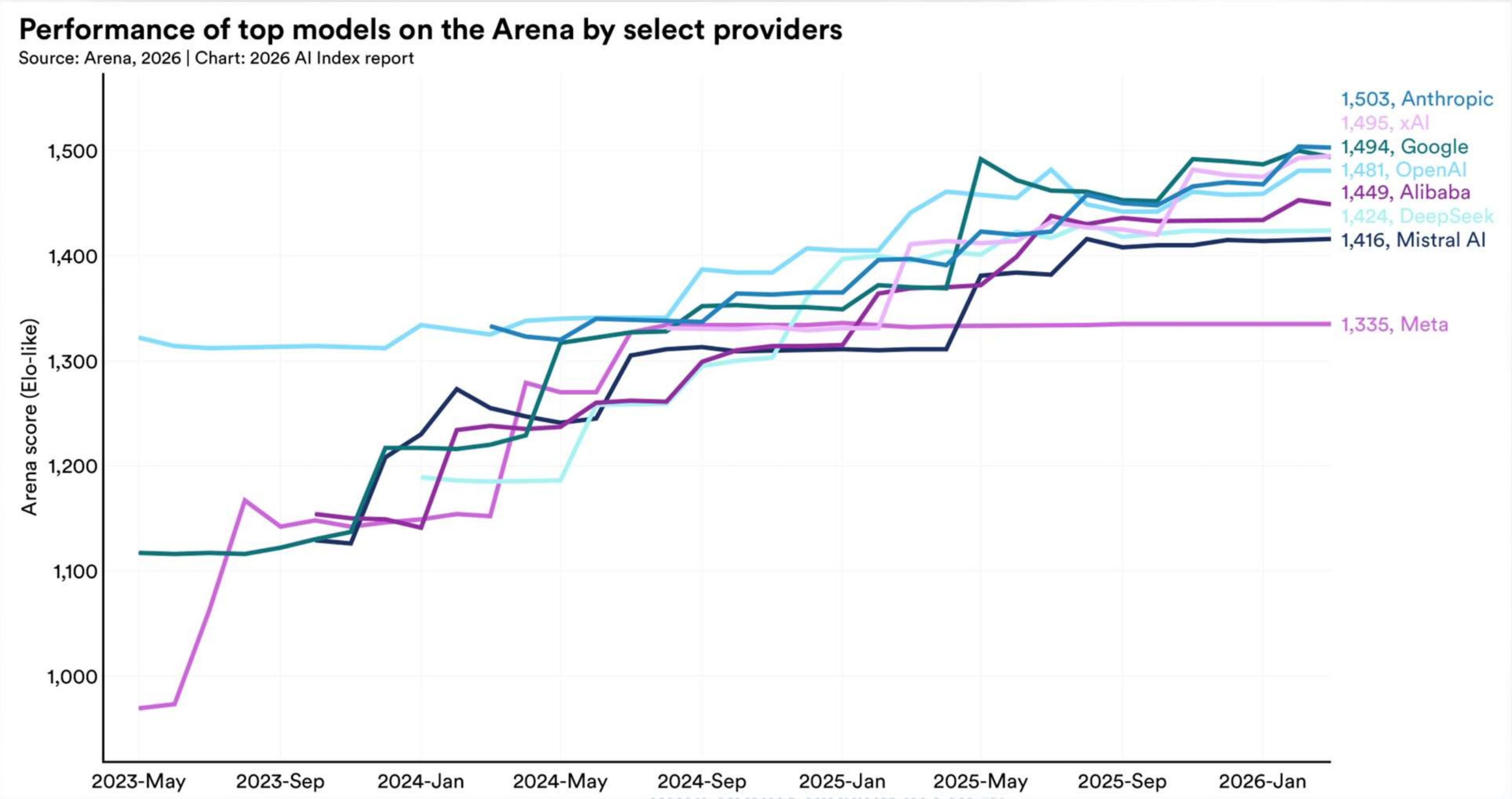
Big winner of the race to green?

Big winner of the race to green?





An AI to rule them all… but which?



So which one to bet on?

Basic rule 3:

During a gold rush, sell shovels

Shovels with a barrier to entry....

The AI Energy Crisis

~50 GWh
to train one frontier AI model
= 5,000 advanced economy homes for a year

2–4x
data centre power growth
projected by 2030

10x
more power for inference
than training

New grid connections take 5–7 years
AI demand is growing by the month

→

Energy is the bottleneck

Hyperscalers are bidding against each other for limited power supply.
The companies and countries that secure reliable energy will win the AI race.

AI leverages human effort, producing vast output with minimal human time. Whoever wins the AI race, dominates the world.

Why Renewables Won't Cut It

Intermittency
Solar: 25% capacity factor
Wind: 35%
AI needs 99.999% uptime

Land Use
1 GW solar: ~2,000 hectares
1 GW nuclear: ~260 hectares
8x more power per hectare

Rising Inputs
Lithium demand 40x by 2040
Cobalt, rare earths finite
Cost curves cannot hold

Grid-scale battery storage: $3.6–6B per GW per day | Global capacity covers <1% of demand

Renewables cannot realistically deliver the 24/7 baseload AI demands

Fossil Fuels: A Bridge, Not a Destination

✓ The Case for Gas	✗ Why It Fails
60%+	490g
CCGT efficiency	CO_2/kWh – incompatible with net-zero
Rapid deployment	300%+ price swings (2021–23)
Dispatchable power	Pipeline dependency = strategic risk

Gas is a bridge, not a destination – we need permanent baseload

Energy Density & EROEI: Uranium Is in a Different League

Energy Source	Energy Density (MJ/kg)	EROEI	Key Insight
Uranium (U-235)	80,620,000	75:1	1.5 million × coal
Coal	24	6:1	Bulky, emissions-heavy
Natural Gas	55	7:1	Cleaner but volatile supply
Oil / HFO	46	5:1	Highest CO_2 per kWh
Hydrogen	142	0.5–2:1	Energy carrier, not source
Wind	N/A (kinetic)	18:1	Intermittent, land-intensive
Solar PV	N/A (photonic)	10:1	Intermittent, materials-heavy

80 million MJ/kg and an EROEI of 75:1 – no other energy source comes close

The Case for Nuclear Power

93%
Capacity factor
vs. solar 25% | wind 35%

1 pellet
= 2,700 tonnes of coal
1.5 million x energy density

8x
more power per hectare than solar
smallest physical footprint

12g
CO_2/kWh lifecycle
same as wind, lower than solar

The only energy source that scores top marks on every metric

Hyperscalers Will Drive Deregulation

Microsoft	Google	Amazon	Oracle
TMI restart 835 MW by 2028	Kairos Power 500 MW SMRs	X-energy SMR partnership	3 SMRs 1 GW campus

Combined AI capex budget:

$200B+

ADVANCE Act
Bipartisan 88–2 Senate vote

Hyperscaler Innovation: Dividing Nuclear Costs by Four

$100+
/MWh today

→

$20–30
/MWh target

SMR output: 50–300 MW | Modular = stackable

SMR Factory Fabrication
Ship reactors like jet engines

Passive Safety
Eliminate redundant active systems

Vertical Integration
Hyperscaler-owned supply chain

SpaceX cut launch costs 95% in a decade by doing exactly this: factory build, vertical integration, deregulation

Delivered Cost of Energy: Nuclear Will Follow Solar and Space Path

Energy Source	Delivered Cost ($/MWh)	Trend
Nuclear (current)	$90–140	↑ Regulation-driven
Nuclear (deregulated)	$20–30	↓↓ Potential with reform
Coal	$65–150	↑ Carbon costs rising
Natural Gas (CCGT)	$45–80	↔ Volatile, region-dependent
Solar PV + Storage	$50–90	↓ Was $350+ in 2010
Wind Onshore + Storage	$55–100	↓ Improving but siting limits
Hydrogen (green)	$120–200+	↓ Early stage, very expensive

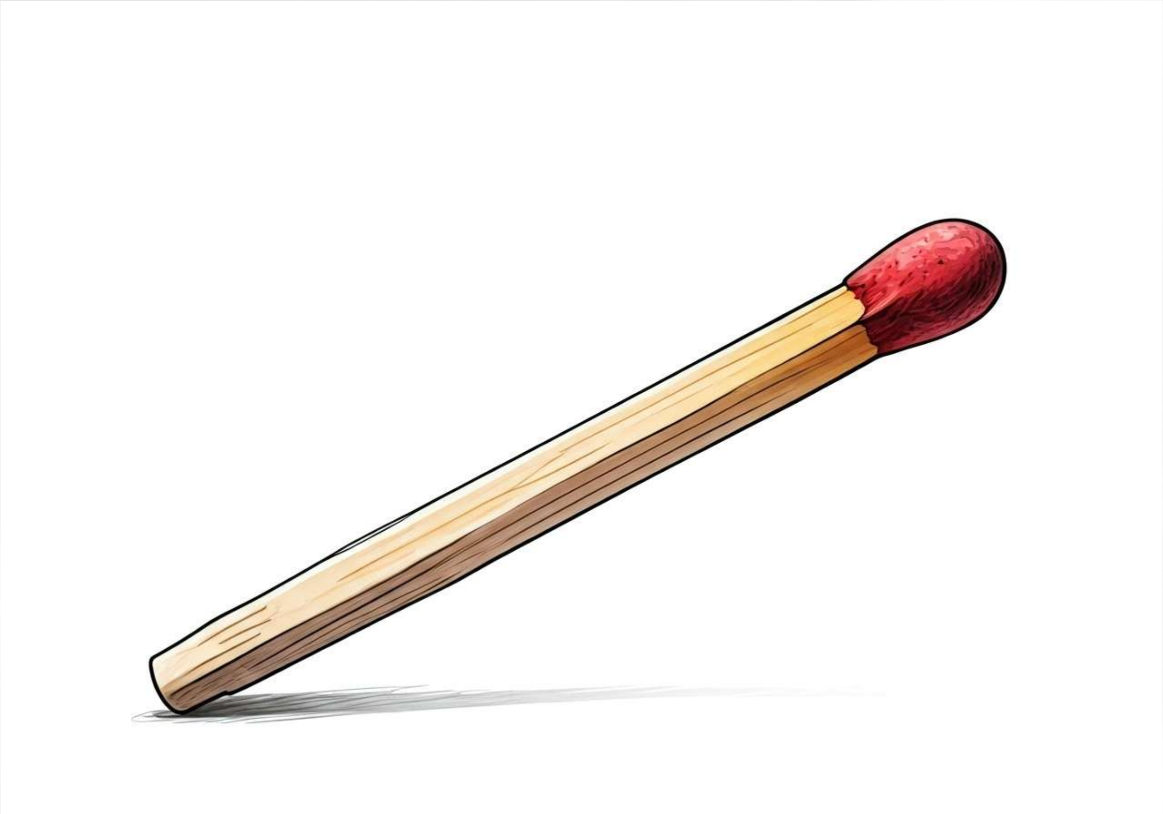
Solar dropped from $350/MWh to ~$50 in 15 years with supportive policy. Nuclear can do the same – or better – with private innovation and deregulation. SpaceX cut launch costs 95% in a decade. Apply that playbook to nuclear.

Nuclear is expensive because of regulation, not physics. Fix the environment, and costs collapse.

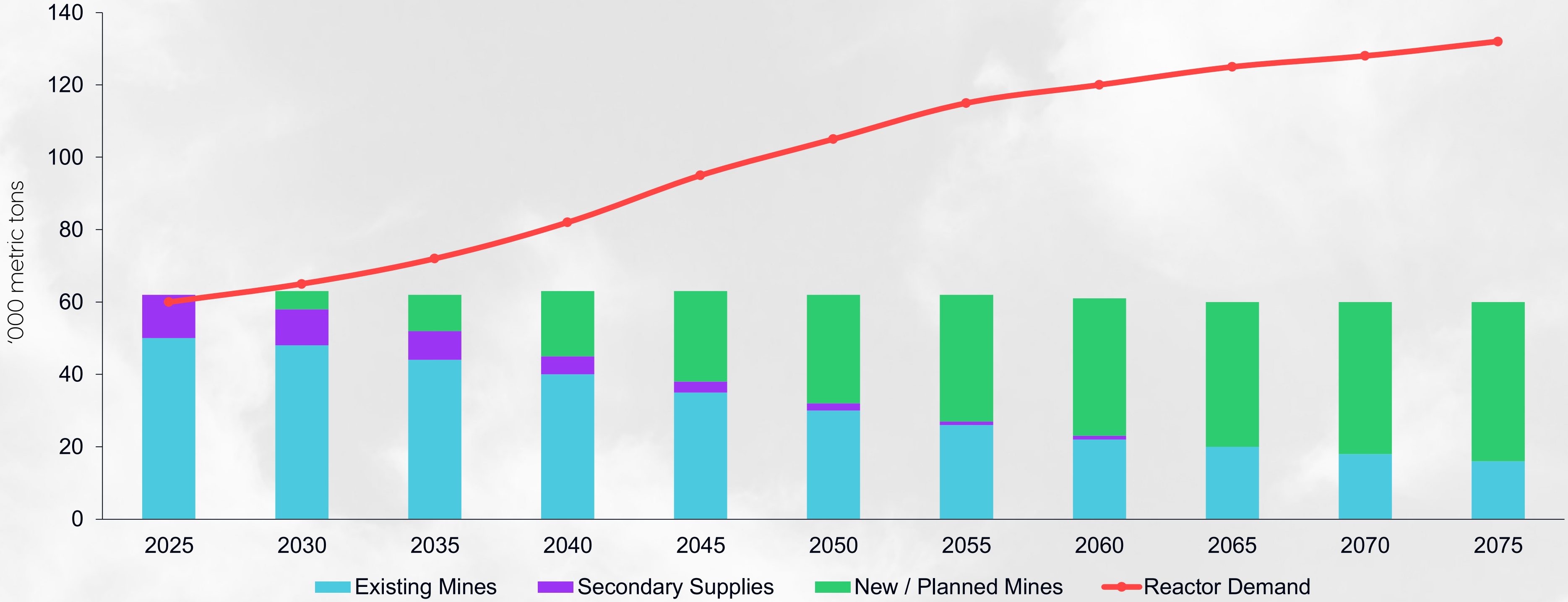
Basic rule 4:

The REAL shovel is the feedstock, not the technology….

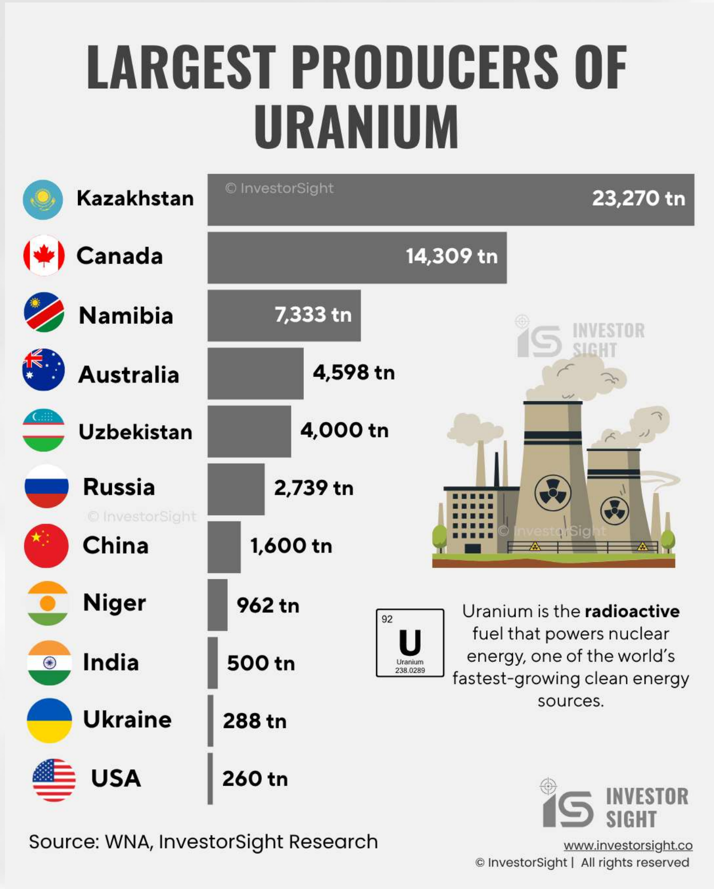
Uranium is the match at the braai….



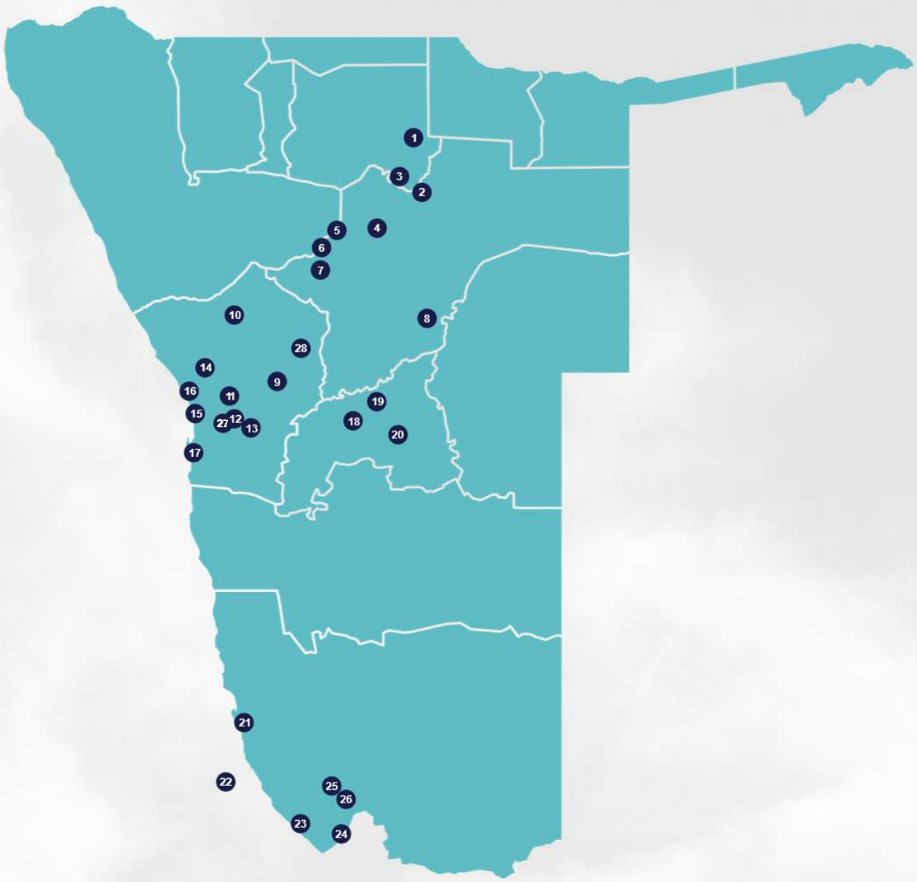
Uranium Supply vs Demand: A Structural Deficit Is Coming



Secondary supplies are depleting. New mines take 10+ years to permit. The gap widens every year.


LARGEST PRODUCERS OF URANIUM
Kazakhstan
© InvestorSight
23,270 tn
Canada
14,309 tn
Namibia
7,333 tn
Australia
4,598 tn
Uzbekistan
4,000 tn
Russia
2,739 tn
China
1,600 tn
Niger
962 tn
India
500 tn
Ukraine
288 tn
USA
260 tn
INVESTOR SIGHT
92
U
Uranium
238.0289
Uranium is the **radioactive** fuel that powers nuclear energy, one of the world's fastest-growing clean energy sources.
Source: WNA, InvestorSight Research
INVESTOR SIGHT
www.investorsight.co
© InvestorSight | All rights reserved

Mining Activity Across the Country



- Political stability and mining legislation
- Diversified mineral base
- ~10% of global uranium mine supply potential
- High value diamonds
- Geological endowment across multiple minerals
- Proven producer base
- Emerging critical and battery minerals opportunity
- Logistically positioned

LEGEND

1. Tschudi Mine
2. Trigon Kombat Copper Mine
3. Ohorongo Cement
4. B2Gold Otjikoto Gold Mine
5. Okorusu Mine
6. Whale Rock Cement
7. Okanjande Graphite Mine
8. Otjozondu Manganese Mine
9. QKR Navachab Gold Mine
10. Andrada Uis Tin Mine
11. Rössing Uranium Mine
12. Swakop Uranium Husab Mine
13. Langer Heinrich Uranium Mine
14. Namib Lead and Zinc Mine
15. The Salt Company
16. Trekkopje Mine
17. Walvis Bay Salt and Chemicals
18. Matchless Mine
19. Otjihase Mine
20. Lodestone Dordabis Iron Ore Mine
21. Elizabeth Bay Mine (Sperrgebiet Diamond Mining)
22. Debmarine Namibia
23. Namdeb Southern Coastal Mines
24. Namdeb Orange River Mines
25. Vedanta Skorpion Zinc Mine
26. Rosh Pinah Zinc Mine
27. Etango Uranium Mine (Under Construction)
28. Twin Hills Gold Project (Under Construction)

Exports and GDP Contributions

Top mineral destinations in '25 by weight.

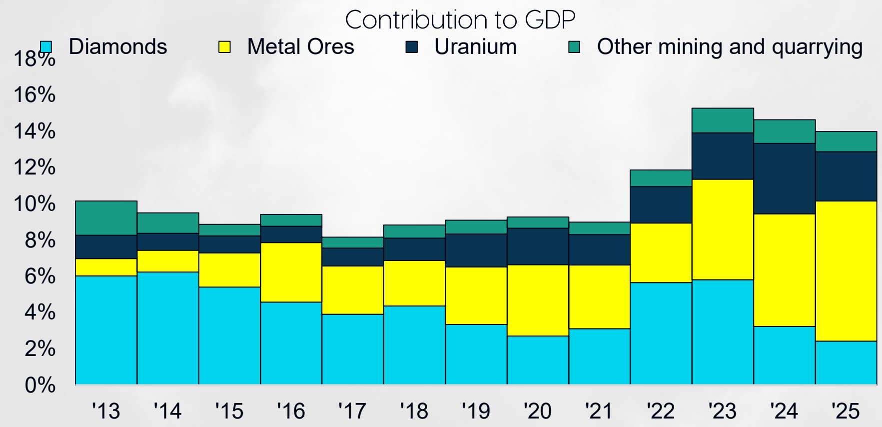
88.97% of Diamonds went to China

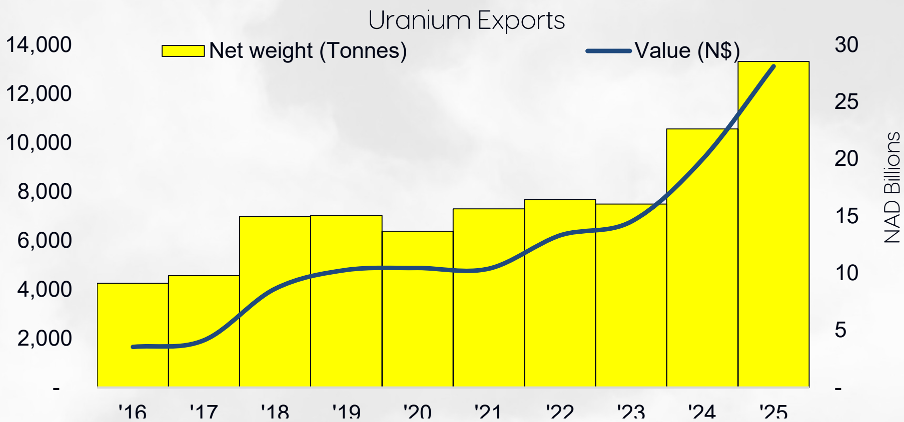
88.61% of Gold went to South Africa

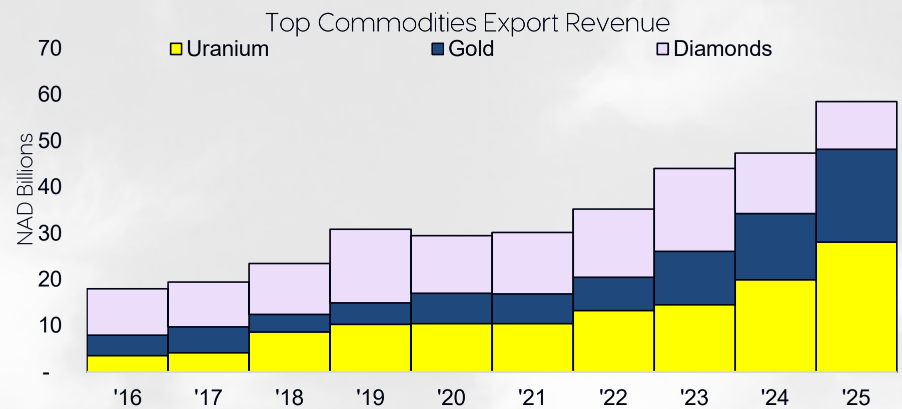
77.26% of Uranium went to China

80.93% of Zinc went to China

47.13% of Copper went to China







Non-Diamond Mining

Mining Projects Pipeline

Project / Mine	Commodity	Status
Husab	Uranium	Active - Ramp up
Rössing	Uranium	Active - Ramp up
Langer Heinrich	Uranium	Active - Ramp up
Etango	Uranium	Early works, awaiting FID
Tumas	Uranium	Early works, awaiting FID
Norasa	Uranium	Pre-construction Phase
Navachab	Gold	Active - Expansion underground
B2Gold	Gold	Active - Expansion underground
Twin Hills	Gold	Developmental stage
Gergarub	Zinc	Exploration
Tschudi	Copper	Active - Exploration
Kombat	Copper	Restart
Koryx	Copper	Exploration
Omitiomire	Copper	Feasibility stage
Uis / Andrada	Tin/Li/Ta	Expansion/Development
Lofdal	Rare Earths	Exploration
Okorusu	Rare Earths	Repurposing

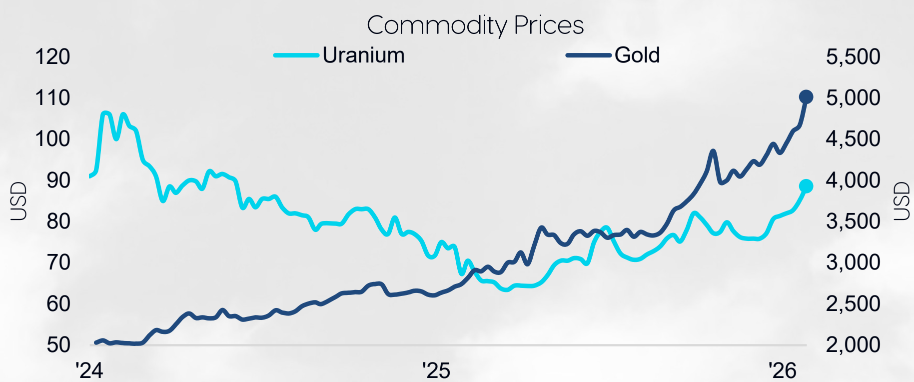
Mining is the key bright spot for '26 (excluding diamonds).

No sharp commodity crash is the base case for '26,

Commodity demand driven by lobal spend on:

- Power
- Grids
- Data Centres

Big pipeline of projects



Mining – “Tonnes” of Future Capacity

Uranium

Mine	Operator	Recent Scale (tU_3O_8/y)	Planned Increase in Scale (tU_3O_8/y)
Husab	Swakop Uranium	5,232	758
Rössing	Rössing Uranium	2,500	0
Langer Heinrich	Paladin Energy	1,374	440
*Tumas**	*Deep Yellow*	*n/a*	*1,633*
*Etango**	*Bannerman Energy*	*n/a*	*1,588*
Totals		**9,206**	**4,428**
% Increase			**48.1%**

Rough Guidelines

The nuclear renaissance has just begun, and the physics of nuclear energy are unbeatable.

Namibia is the third largest uranium producer in the world. We have the shovels needed to mine AI gold.

Will we capitalise on it?

CIRRUS

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The Regulation Problem: Why Nuclear Costs So Much

10–15 years western-world licensing timeline – before breaking ground

$500M+ just in pre-construction regulatory compliance

30–40% of total plant cost is regulatory compliance

South Korea builds in 4–5 years | China in 5 years | US takes 15–25 years

The problem isn't nuclear physics – it's nuclear paperwork

Nuclear Safety: Myths vs. Reality

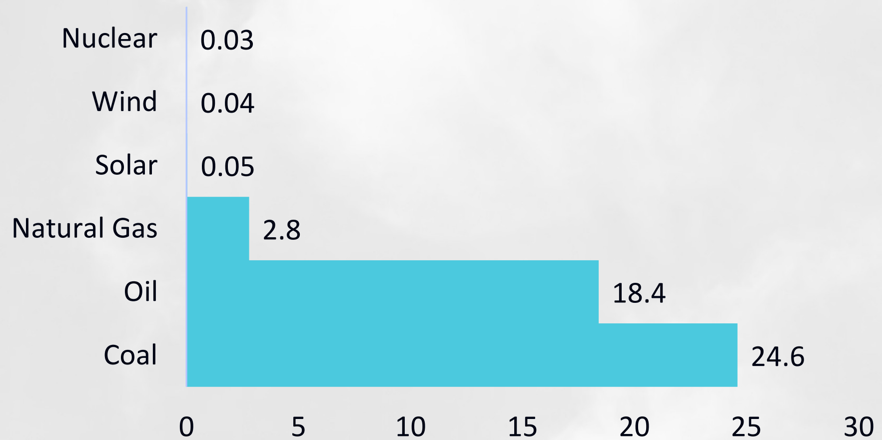
Nuclear Bomb vs. Nuclear Power Plant

Nuclear Bomb
90%+ enriched U-235
Uncontrolled chain reaction
Like TNT

Nuclear Power
3-5% enriched U-235
Controlled, self-limiting
Like incense

A reactor cannot explode like a bomb – the physics won’t allow it

Deaths per TWh of Electricity Produced



Source: Our World in Data / Markandya & Wilkinson (2007)

Nuclear is the safest form of energy production per unit of electricity generated
Including Chernobyl, Fukushima and Three Mile Island in the statistics

The True Cost of Regulation: A Global Comparison

Country	Build Cost ($/kW)	Timeline	Regulatory Burden
United States	$10,000–15,000	15–20 years	Extreme
France	$6,000–8,000	10–15 years	High
South Korea	$2,500–3,500	5–7 years	Moderate
China	$2,000–3,000	5–6 years	Streamlined
UAE (Barakah)	$3,500–4,500	8 years	Moderate

The physics is identical. The cost difference is entirely regulatory. Western nations pay 3–5x more to build the same reactor – a self-imposed competitive handicap in the AI energy race.

The SpaceX Playbook: What Happens When Innovators Take Over

Metric	Government (NASA)	Private (SpaceX)	Nuclear
Cost per launch / kW	$1.5B (SLS)	$67M (Falcon 9)	$10K → $2.5K/kW?
Development time	20+ years	6 years	15 yrs → 3–5 yrs?
Innovation cycle	Decades	Months	Frozen since 1970s
Cost reduction	Costs rose over time	95% reduction	10x target
Reusability	Disposable rockets	Reusable boosters	Spent fuel reuse
Approach	Cost-plus contracts	Vertical integration	SMR factories

Applied to Nuclear

SpaceX cut launch costs by 95% in a decade. Hyperscalers will do similar for nuclear.

Uranium Supply: Deep Dive on Sources

400,000+ tonnes of spent fuel in safe storage worldwide – a future energy reserve

Reprocessing Pathways

MOX Fuel – proven in France
Fast Reactors – burn 99% of fuel
DU Re-enrichment – 1.6Mt tails

Mining Regions

43% Kazakhstan
Canada · Australia · Namibia · Niger
Geographically diverse, friendly nations

Multiple proven supply pathways – no single point of failure

BUT: Supply shortages lie ahead.

Managing Nuclear Waste: Smaller Than You Think

NUCLEAR (1 GW reactor / year)	COAL (equivalent plant)
3 m³	**300,000+ t**
contained, tracked, solid	ash, open-air ponds, airborne

Vitrification
Fused into stable glass blocks for geological timescales

Onkalo
World's 1st permanent repository: 400m underground, Finland

Reprocessing
Reduces high-level waste volume by 96%

Dry Cask
Safe interim storage 100+ years, passive cooling, zero emissions

All spent nuclear fuel ever produced in the US fits on one football field, stacked 10m high

Nuclear is the only energy where ALL waste is contained and managed

The Nuclear Renaissance: Physics Is Indisputable

80,000,000 MJ/kg

Nuclear fuel energy density | Coal: 24 MJ/kg | That's 1.5 million times more

⚡ AI creates the economic imperative that changes everything

🏛 National security makes nuclear bipartisan

🚀 SMR tech + hyperscaler capital are converging now

The physics of nuclear is indisputable, and energy demand will drive a multi-decade, even century-long, renaissance.

Only nuclear will be able to power the AI age.

He who builds first, wins.