

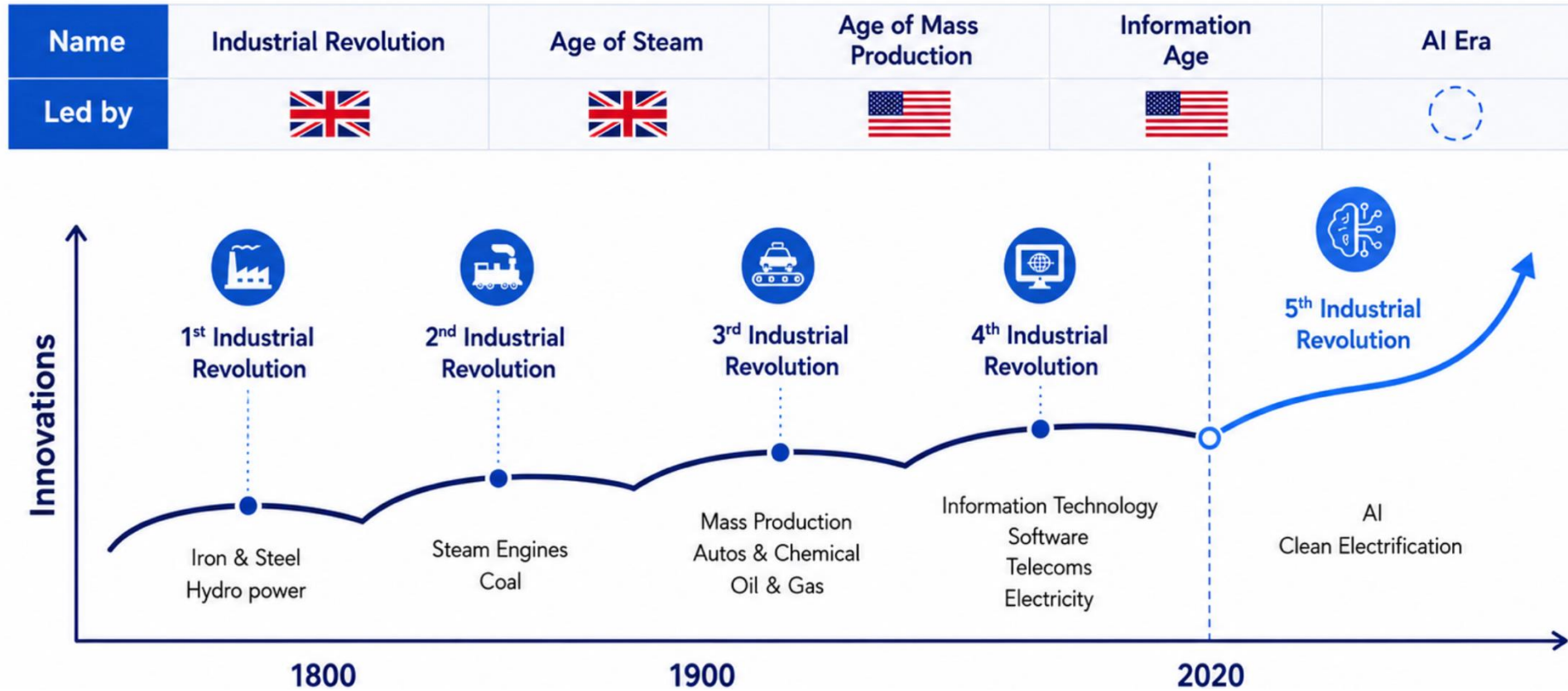
An aerial photograph of a rugged coastline. The top half of the image shows dark, jagged rock formations meeting the sea. White, frothy waves are crashing against the base of the rocks, creating a stark contrast with the deep blue water. The bottom half of the image is a solid, dark blue gradient, serving as a background for the text.

The Coming of the 5th Industrial Revolution

GERARD REID

JULY 2026

We are the start of the 5th industrial revolution, which will likely be the most disruptive in human history



There are 5 key technologies driving this revolution

CORE TECHNOLOGIES



AI

Turns data into intelligence

Drives automation, optimisation and autonomy



SOLAR

The cheapest source of new electricity

Scales fast and supports energy abundance



BATTERIES

Store power and shift it through time

Enable flexibility, resilience and electrification



SEMICONDUCTOR ENABLERS

Chips, sensors and power electronics

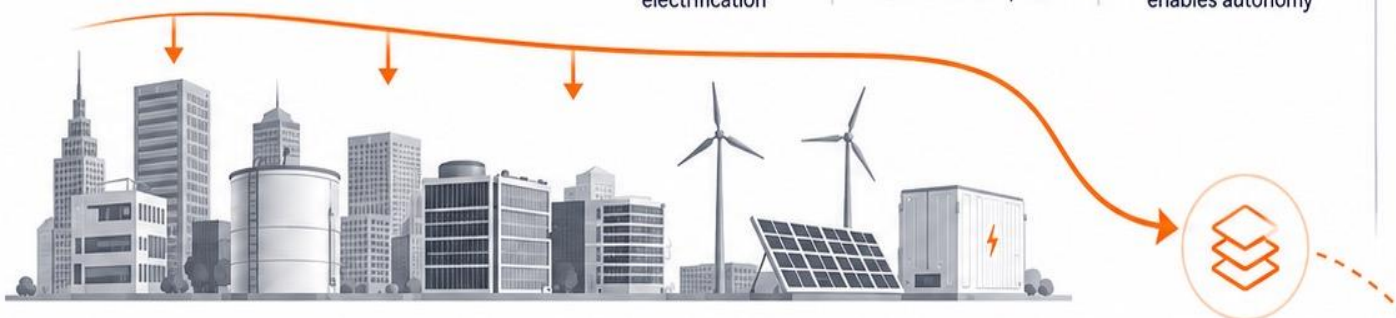
Make compute, control and electrification possible



ROBOTICS

Brings intelligence into the physical world

Automates labour, boosts productivity and enables autonomy



WHY THIS MATTERS NOW



INTELLIGENCE

AI makes systems smarter and more productive



ELECTRIFICATION

Solar and batteries accelerate the shift from molecules to electrons



PRODUCTIVITY

Semiconductors and software improve efficiency across the economy



AUTOMATION

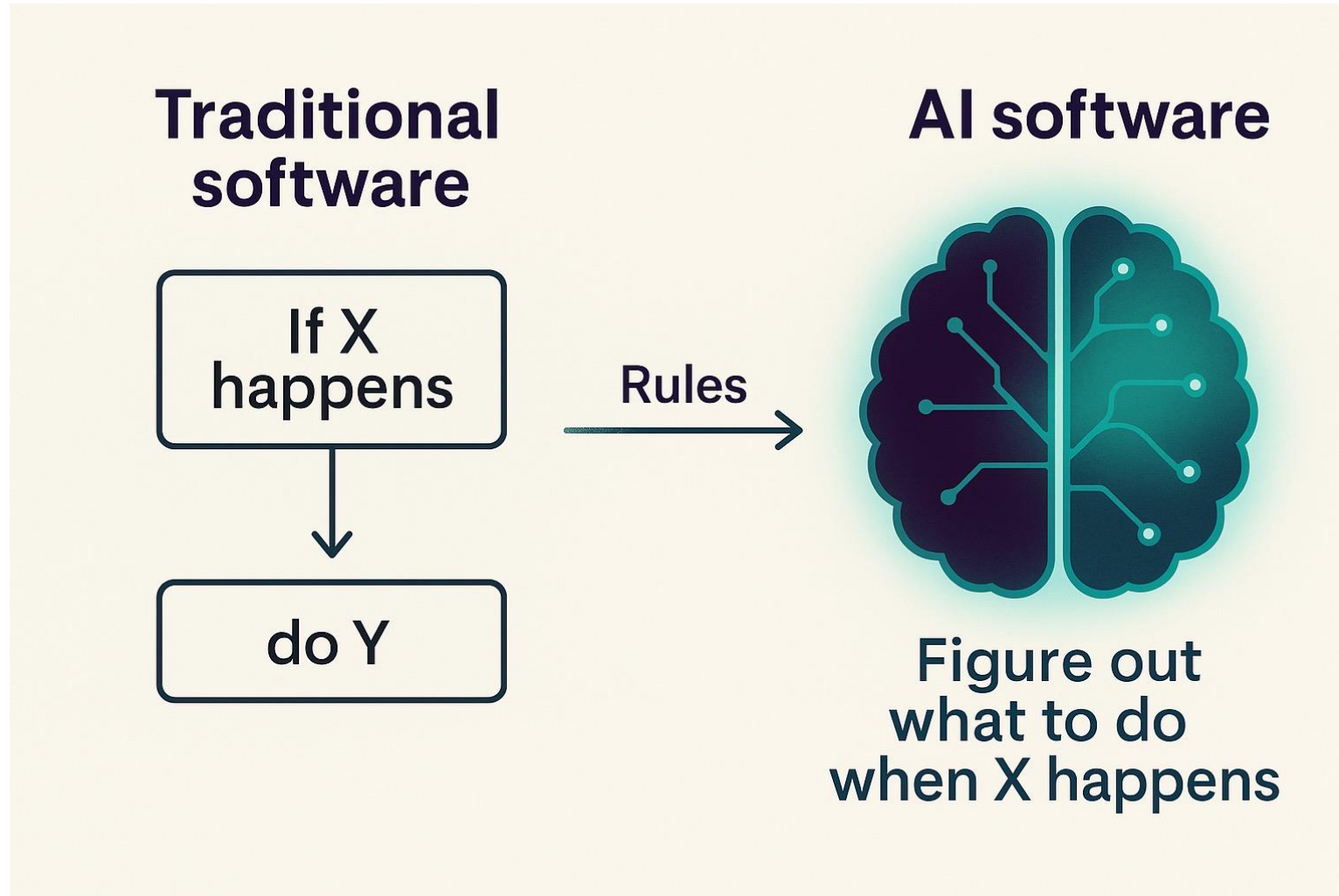
Robotics extends intelligence into the real world and scales output



ABUNDANCE

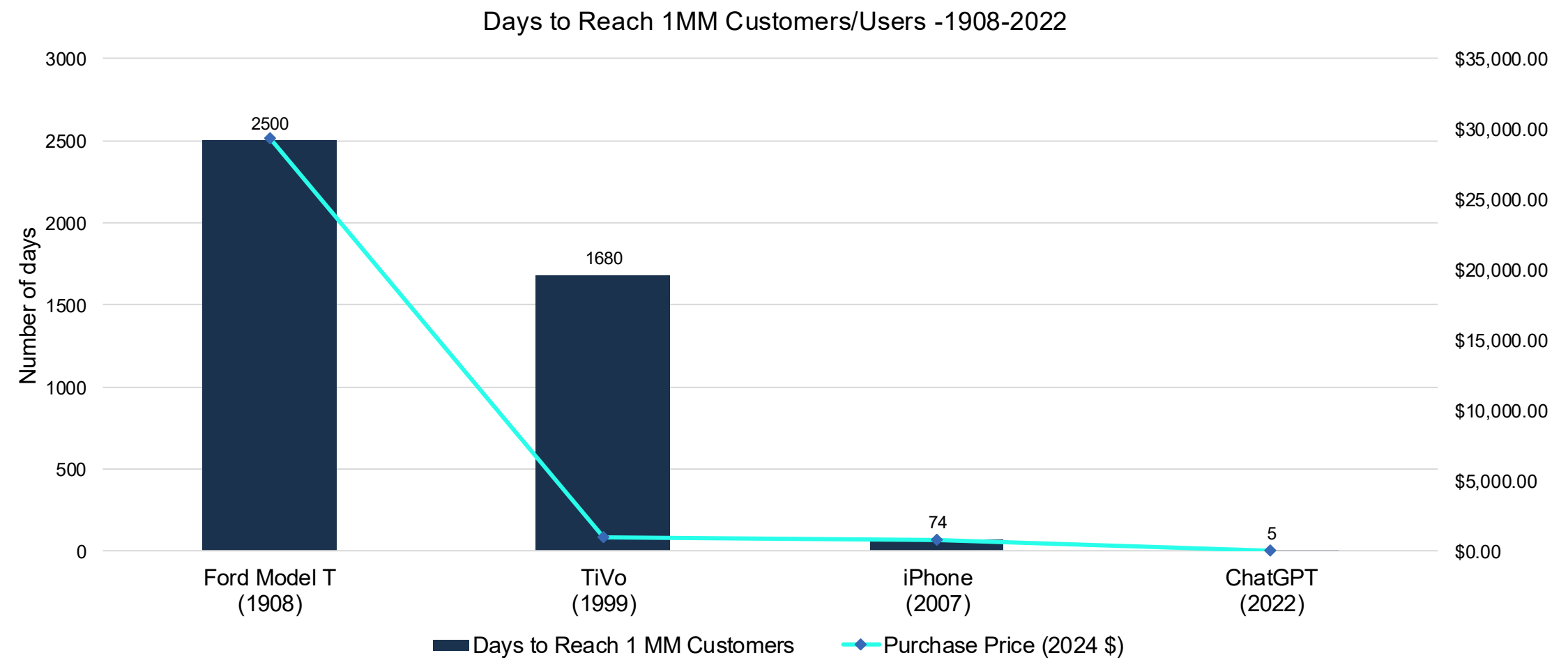
Together these technologies lower costs and expand capability

#1 AI: The greatest technology shift in the history of mankind



We have never seen a technology scale like Chat GPT

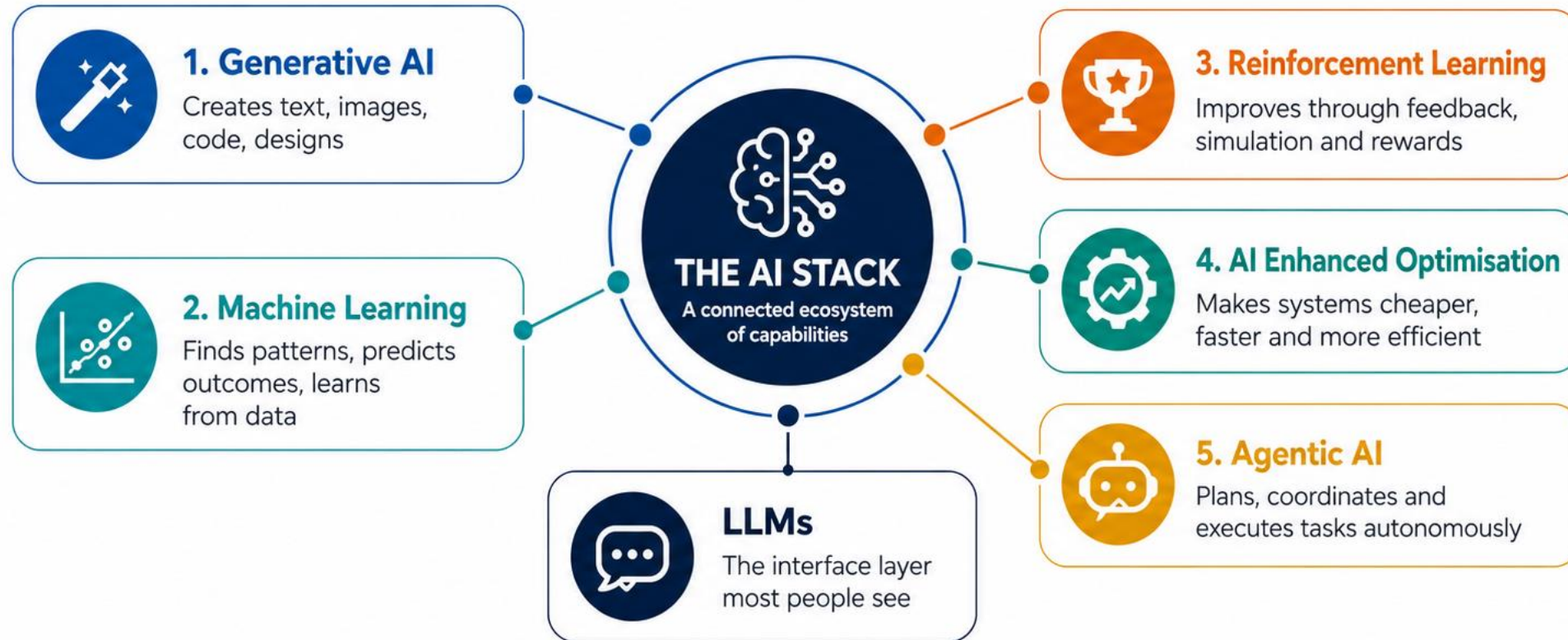
ChatGPT now has 800m weekly users



Source: Epoch AI

But there is more to AI than LLMs

AI takes many forms and is already in use around us



Generative AI is about creating new content



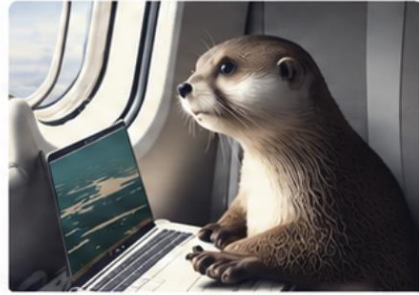
Prompt: “Please draw an otter on a plane using WiFi”



February 2022



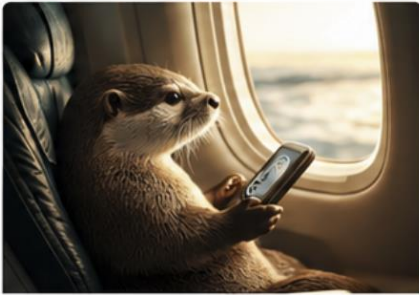
July 2022



November 2022



March 2023



July 2024



April 2025

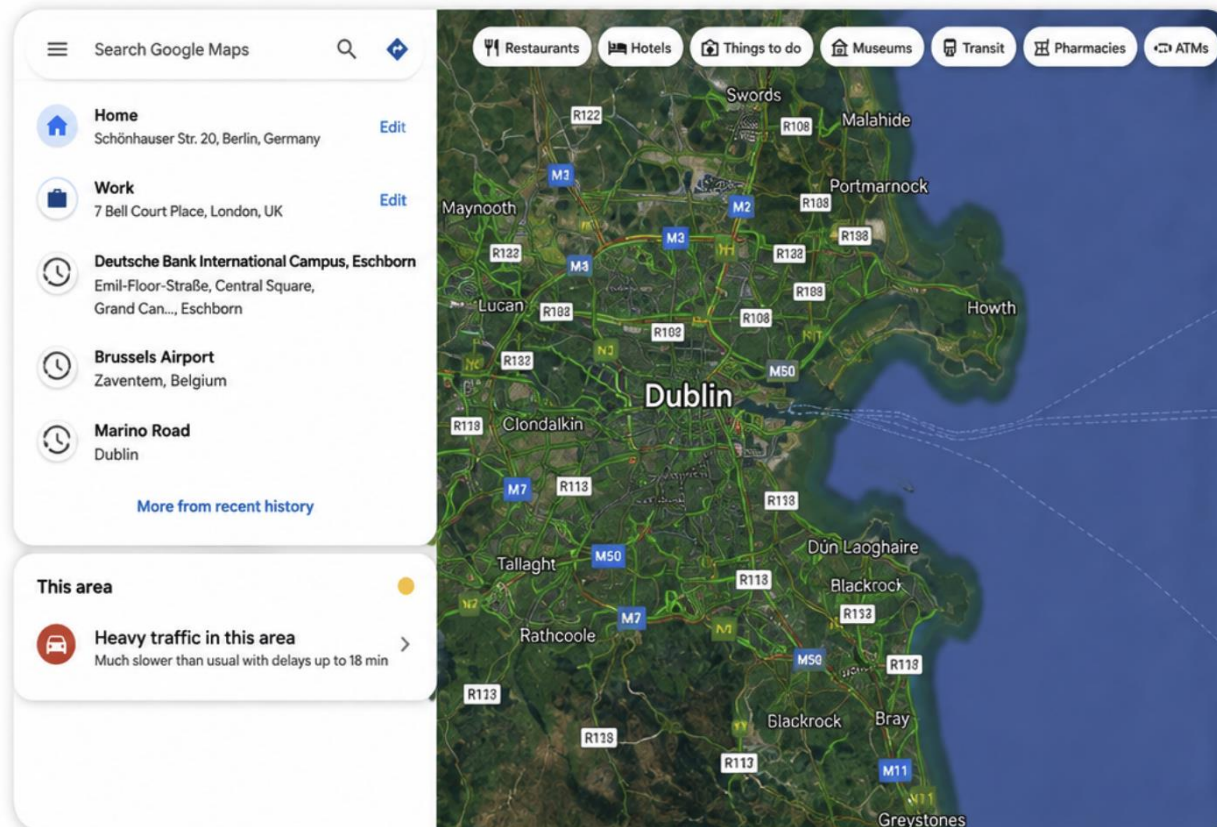


The progress is undeniable.

The quality of AI generated images improved dramatically in just three years, moving from quirky and inconsistent outputs to photorealistic, well composed scenes.

Machine learning (ML) is about using algorithms that are trained on historical data to recognize patterns and make predictions

We use it every day with Google Maps.



Predicting traffic

Forecasts congestion based on historical and real-time data



Estimating travel time

Predicts how long a journey will take



Detecting roads and buildings

Uses satellite imagery and Street View to identify and keep maps up to date



Recognizing store updates and business information

Learns from changes to keep information accurate

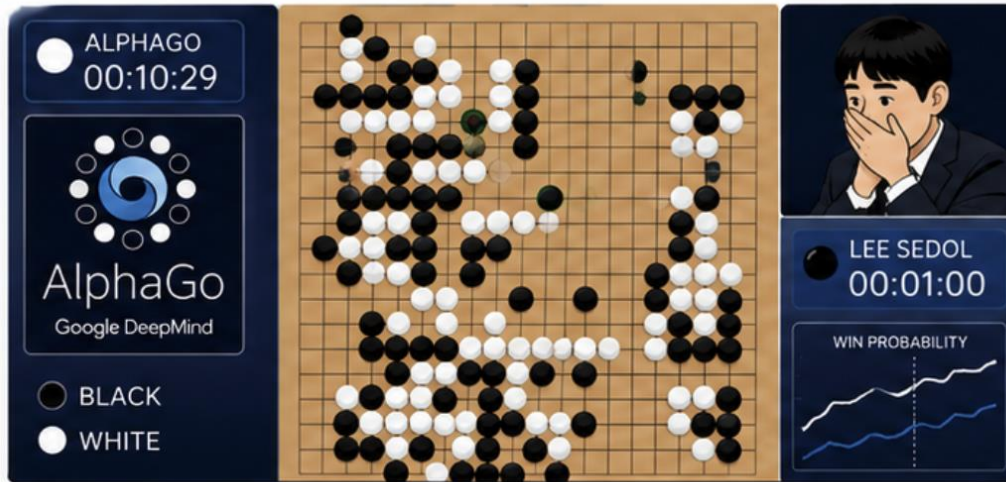


Parking and route recommendations

Suggests the best routes and parking options

Then we have Reinforcement Learning (RL) where the AI agent learns through trial and error, running through lots of simulations to discover the best strategy

AlphaGo and Move 37



AlphaGo ran through huge numbers of simulations and found moves humans did not expect.

Spotify and Netflix recommendations



1. You play a song, skip a track, binge a series, or stop watching early



2. The app observes your actions



3. It tests different suggestions and learns which ones keep you engaged



4. Over time it learns what to play or recommend next

With AI Enhanced Optimization, advanced algorithms search through complex solution spaces to find the best outcome, faster than traditional approaches

A smart thermostat is a simple everyday example.



Smart thermostats



Learns when you are home



Learns your comfort preferences



Responds to energy price changes



Optimizes heating and cooling schedules



Reduces cost while keeping you comfortable

Agentic AI perceives its environment, reason about choices, and autonomously take actions to achieve goals...



Waymo



1 Perceives — cars, cyclists, pedestrians, lanes, lights, obstacles



2 Reasons — assesses risk and predicts what others may do next



3 Plans — chooses the safest and most efficient maneuver



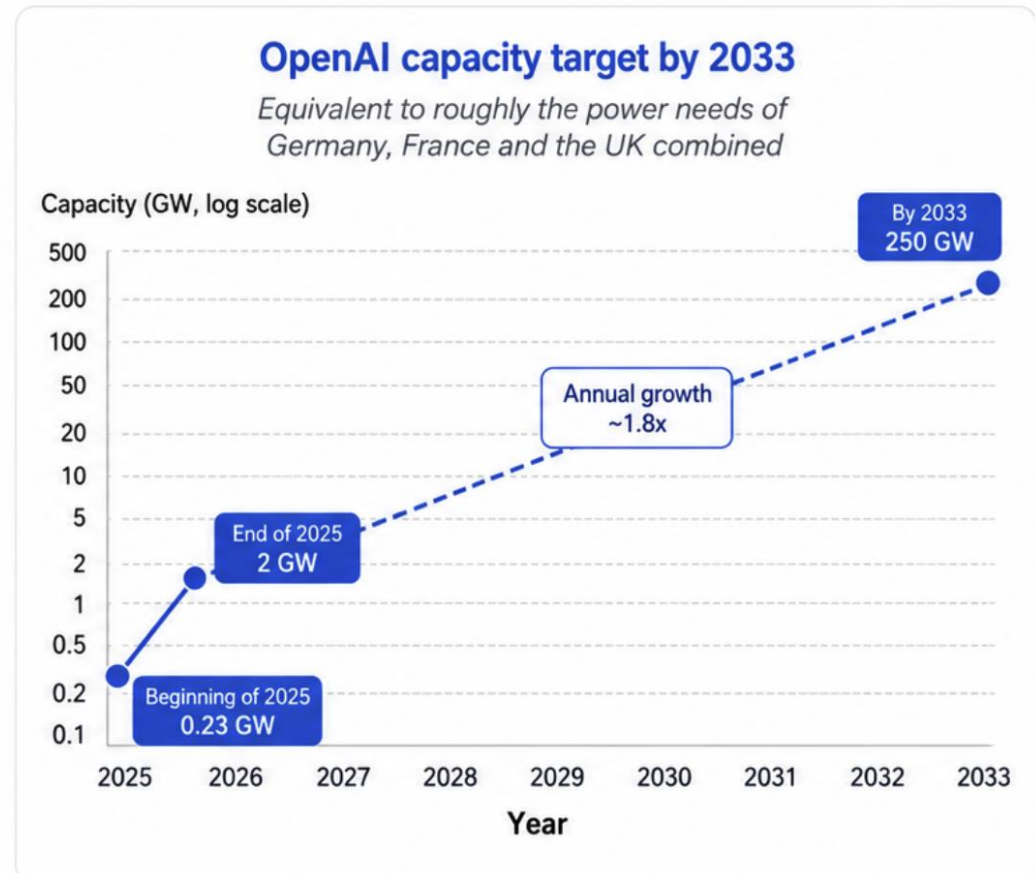
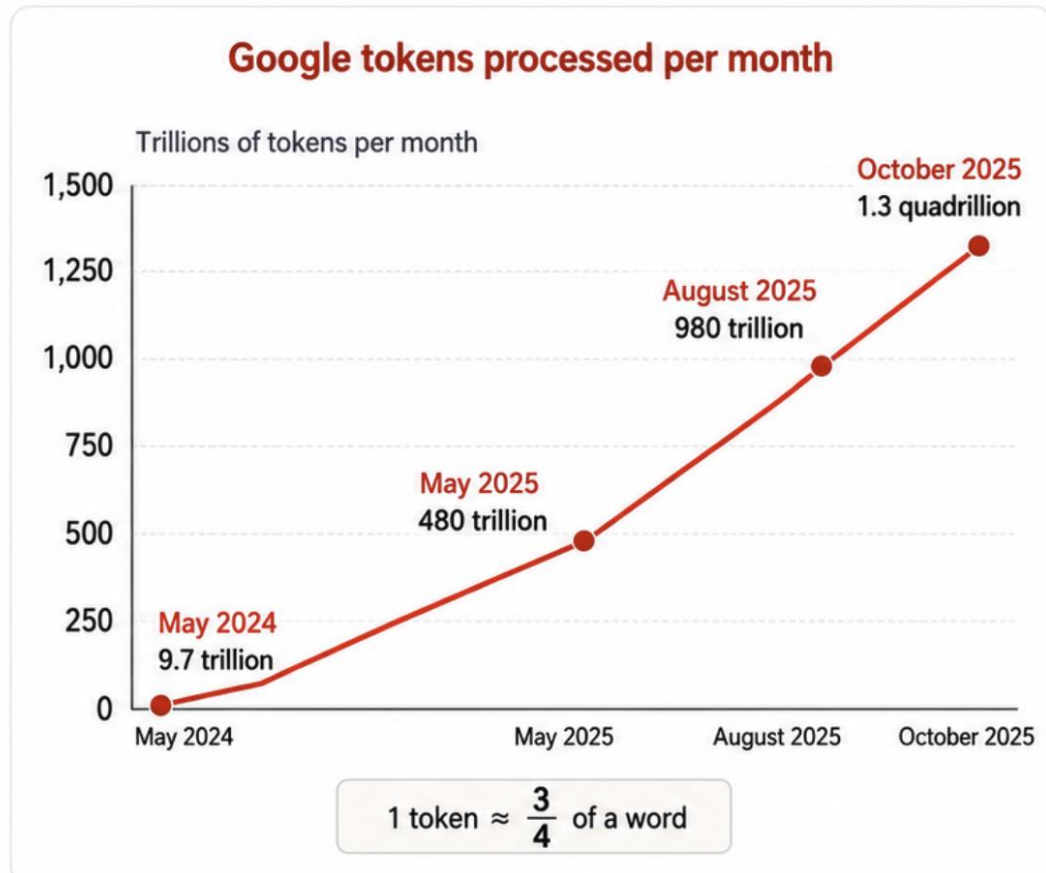
4 Acts — steers, brakes and accelerates without human input



5 Learns — improves from large scale driving and simulation data

AI is driving huge increases in computer data processing and electricity

140x in tokens processes per month by Google over the last 18 months

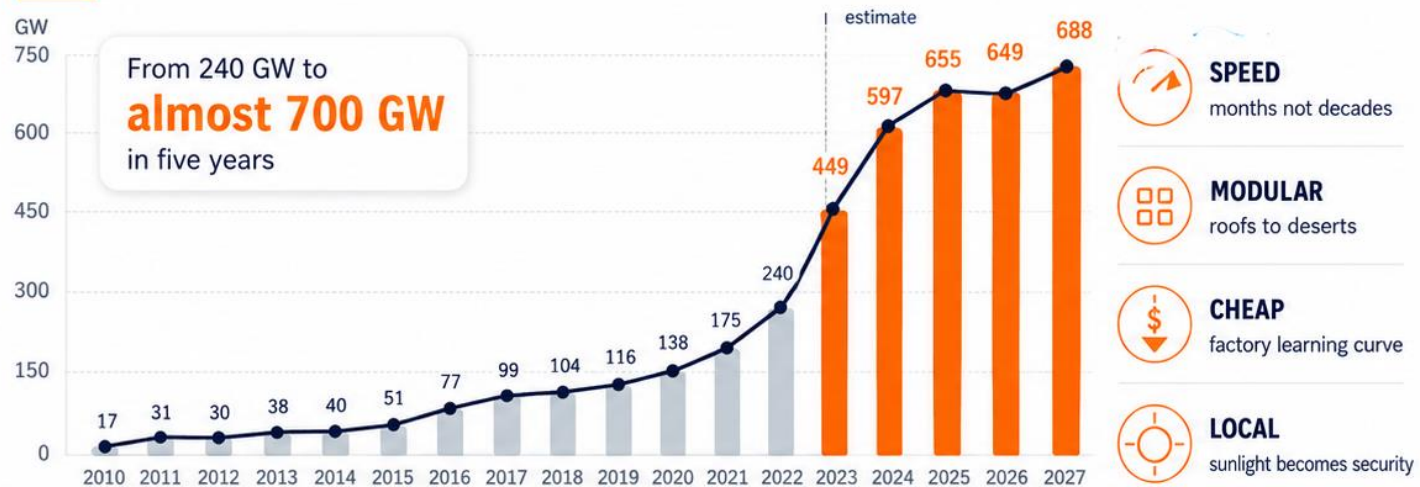


Source: Google, Open AI

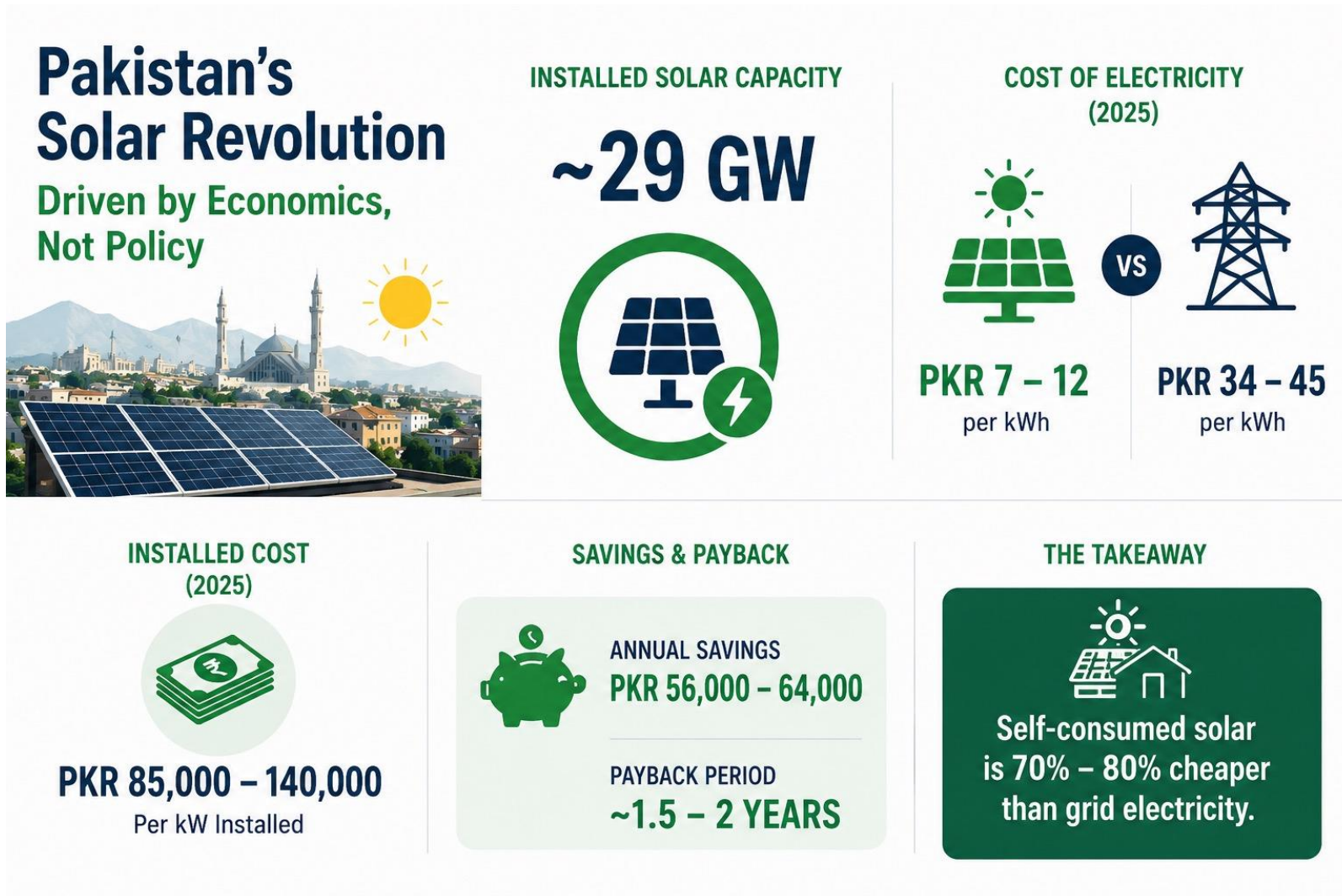
#2 Solar: the first exponential energy technology

Enough installed last year to power Japan for a year

GLOBAL SOLAR DEPLOYMENTS



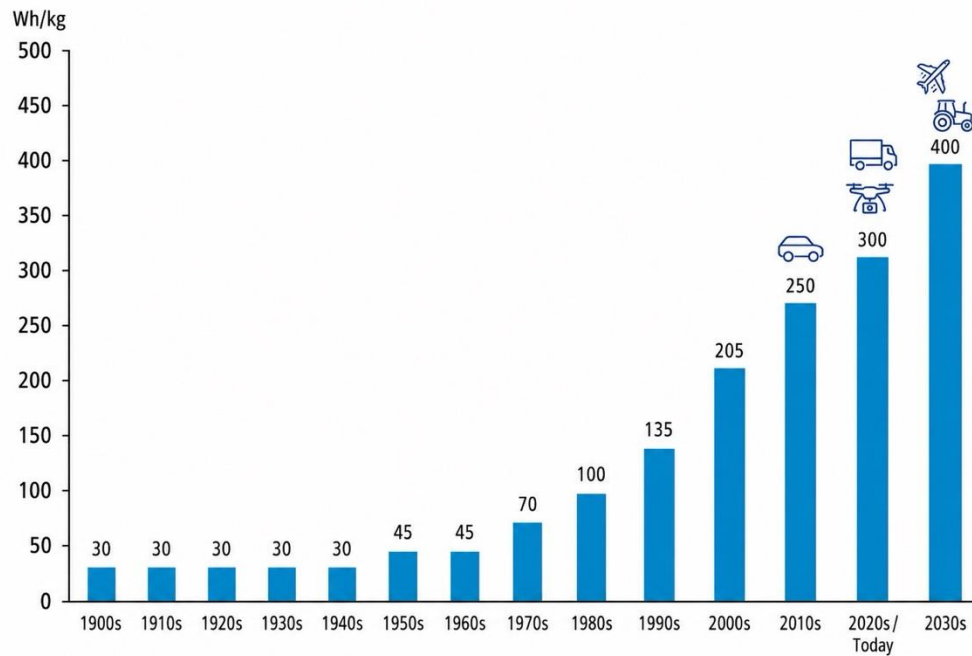
Behind the meter solar is incredibly cheap



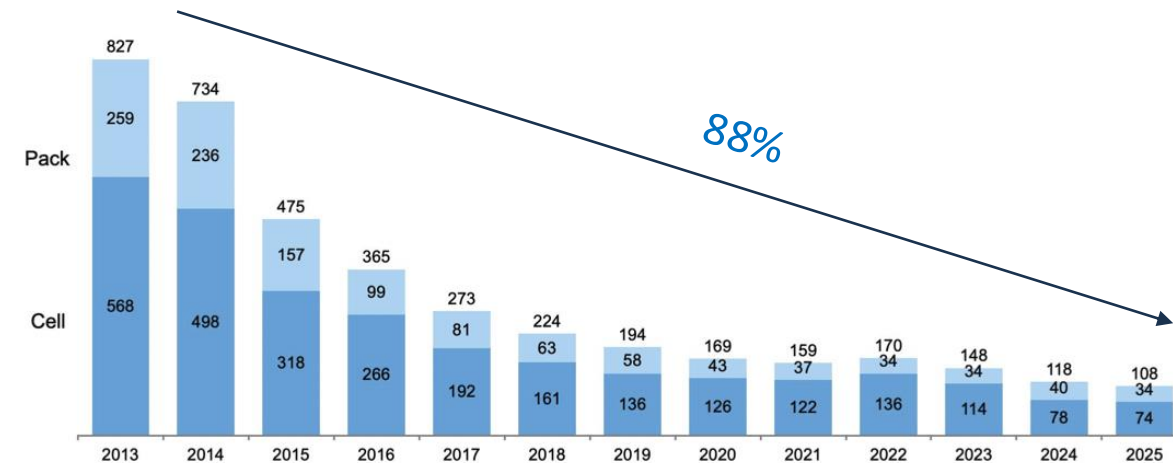
#3 Batteries have become the first exponential storage technology

With ongoing performance increases and costs decreases opening up new markets

Battery Cell Energy Density (Wh/kg)



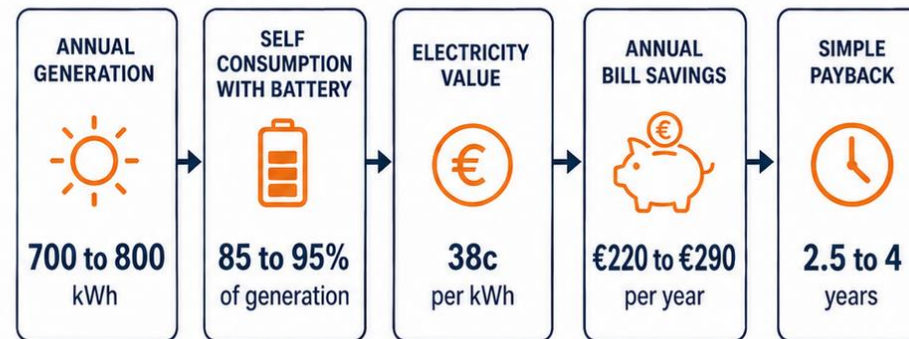
Lithium-ion battery pack prices (\$/KWh)



It is the combination of solar and storage which is unstoppable – Take Germany for instance



	0.8 kW Solar
	2.24 kWh Battery
	€800 Installed cost



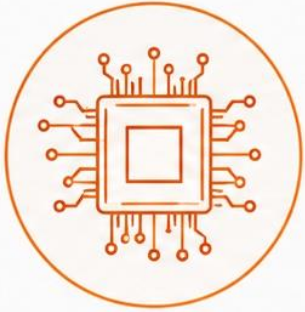
CENTRAL CASE

$$750 \text{ kWh} \times 90\% \times \text{€}0.38 = \text{€}257 \text{ a year}$$

$$\text{Payback: } \text{€}800 \div \text{€}257 = 3.1 \text{ years}$$

#4 Semiconductors are the enablers of change

They provide the nervous system of the 5th industrial revolution



SEMICONDUCTORS

The brains of everything
Compute, control and intelligence



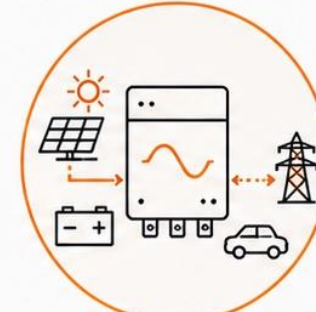
SENSORS

The eyes and ears of machines
Turning the physical world into data



CONNECTIVITY / IoT

The nervous system
Connecting billions of
devices in real time



POWER ELECTRONICS

The muscles of electrification
Controlling power across solar,
batteries, EVs and grids



WHY THIS MATTERS

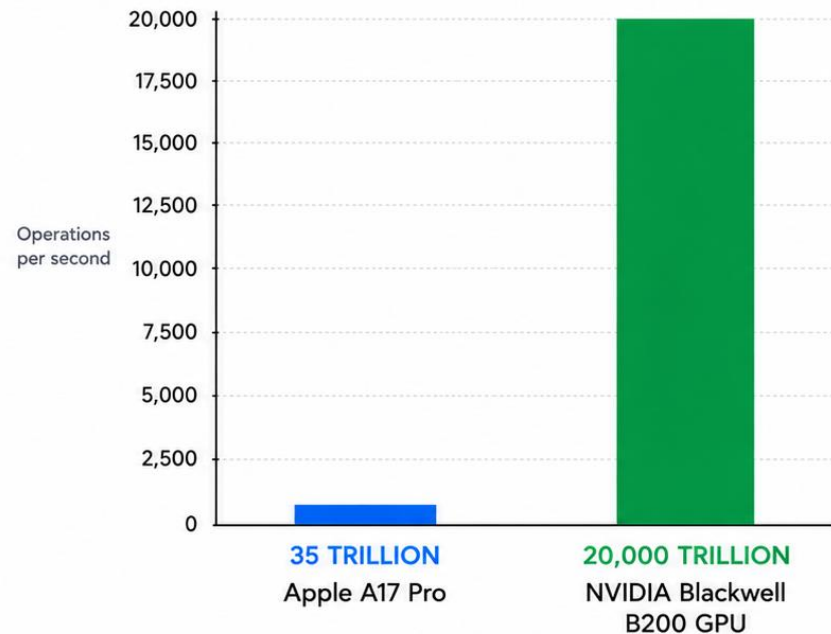
Together they allow machines, buildings, vehicles, factories and grids to sense, think, communicate and act.

Technology improvements and cost reductions in semiconductors is enabling compute power to scale exponentially

2 Blackwell Chips are equivalent to Tianhe 2 supercomputer from 2013

AI COMPUTING POWER

Operations per second



COST: ~\$100K

TIANHE-2 SUPERCOMPUTER

One of the world's most powerful computers



COST: ~\$390M

Tianhe-2 Supercomputer (2013)
National University of Defense Technology, China

Semiconductors are also transforming power management

Better chips and software means more range, faster charging, lower energy usage and more range nervous system of the future energy system



We are at the start of the Robotisation of our world

Robotics are moving from pilot projects to scale deployment as capabilities go up and costs fall



INDUSTRIAL & COBOT SURGE

Cobots growing fast across factories and electronics

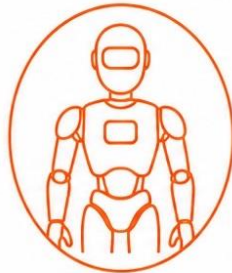
Cheaper, safer and easier to deploy alongside humans



WAREHOUSE & LOGISTICS AUTOMATION

Picking, sorting and delivery are scaling first

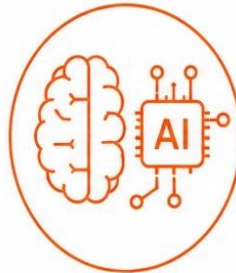
Amazon, DHL and Ocado lead the fastest near term ROI



HUMANOID: REAL BUT EARLY

Tesla Optimus, Figure and Agility move into structured settings

General purpose deployment remains more a post 2030 story



AI GIVES ROBOTS COMMON SENSE

Vision language models help robots understand instructions

They adapt to new tasks without reprogramming



COST CURVE & DISRUPTION

Humanoid costs should fall sharply by around 2030

Auto assembly, fulfilment and construction are disrupted first



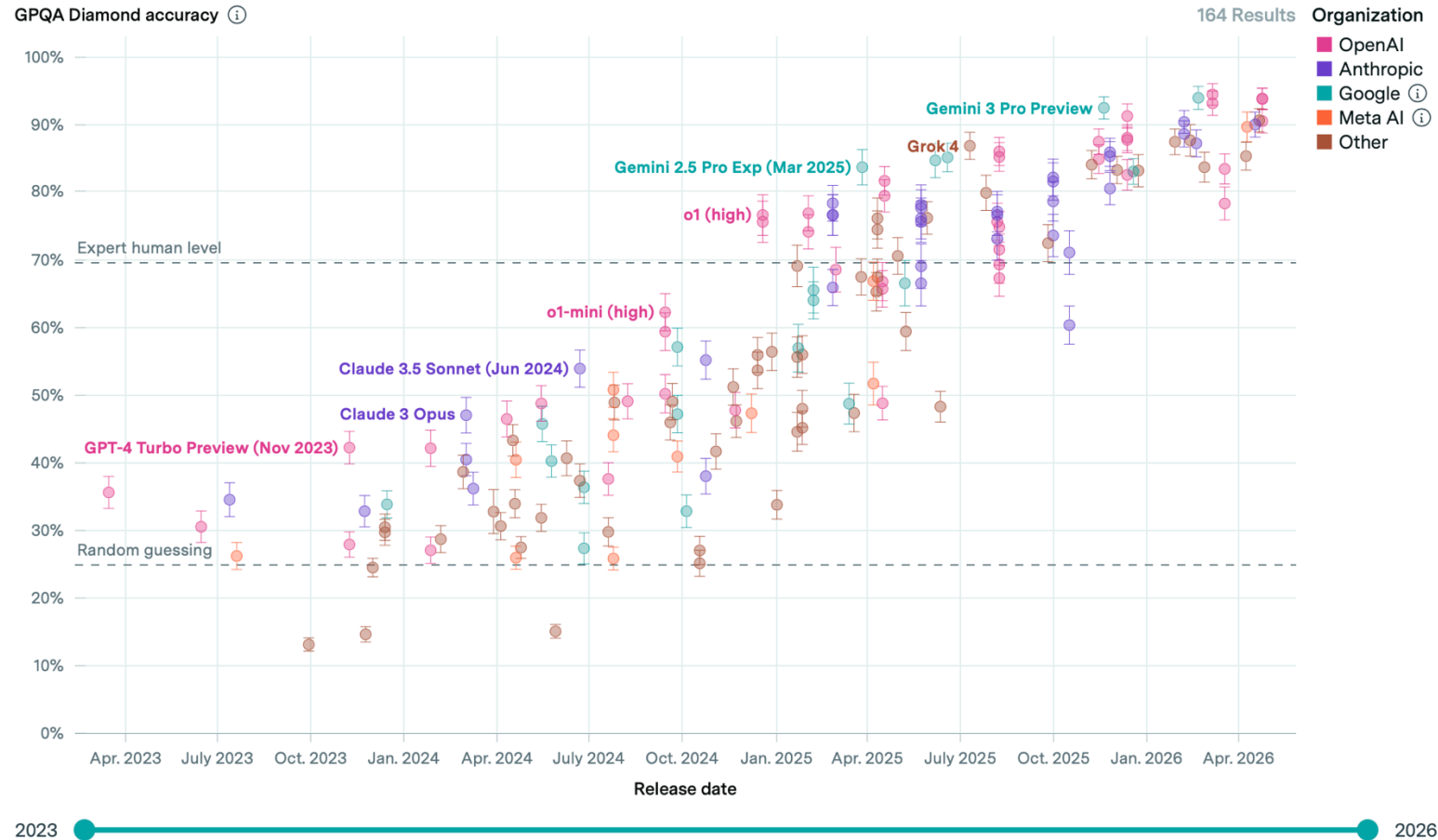


Implications

#1: The speed of change is hard to grasp

AI has gone from failing science exams to PhD standard in 3 years

AI performance on a set of Ph.D.-level science questions



Source: Epoch AI

#2: We are moving from a highly predictable to a difficult to predict world...



We are seeing a seismic change in the world order

And Europe is stuck in the middle...



#3: There are 5 areas where AI will cause radical changes in the next years

1

White Collar Reinvention



Lawyers, analysts, coders, consultants and administrators are augmented first, then partly replaced. The biggest near term labour market shock.

2

Smart Grids & Infrastructure



AI optimises power networks, batteries, demand response and grid congestion. Critical to making renewable power systems work.

3

Autonomous Mobility & Logistics



Robotaxis, trucking, ports, warehouses and delivery networks become increasingly automated. Slower than hyped, but enormous.

4

Healthcare Transformation



Diagnostics, drug discovery and personalised medicine move to scale. Better outcomes, lower costs, faster innovation.

5

Scientific Acceleration



Materials, climate tech, biotech, energy and fusion all move faster as AI compresses R&D cycles from decades to years.

White collar work as we know it will radically change

It already is and is changing how people write, analyse and execute

1 Routine work gets automated



-  Drafting emails
-  Summarising documents
-  Creating presentations
-  Basic research

2 Good workers become much faster



-  Better writing
-  Faster analysis
-  Quicker decisions
-  Higher output

3 The job shifts up the value chain



-  Less time on formatting
-  More time on judgment
-  Creativity matters more
-  Client insight matters more

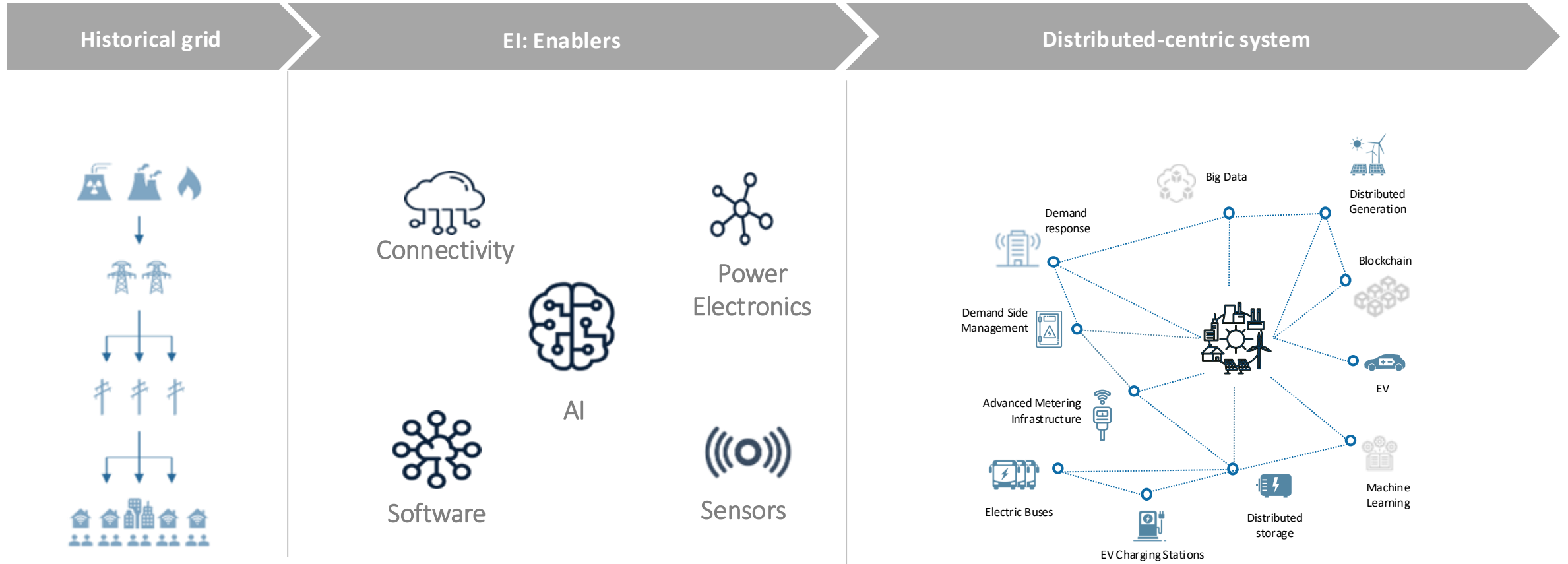
4 The winners will be AI enabled professionals



-  People who use AI well will outperform
-  Teams will get smaller and more productive
-  Companies will expect AI fluency
-  The edge will come from human plus machine

AI will be a key tool going forward in the world of electricity

The glue that binds everything together

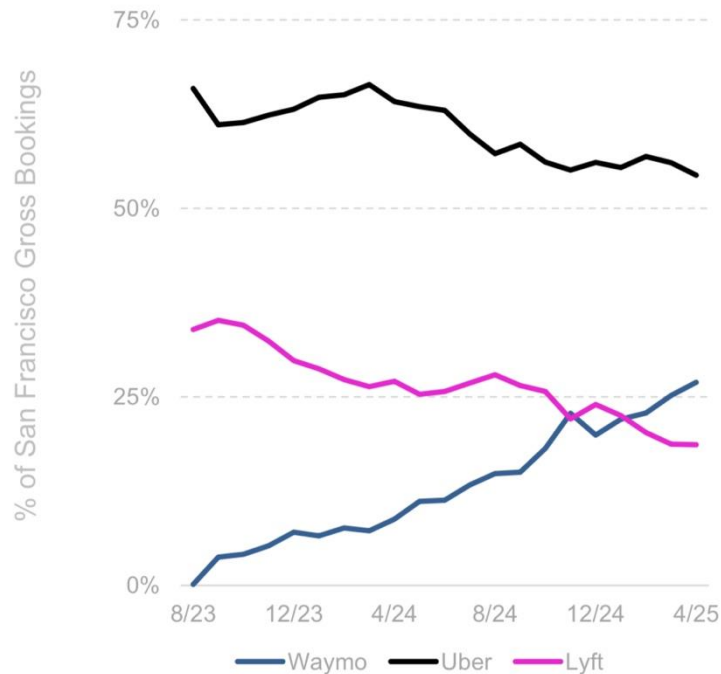


Source: Alexa Capital

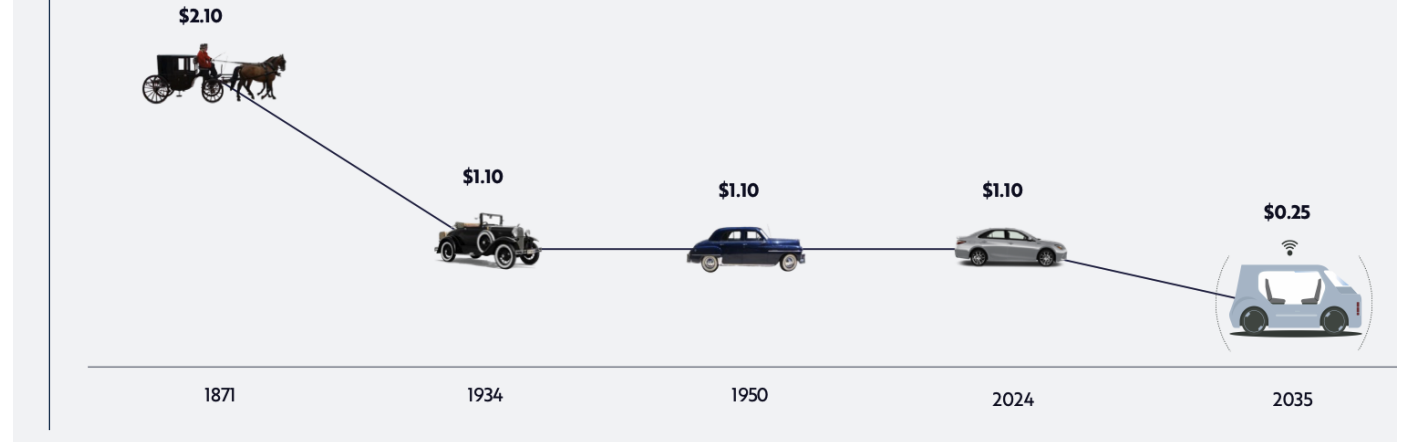
Autonomous taxis are a huge opportunity for AI

And they will signal a move away from car ownership...

Estimated Market Share (Gross Bookings) – 8/23-4/25,
San Francisco Operating Zone, per YipitData



Cost Per Mile Of A Personally Owned Vehicle
(2024 \$)



Health care is radically changing

We are moving from reactive medicine to data based preventative medicine

1

Diagnostics



Earlier and more accurate detection across imaging, pathology and triage

2

Drug Discovery



AI shortens discovery cycles and improves the odds of finding effective therapies

3

Personalised Medicine



Treatments become more tailored to each patient, improving outcomes and reducing waste

4

Clinical Productivity



Administrative work, documentation and decision support become faster and more efficient

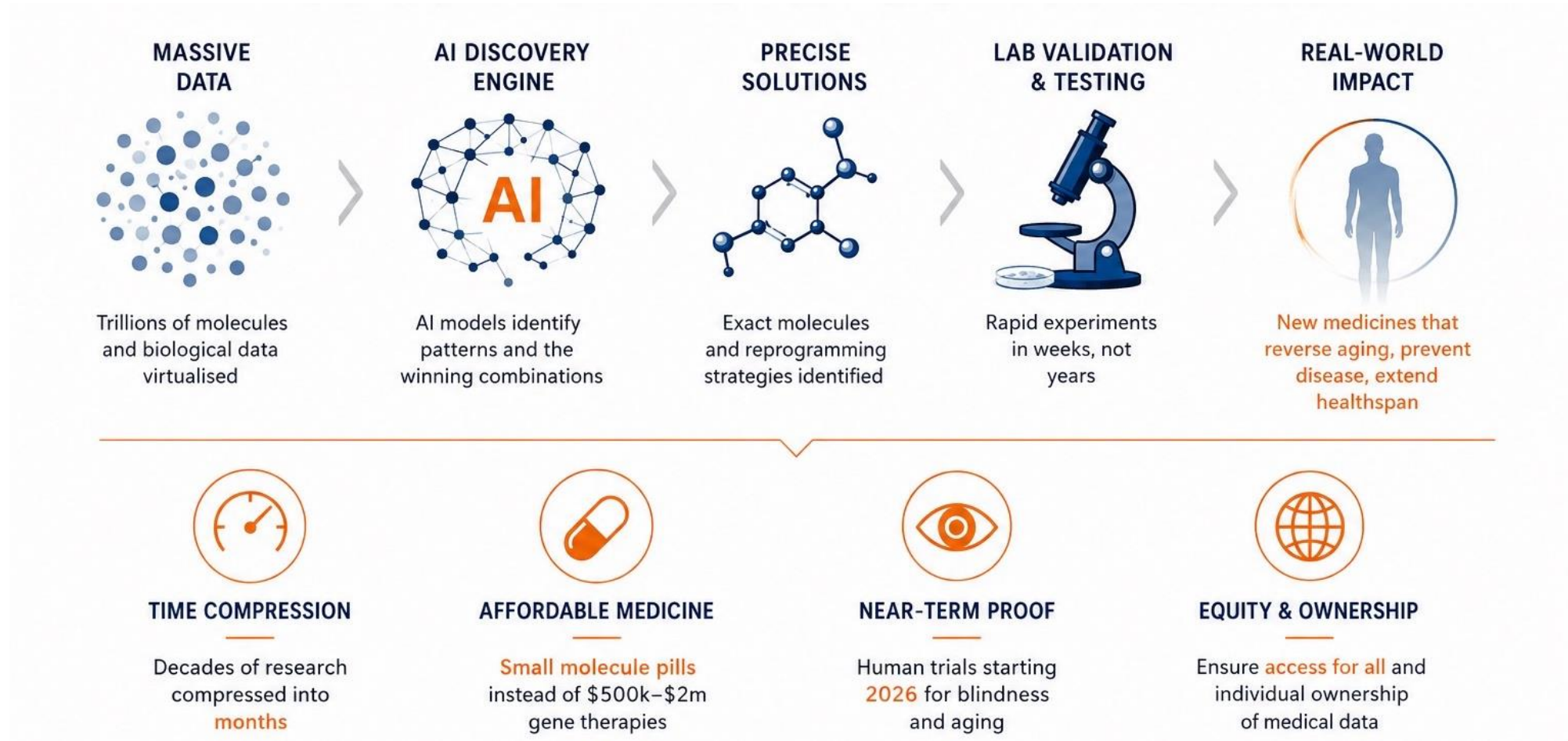
5

Prevention & Monitoring



Care shifts upstream through continuous monitoring, prediction and earlier intervention

David Sinclair believes we all live to 125



Source: Harvard Medical School David Sinclair

AI is speeding up scientific progress

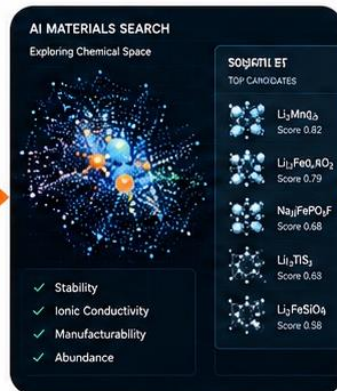
For instance in battery materials

Trial & Error



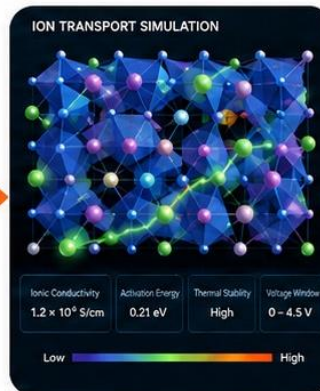
Traditionally, chemists test hundreds or thousands of materials through slow, expensive experimentation.

AI Search



AI scans huge chemical spaces and predicts which materials are most likely to be stable, conductive and manufacturable.

Simulation



Models predict ion flow, degradation and thermal behaviour before the best candidates ever reach the lab.

Lab Testing



Researchers focus only on the most promising options, cutting dead ends and speeding up development.

Faster Discovery

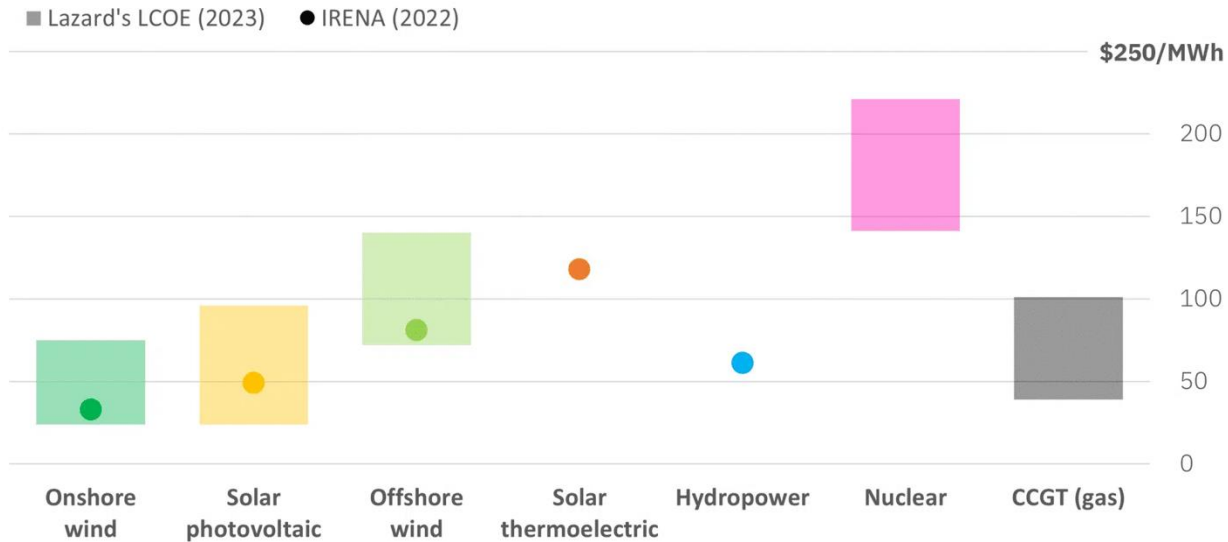


Chemistry shifts from trial and error to search, simulation and optimisation — compressing years of discovery.

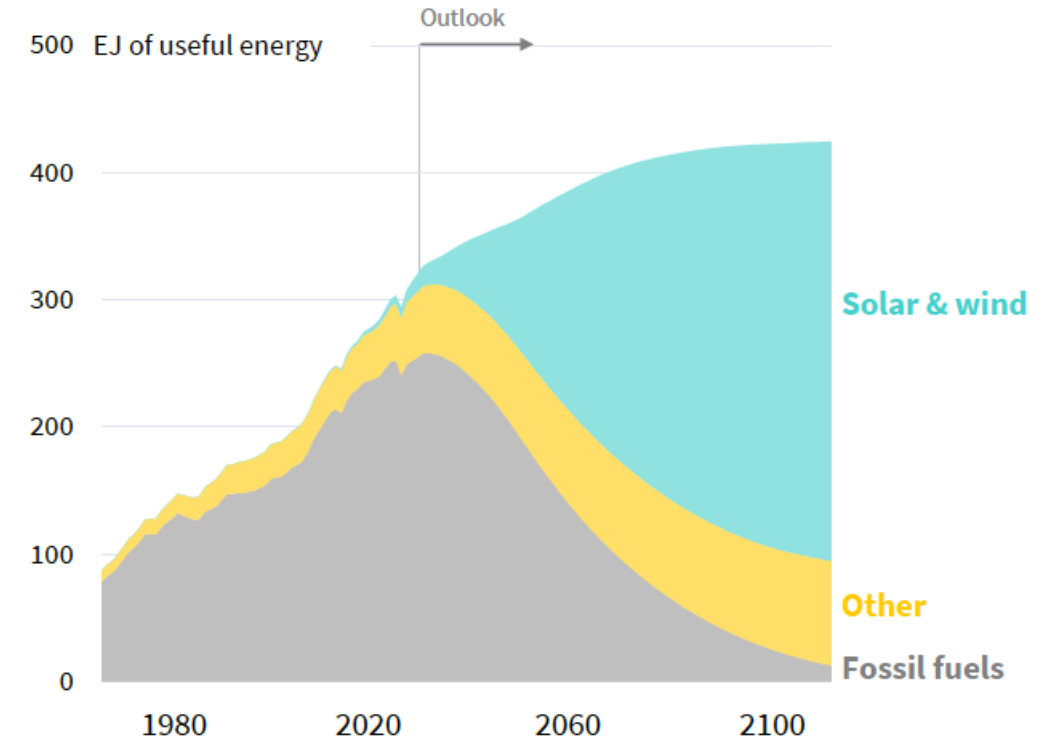
#6: We will build a power system around renewables and in particular solar

They are just so cheap and quick to build!

Levelized Cost of Energy (LCOE)

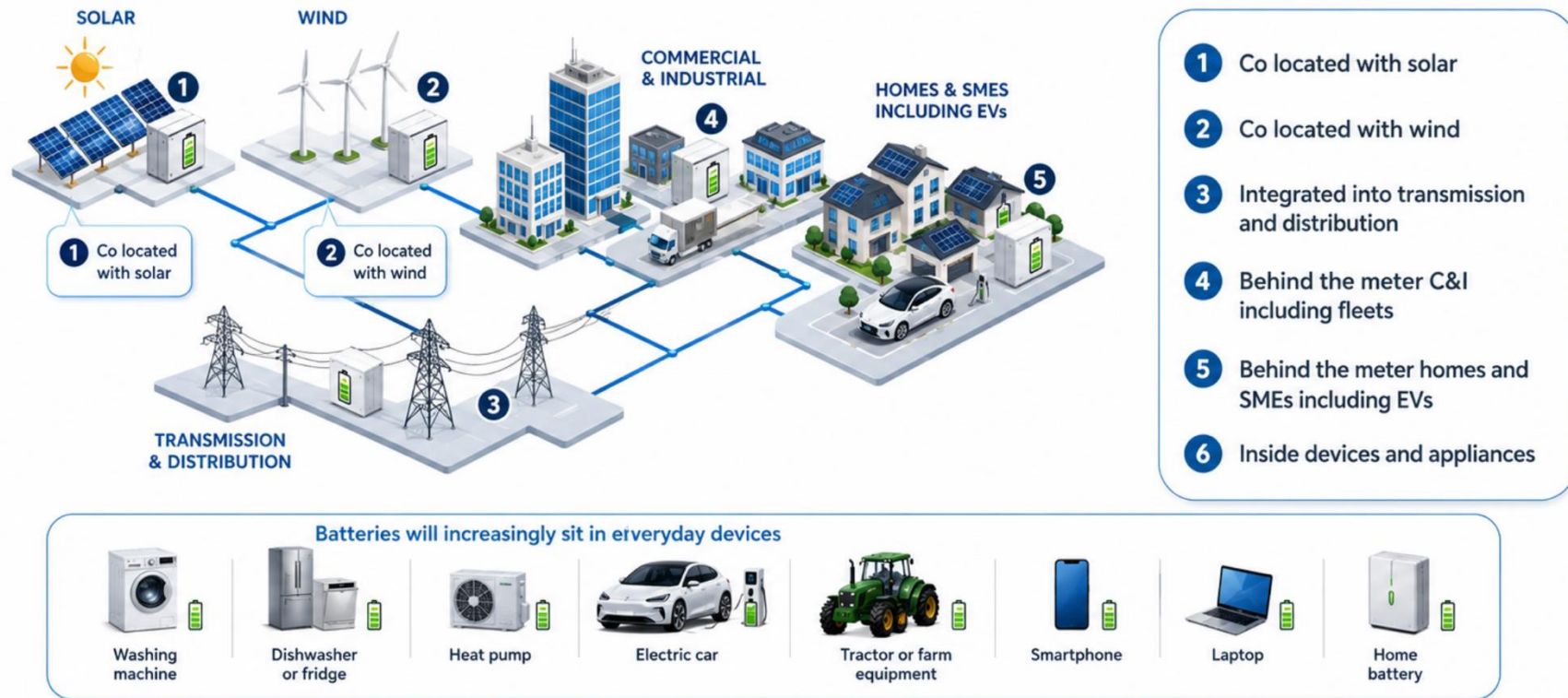


The Future



#7: Batteries will be everywhere...

Including our vehicles, homes, buildings, factories and everyday devices



Offgrid solar with storage is becoming cheaper than staying on the grid

Take a look at Australia to see the future...

Example off grid household system		
	Usage per day	12 kWh
	Solar	12 kW at A\$0.80/W = A\$9,600
	Battery	50 kWh at A\$350/kWh = A\$17,500
	Balance of system + installation	~A\$5,000
	Total installed CAPEX	~A\$32,000



Key cost drivers (LCOE)

	Pure solar LCOE	~4 c/kWh
	Battery adds	~12 c/kWh
	Off grid solar + storage	15 to 17 c/kWh
	With one EV	13 to 14 c/kWh
	Grid power in Australia	~28 c/kWh

Off grid
15 to 17
c/kWh

VS

On grid
~28
c/kWh

✓ Off grid power is now materially cheaper



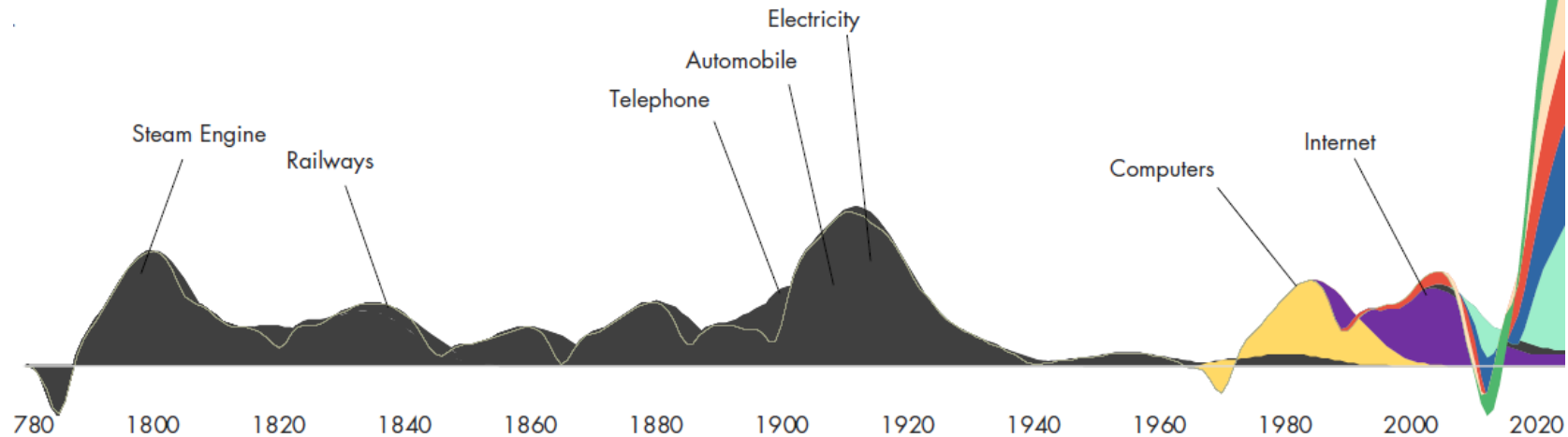
#8: It's game over for the ICE

EVs are cheaper to buy and run...

BYD DOLPHIN SURF		TYPICAL SMALL PETROL CAR	
100% Electric		e.g. Dacia Sandero / Toyota Yaris	
			
 €17,985 Purchase Price (Ireland)		 PURCHASE PRICE (On the Road)	
 322 km WLTP Combined Range		 RANGE (WLTP)	
 ~ €4.20 Cost per 100 km (electricity)		 RUNNING COST per 100 km	
 ~ €630 Annual energy cost (15,000 km/yr)		 ANNUAL ENERGY / FUEL COST (15,000 km/yr)	
 Lower Maintenance		 MAINTENANCE	
		 ~ €9.60 Cost per 100 km (petrol)	
		 ~ €1,440 Annual fuel cost (15,000 km/yr)	
		 Higher Maintenance	

#9: The investment opportunities are enormous

Impact of Big Technology Shifts on Economic Development



Renewables



Electrification

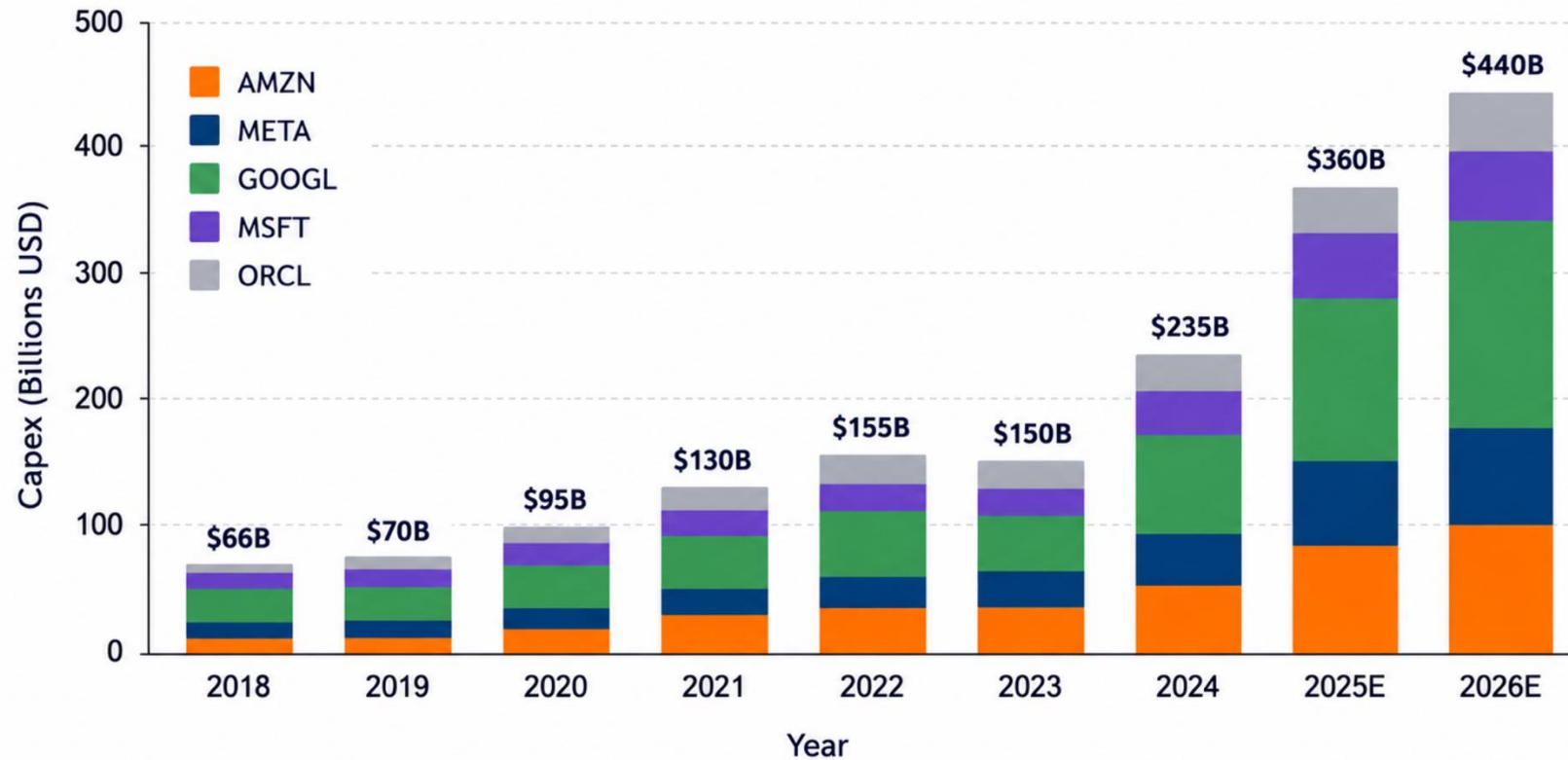


IoT



AI

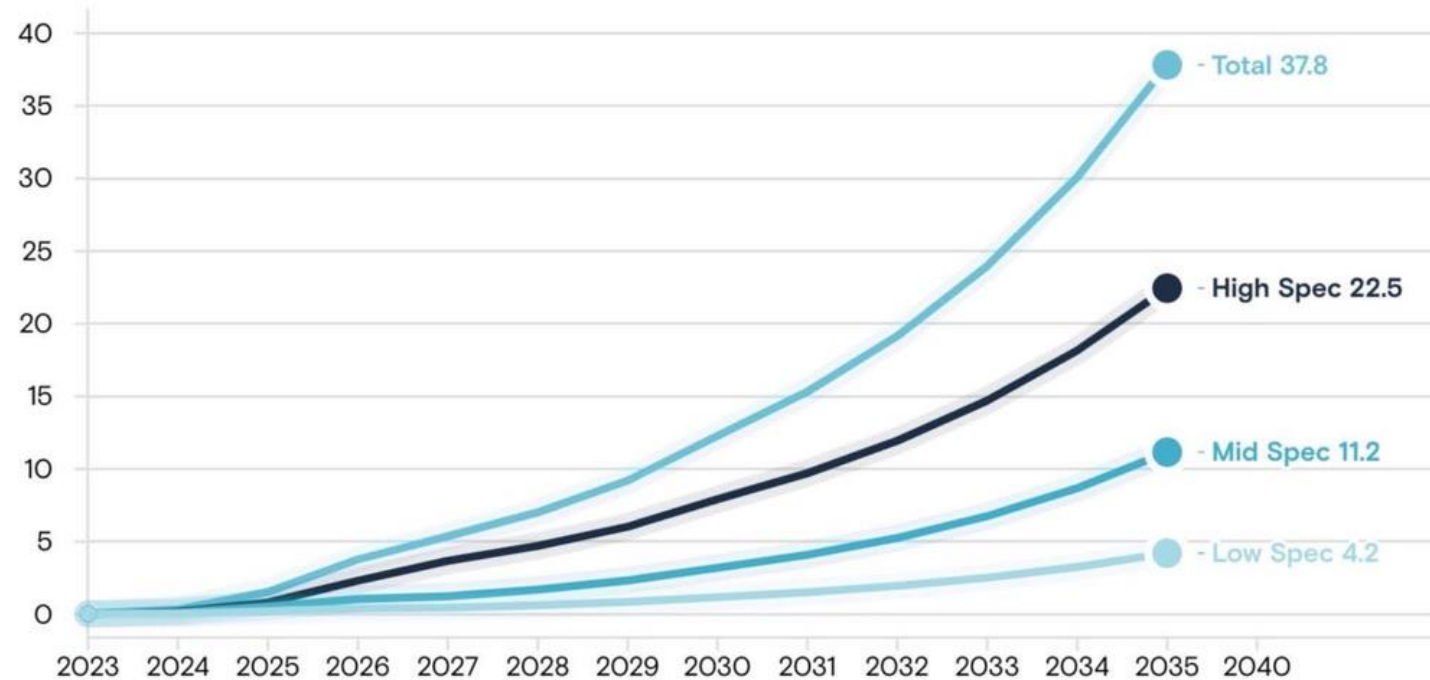
We need massive amounts of new infrastructure particularly in data centers and energy



AI will create new industries such as humanoid robots

Humanoid robots are expected to become a \$38 billion market by 2035

Forecast global humanoid robot market size (\$ billion)

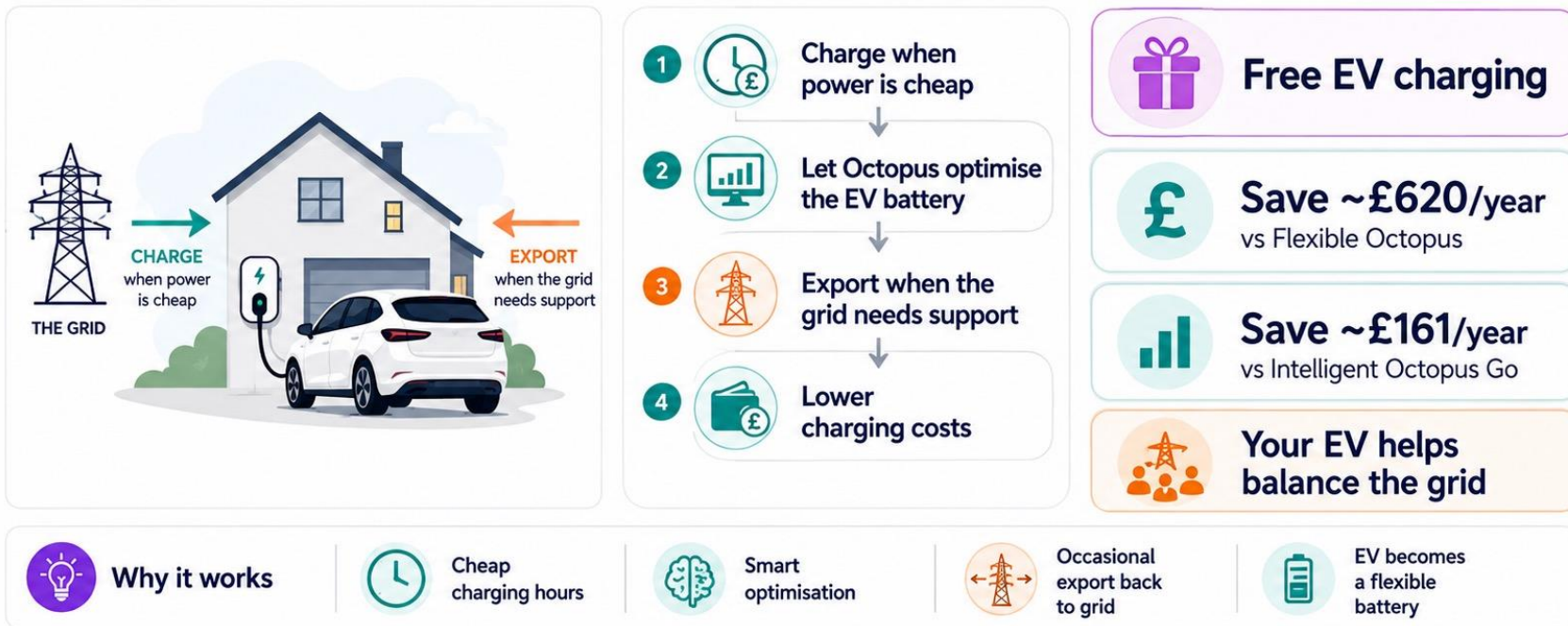


We will see a whole range of new business models such as Vehicle 2 Grid

The cheapest battery may already be sitting in your driveway

Octopus Power Pack

— How V2G turns your EV into a grid asset —



The slow adopters will have stranded assets or be restructured

Large, regulated, and capital-heavy incumbents are being left behind



The cost of slowness: every delay compounds the write-down

Hinkley Point: 14 years later and way over budget

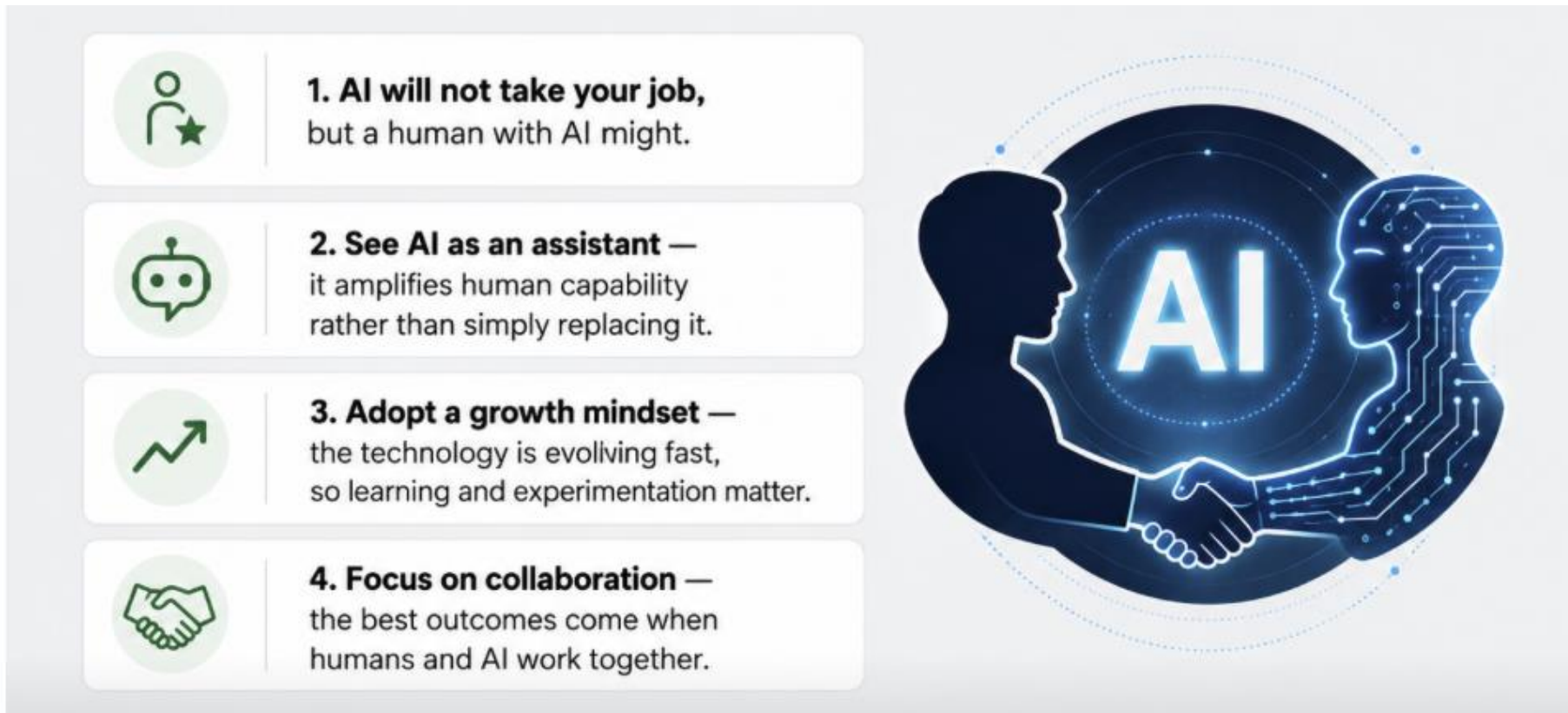




What should we do

#1: We need to see AI as an enabler, not a threat

The winners will be those people, organisations and countries that learn to work with AI, rather than working against it



1. AI will not take your job,
but a human with AI might.

2. See AI as an assistant —
it amplifies human capability
rather than simply replacing it.

3. Adopt a growth mindset —
the technology is evolving fast,
so learning and experimentation matter.

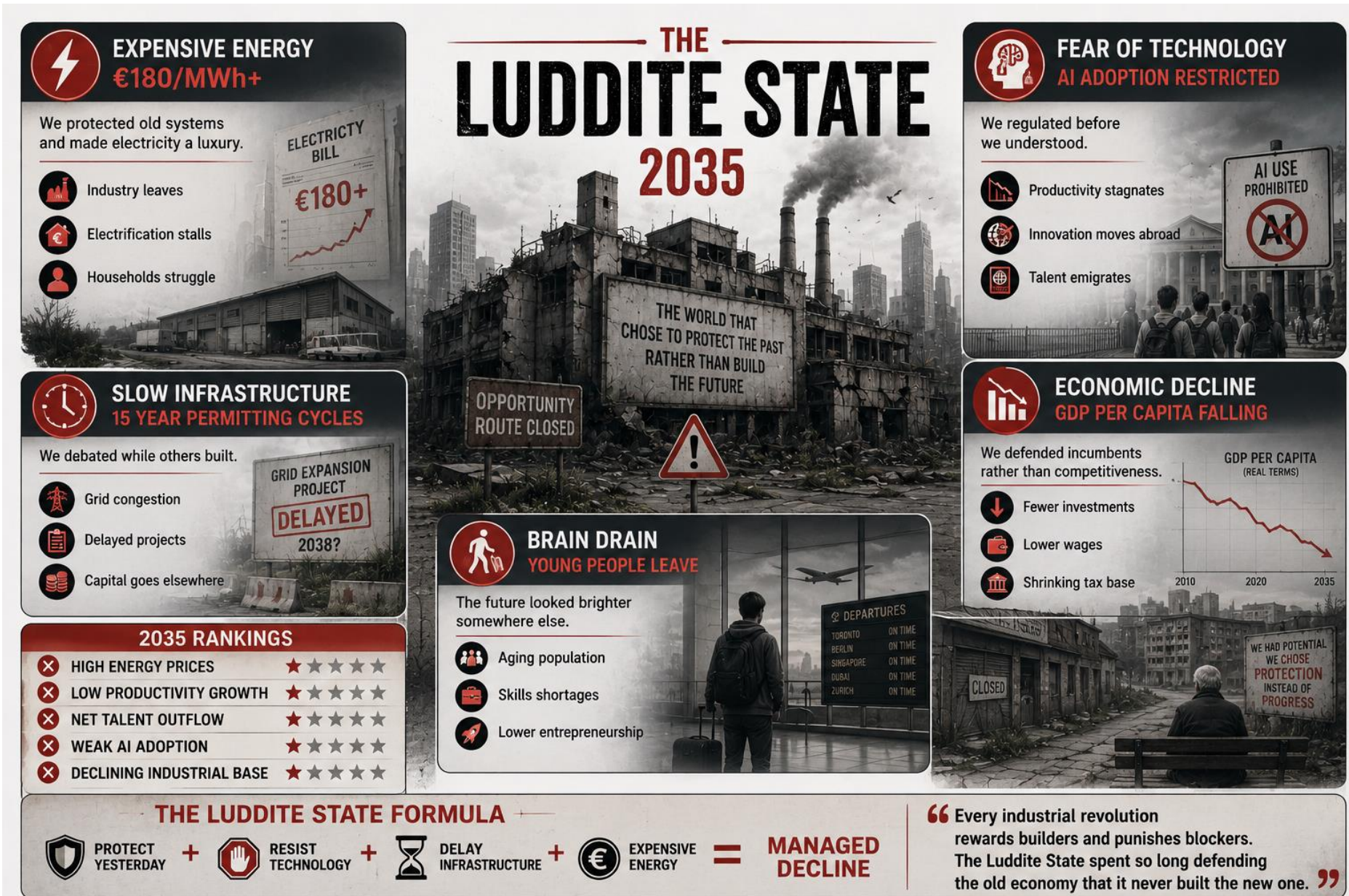
4. Focus on collaboration —
the best outcomes come when
humans and AI work together.

AI

#2: We need to push the development of growth mindset cultures across the energy industry



Finally, we have a choice to make between....



WELCOME TO LUMINA, 2035

The world that became possible



“The Fifth Industrial Revolution was not about smarter machines. It was about **better lives.**”



+48%

GDP PER CAPITA
vs 2025



24 hrs

AVERAGE
WORKING WEEK



+5.6 yrs

LIFE EXPECTANCY
vs 2025



0%

ENERGY
POVERTY



-58%

LONELINESS
INDEX vs 2025



+71%

WELLBEING
INDEX vs 2025

CLEAN
ENERGY.
SMARTER
SYSTEMS.
BETTER
LIVES.





ALEXA | CAPITAL

FINANCIAL ADVISORY FOR A SUSTAINABLE FUTURE

LONDON | NEW YORK | BERLIN