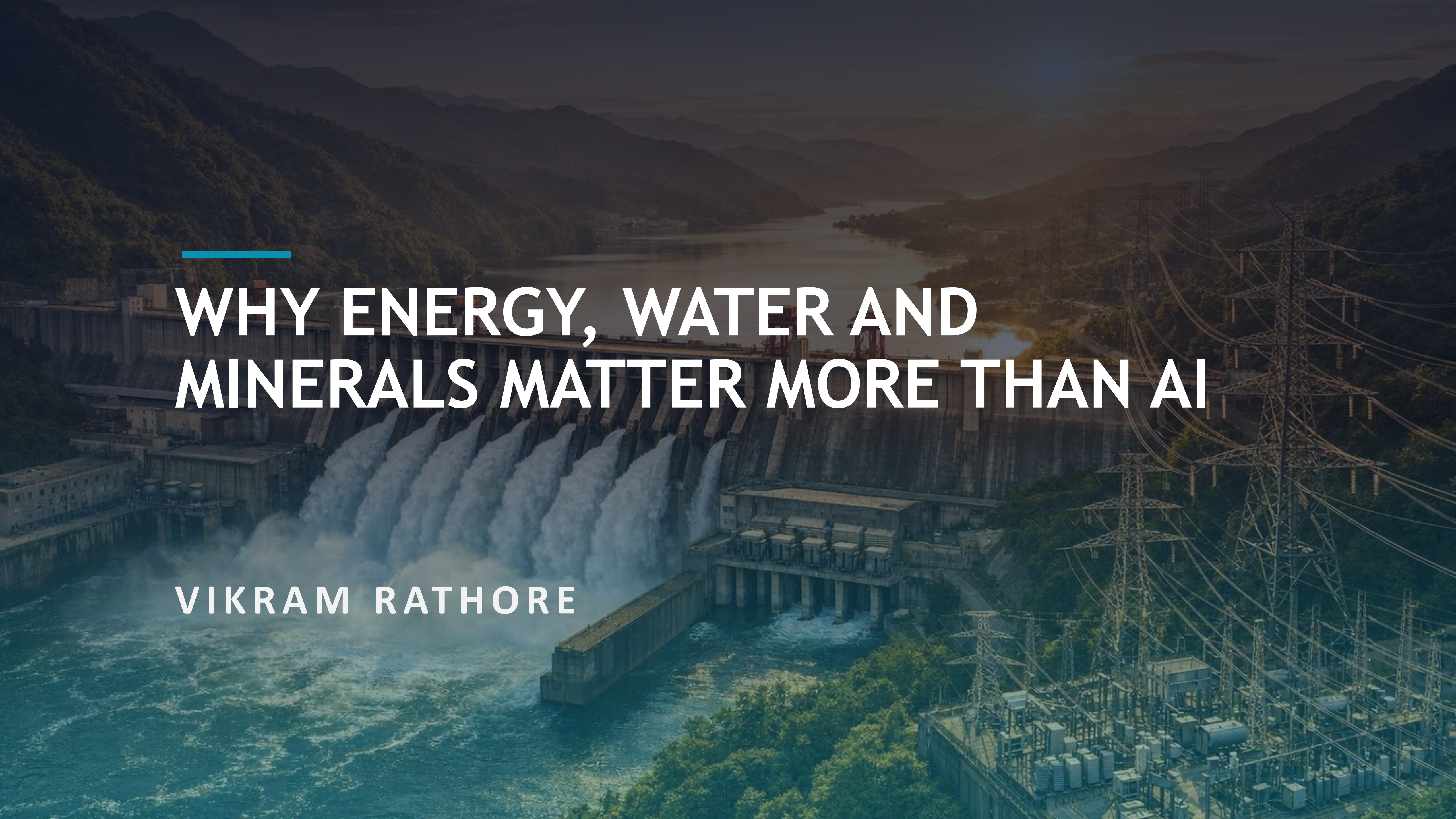

WHY ENERGY, WATER AND MINERALS MATTER MORE THAN AI

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THE DIGITAL DEMAND

- AI systems require advanced chips and vast data centres to function at scale
- Data centres consume enormous electricity and millions of gallons of water for cooling
- Semiconductor fabs demand ultra-pure water, stable power, and critical minerals to produce chips
- Nuclear energy — including next-gen SMRs — is emerging as a baseload solution for data centre power
- Every smartphone, EV, and AI model traces back to the same physical bottleneck: energy, water, and minerals

SOLVING THE WATER CRISIS

- **DESALINATION**
- Converts seawater to fresh water but consumes massive energy — nuclear-powered desalination is gaining traction to break the fossil fuel dependency
- **GREYWATER RECYCLING**
- Treats used water from showers, sinks, and laundry for reuse — cutting household consumption by up to 40% with minimal energy
- **ATMOSPHERIC WATER HARVESTING**
- Solar-powered generators extract moisture directly from air — viable in arid regions where conventional infrastructure is unfeasible
- **AI-DRIVEN SMART WATER GRIDS**
- Machine learning detects leaks in real time, optimizes pressure and flow — reducing waste across entire city water networks
- **GRAPHENE MEMBRANE FILTRATION**
- Next-gen membranes purify water using far less energy than traditional reverse osmosis, making clean water more accessible and affordable

FROM BRINE TO CRITICAL MINERALS

- **BRINE: THE OVERLOOKED RESOURCE**
- Desalination produces concentrated brine — waste rich in dissolved minerals that are typically dumped back into the ocean
- **WHAT'S IN THE BRINE**
- Lithium, magnesium, potassium, nickel, cobalt, and other critical minerals can be extracted from brine residue
- **WHY THIS MATTERS**
- These are the exact minerals needed for EV batteries, semiconductor chips, and AI hardware — currently sourced through environmentally destructive mining
- **WASTE BECOMES STRATEGY**
- Brine mining could reduce dependence on traditional extraction, turning an environmental liability into a geopolitical asset

CRITICAL MINERALS: THE CENTRAL NODE

- Copper is the backbone of electrification — 83 kg per EV, 8–10 tonnes per offshore wind turbine, and essential for every metre of power grid
- Global copper demand could grow 48% by 2040 (IEA), yet mine supply grows only 1.5–2% annually — a structural deficit
- Lithium, rare earths, nickel, and cobalt feed two critical paths: batteries for EVs and energy storage, and semiconductors for chips and AI
- The global grid must double to 152 million km by 2050 — requiring $21 trillion in investment and vast copper volumes
- Mining and refining all these minerals demands heavy energy and water — the mineral bottleneck connects every layer of the ecosystem

THE POWER EQUATION

- **FOSSIL FUELS**
- Oil, natural gas, and coal still provide over 80% of global energy — powering industry, transport, and electricity grids
- **HYDROPOWER**
- Reliable and renewable, but geographically limited and vulnerable to drought and climate shifts
- **RENEWABLES**
- Solar and wind are scaling fast but remain intermittent — requiring battery storage built from critical minerals
- **NUCLEAR**
- The resurgent option: Small Modular Reactors (SMRs) offer stable baseload power for data centres and desalination, with minimal carbon

THE INTERCONNECTED CYCLE

- AI → Chips + Data Centres → Massive energy and water demand
- Water scarcity → Desalination + Recycling + Harvesting → Requires power
- Desalination brine → Critical minerals (lithium, cobalt, rare earths)
- Minerals + Copper → Batteries + Semiconductors + Power Grids → EVs + AI
- EVs → Grid expansion (copper-intensive) → Mining → Energy + Water → Full circle

LAYERS OF THE ECOSYSTEM

- **LAYER 1: FOUNDATION**
- Water, energy (fossil fuels, nuclear, renewables), and critical minerals form the base of all modern systems
- **LAYER 2: INDUSTRY**
- Manufacturing, power grids, logistics, and transportation process and move resources globally
- **LAYER 3: TECHNOLOGY**
- Data centres, semiconductors, batteries, and EVs are built from processed materials and powered by Layer 1
- **LAYER 4: APPLICATIONS**
- AI, devices, cars, and digital services serve consumers and businesses — all dependent on Layers 1–3
- **LAYER 5: EXPERIENCE**
- Lifestyle, economic growth, education, and work — the visible surface powered by invisible infrastructure

THE GEOPOLITICAL MAP

RESOURCE	STRATEGIC PLAYERS
Semiconductors	Taiwan, South Korea, Netherlands
Copper	Chile, Peru, DRC, Indonesia (48% demand growth by 2040)
Rare Earths	China (dominates 60%+ of global supply)
Lithium	Australia, Chile, Argentina (Lithium Triangle)
Oil & Gas	Middle East, United States, Russia
Data Centres	United States, China, India, Europe
AI Leadership	United States, China

No single nation controls the full stack. Resource interdependence is the defining geopolitical reality of the 2020s.

THE WAY FORWARD

- Recognize the cycle: every resource decision — energy, water, minerals — ripples through the entire technology ecosystem
- Invest in circular systems: brine mining, battery recycling, grid networks and renewable integration reduce virgin extraction
- Scale nuclear: SMRs can provide stable, low-carbon power for data centres and desalination simultaneously
- Secure mineral supply chains: diversify sourcing away from single-nation dependencies
- Policy must match physics: energy, water, and minerals are interconnected systems — not siloed government departments