Introduction to AI Policy and Regulation



Image: Theodore Christopher. Wikimedia Commons

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What is one aspect of AI that requires policy or regulation?

Outline and Learning Objectives

- Scope of AI and digitalization policy and regulation
- AI policy landscape
- Implications for climate, innovation, deployment, and decision-making

Perspective as a Researcher and Policy Practitioner



Images: BalkisSerkers CC BY SA 3.0, The White House

How Policymakers Use Energy and Environmental Info

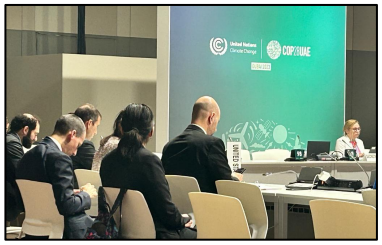
- **Diplomatic:** Overall commitment setting and foreign policy
- **Policy:** Support for propose legislative laws or executive ministerial policy actions
- **Regulatory:** Assessing benefits and costs of proposed regulations
- **Budget:** Allocating deployment and R&D investments and directions
- **Distributive:** Assessing equity impacts
- **Evaluative:** Observed or projected benefits and impacts relative to a baseline













AI Amplifies Deep Uncertainties Society Faces In Addressing Physical and Transition Risks of Climate

- Some uncertainties involve **data**
  - What climate extremes should companies or governments plan for? How cheap will energy storage get?
- Some involve **technologies**
  - How will AI and vehicle automation affect emissions or energy demand?
- The deepest uncertainties are in **social systems**
  - How will climate change and AI affect affordability, the economy, and growth? Who pays, and who benefits?

Who Governs AI?

- National, state, and local governments
- Regulatory agencies
- Firms
- Standards organizations
- International institutions
- Civil society
- Users

How to Measure AI Risk?

Risk is a function of the **probability** of an event occurring

and the **magnitude** of the **consequences** of that event

Source: NIST (2024)

AI Risk Can Be Assessed Similar to Climate Risk



Image Source: NOAA Sea Level Rise Viewer https://coast.noaa.gov/slr/

Climate Risk is a Function of Hazard, Exposure, and Vulnerability

Hazard: The probability of hazard occurrence

Exposure: Density of people, property, systems or elements in the hazard zone

Vulnerability: Susceptibility to harm and value of the people, property, systems or elements in the hazard zone

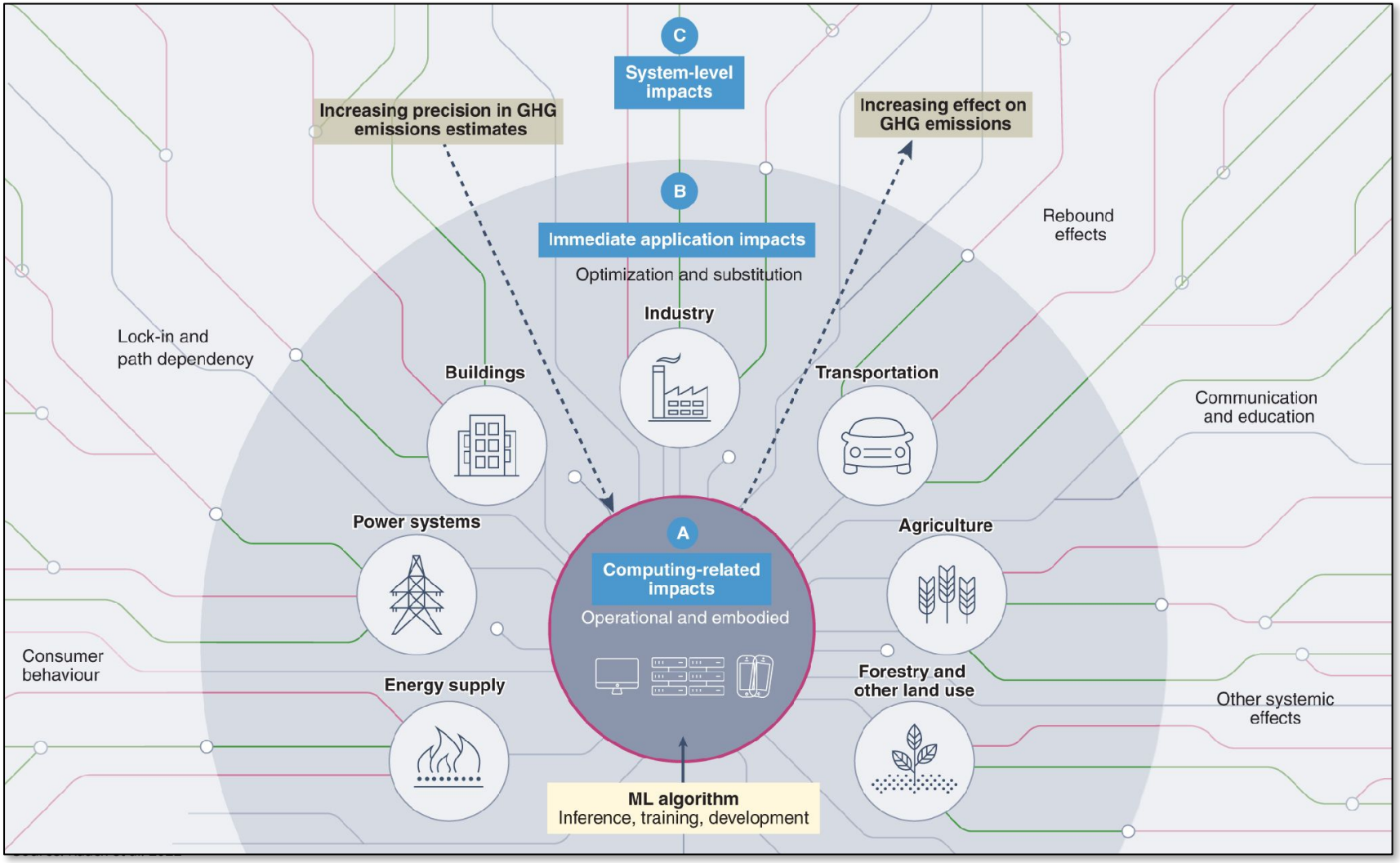
What is one risk posed by AI?

What are Some Risks of a Generative AI Future?

- Information availability about weapons of mass destruction
- Confabulation
- Dangerous, Violent, or Hateful Content
- Data Privacy
- Environmental Impacts
- Harmful Bias
- Human-AI Configuration
- Information Integrity
- Information Security
- IP Rights
- Obscene, Degrading, and Abusive Content
- Value Chain Integrity

Source: NIST (2024)

AI Policies Can Affect Climate Outcomes



Many Governments Have Agreed on Core Principles for Innovative, Trustworthy AI

- Inclusive growth, sustainable development and well-being
- Human rights, democratic values, including fairness and privacy
- Transparency and explainability
- Robustness, security, and safety
- Accountability

Source: OECD (2026) https://www.oecd.org/en/topics/ai-principles.html

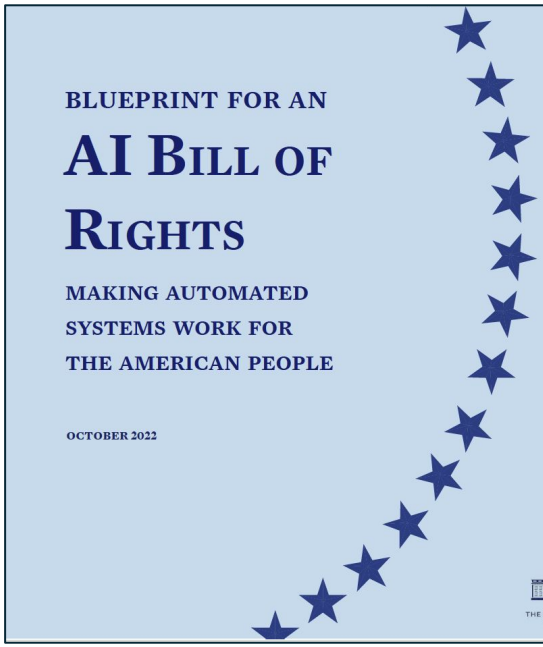
2022 White House Blueprint for an AI Bill of Rights



Safe and Effective Systems



Human Alternatives, Consideration, and Fallback





Notice and Explanation



Algorithmic Discrimination Protections



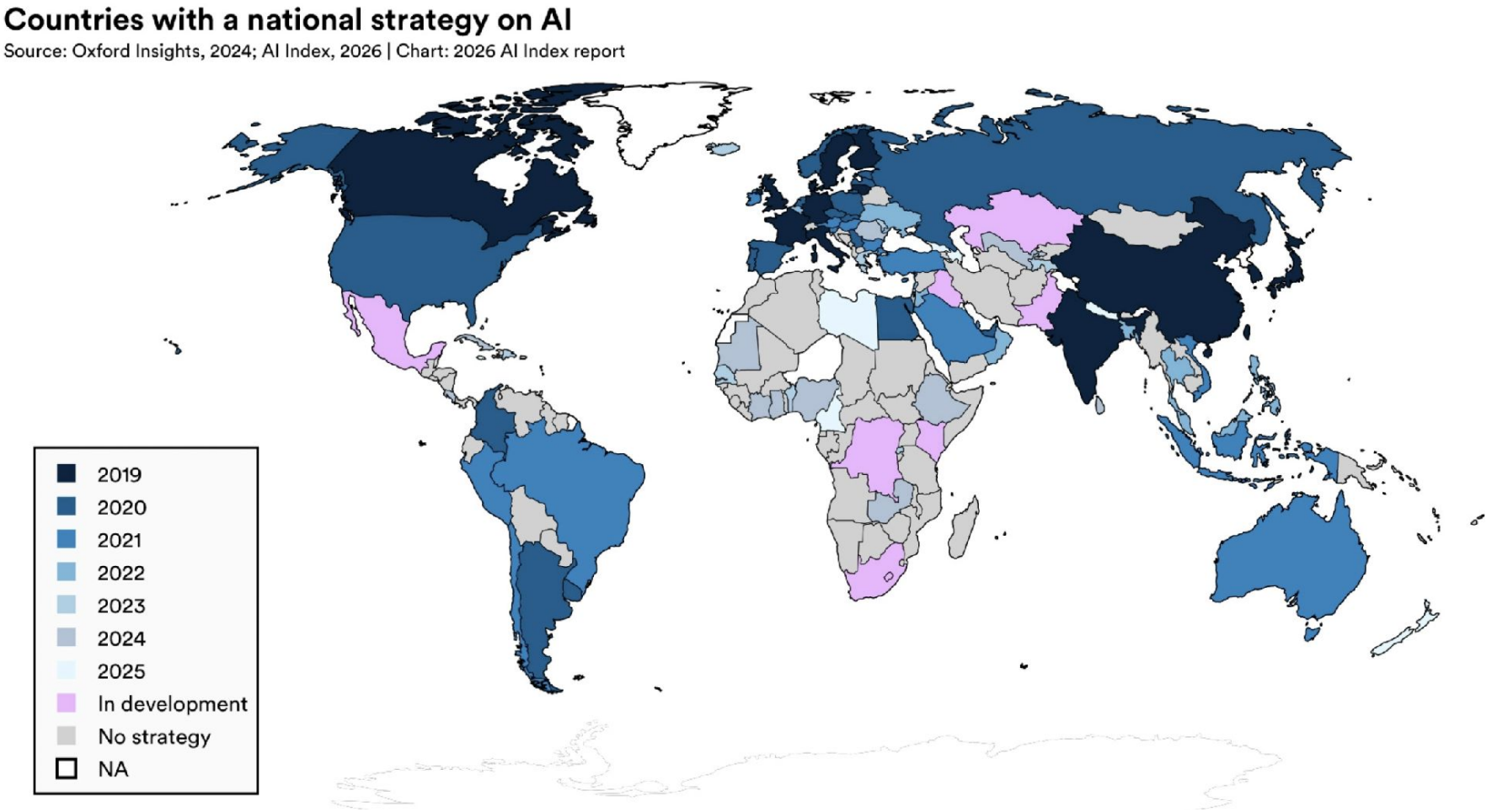
Data Privacy

Source: White House OSTP (2022)

AI and Digitalization Policy and Regulation Encompasses Broader Economic and Socio-Technical Systems

- R&D, Innovation, and Competition
- Rights, Privacy, and Access
- National Security and Safety
- Technology
- Labor and Economy
- Healthcare and Education
- Energy, Climate, and Environment

Growth of National AI Strategies



Source: The Stanford Institute for Human-Centered AI (2026)

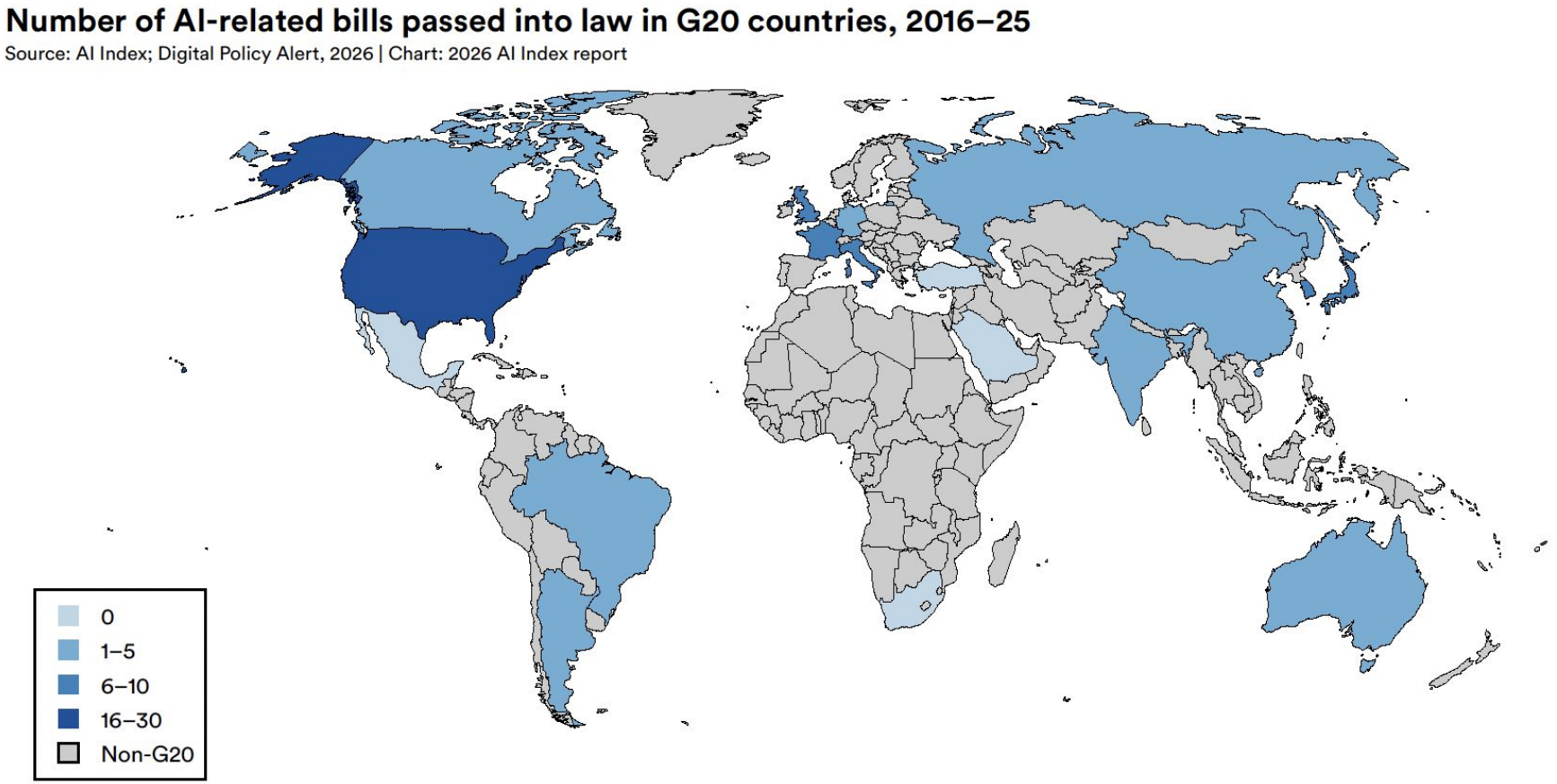
Overlapping Approaches to AI Governance

- Rights-based
- Risk-based
- Standards-based
- Sectoral
- Safety
- Digitalization
- Procurement and Public Sector
- Climate and Infrastructure

Policies and Regulations Codify and Enforce Principles

- National, state, and local governments
- Regulatory agencies
- Firms
- Standards organizations
- International institutions
- Civil society
- Users

Growth of National AI Policies



Source: The Stanford Institute for Human-Centered AI (2026)

Risk-based Governance

- First comprehensive legal framework for artificial intelligence
- Established rules for the development, placing on the market, and use of AI systems in the European Union
- Based on risk levels ranging from unacceptable risk to minimal risk.



Source: https://explorer.artificialintelligenceact.eu

Rights-based Governance





Source: https://www.coe.int/en/web/artificial-intelligence/the-framework-convention-on-artificial-intelligence and https://www.unesco.org/en/articles/recommendation-ethics-artificial-intelligence

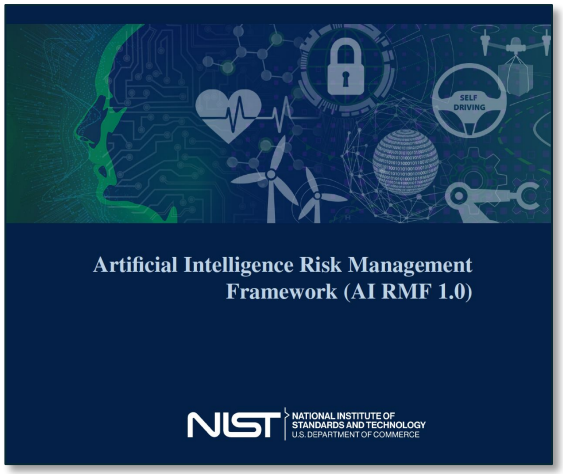
Industry-Facing Governance

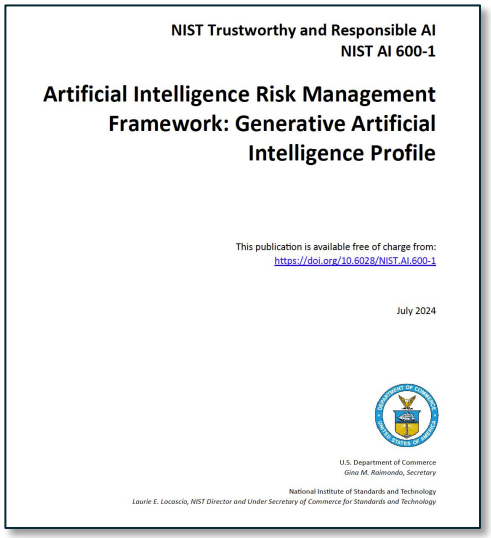
- U.K.
- Singapore
- China
- U.S.

Source:

U.S. AI Policy and Governance

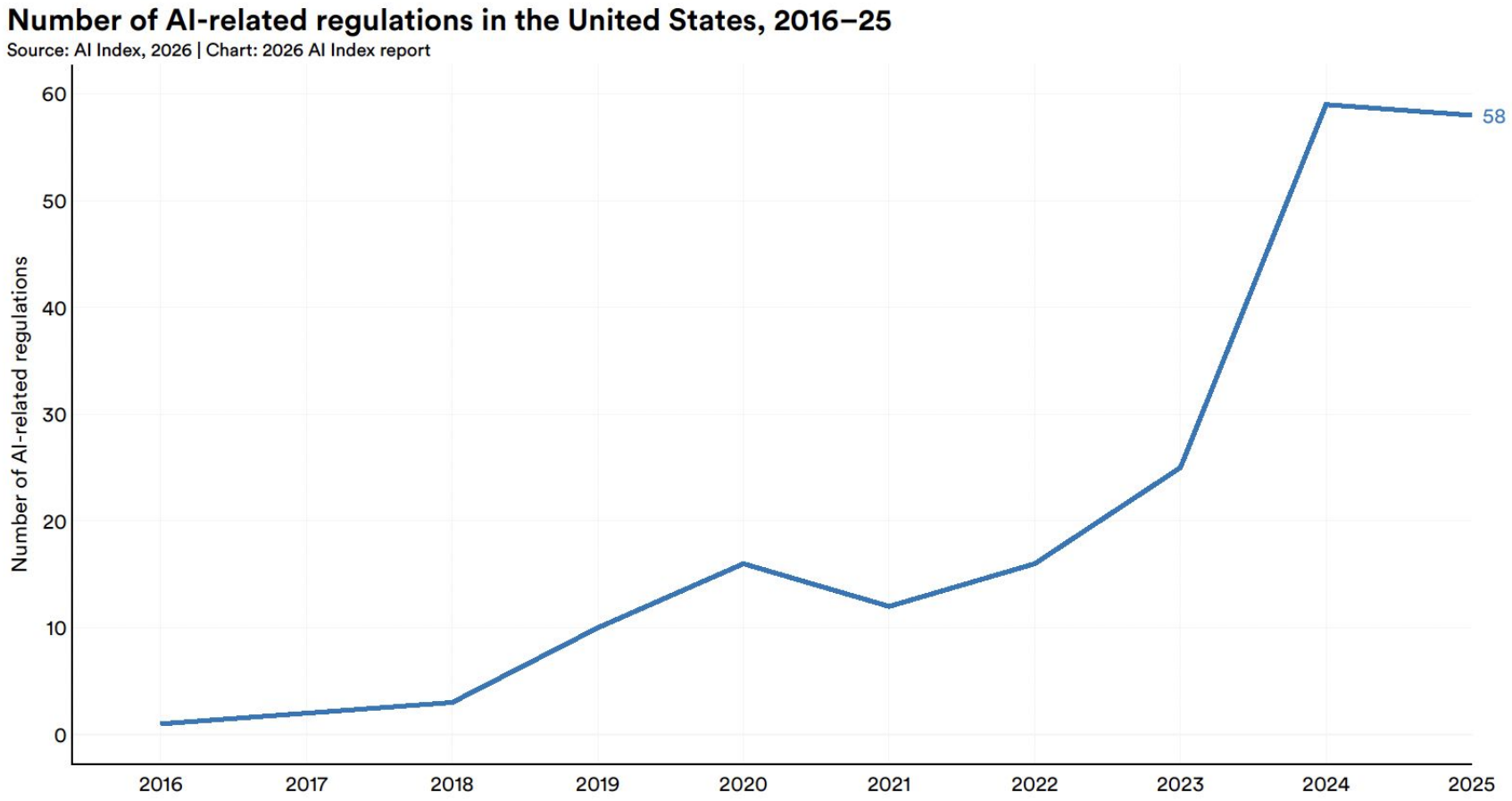






Source: https://www.nist.gov/itl/ai-risk-management-framework, https://doi.org/10.6028/NIST.AI.600-1

Growth of U.S. AI Policies



Source: The Stanford Institute for Human-Centered AI (2026)

Global



Actors	Actions
IPCC, UN, other international bodies	Mutlilateral agreements
Multinational businesses	Funding
	Tracking and monitoring

National



Actors	Actions
Federal agencies	Funding
National associations, NGOs	Research
	General guidance
	Technical assistance
	Tracking and monitoring

Tribal



Actors	Actions
Tribes, Tribal associations	Knowledge and action sharing
Tribal agencies	General guidance
	Funding

Regional



Actors	Actions
Councils of governments (COGs)	General guidance
Regional NGOs	Technical assistance
	Knowledge and action sharing
	Funding

State



Actors	Actions
State and territorial governments	General guidance
State-level NGOs	Technical assistance
Higher-education institutions	Knowledge and action sharing
	Research
	Funding

Local



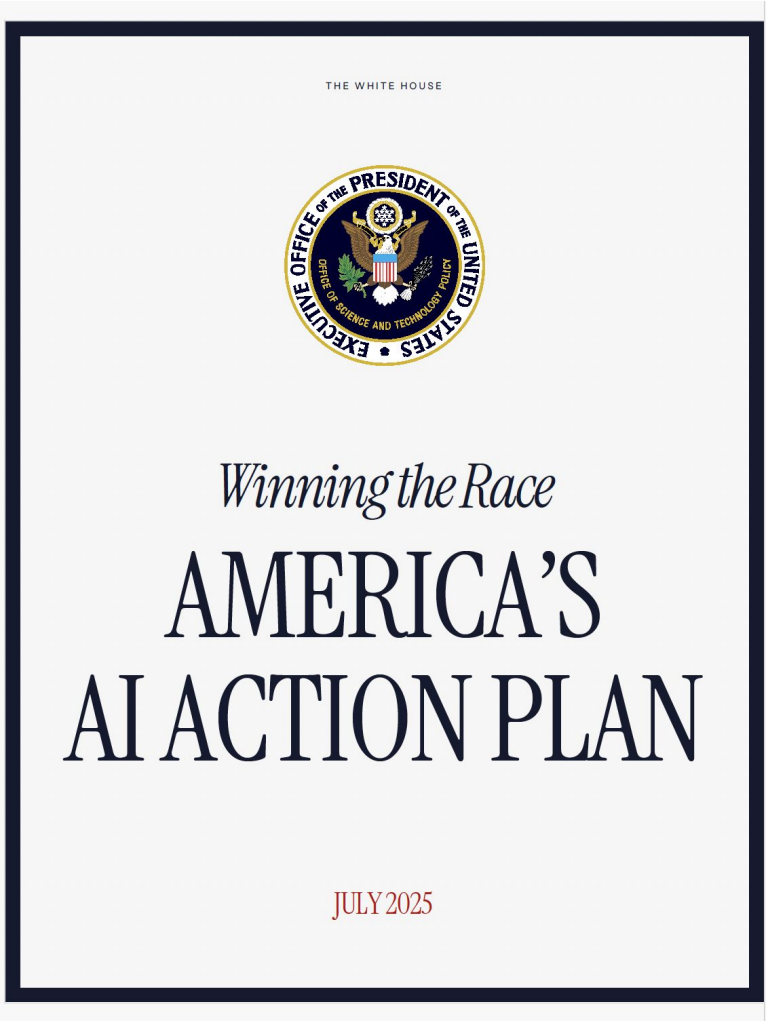
Actors	Actions
Local government	Tracking and monitoring
Individuals, civil society, community-based organizations	Funding
	Knowledge and action sharing

Source: NCA (2023)

U.S. AI Policy and Governance



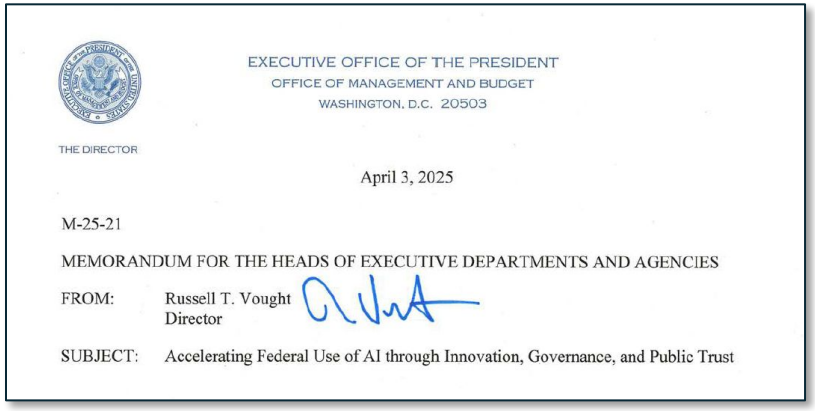
- U.S. Executive Orders direct department and agencies to act



Source: https://www.whitehouse.gov/presidential-actions/2025/01/removing-barriers-to-american-leadership-in-artificial-intelligence/ and https://www.ai.gov/action-plan

U.S. AI Policy and Governance

- Federal use of AI in operations and governance, M-25-21
- Federal use of AI in procurement and acquisition, M-25-22



EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF MANAGEMENT AND BUDGET
WASHINGTON, D.C. 20503

THE DIRECTOR

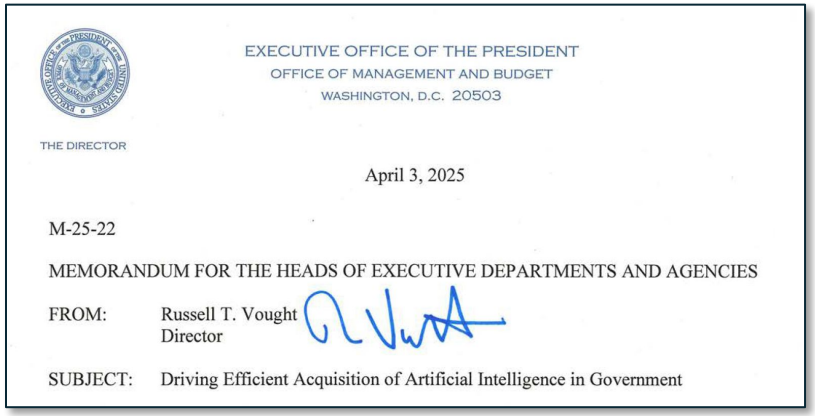
April 3, 2025

M-25-21

MEMORANDUM FOR THE HEADS OF EXECUTIVE DEPARTMENTS AND AGENCIES

FROM: Russell T. Vought
Director

SUBJECT: Accelerating Federal Use of AI through Innovation, Governance, and Public Trust



EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF MANAGEMENT AND BUDGET
WASHINGTON, D.C. 20503

THE DIRECTOR

April 3, 2025

M-25-22

MEMORANDUM FOR THE HEADS OF EXECUTIVE DEPARTMENTS AND AGENCIES

FROM: Russell T. Vought
Director

SUBJECT: Driving Efficient Acquisition of Artificial Intelligence in Government

Source: OMB (2025)

Some Proposed U.S. AI Laws

- Impose restrictions on the use of AI systems or on data
- Require evaluations of AI systems and uses
- Impose transparency, notice, and labeling requirements
- Designate regulatory authorities to oversee AI systems
- Protect consumers through liability measures
- Direct the government to study AI
- Define governmental procurement and use policies

Source: https://www.brennancenter.org/our-work/research-reports/artificial-intelligence-legislation-tracker

AI Policy is More Than Laws

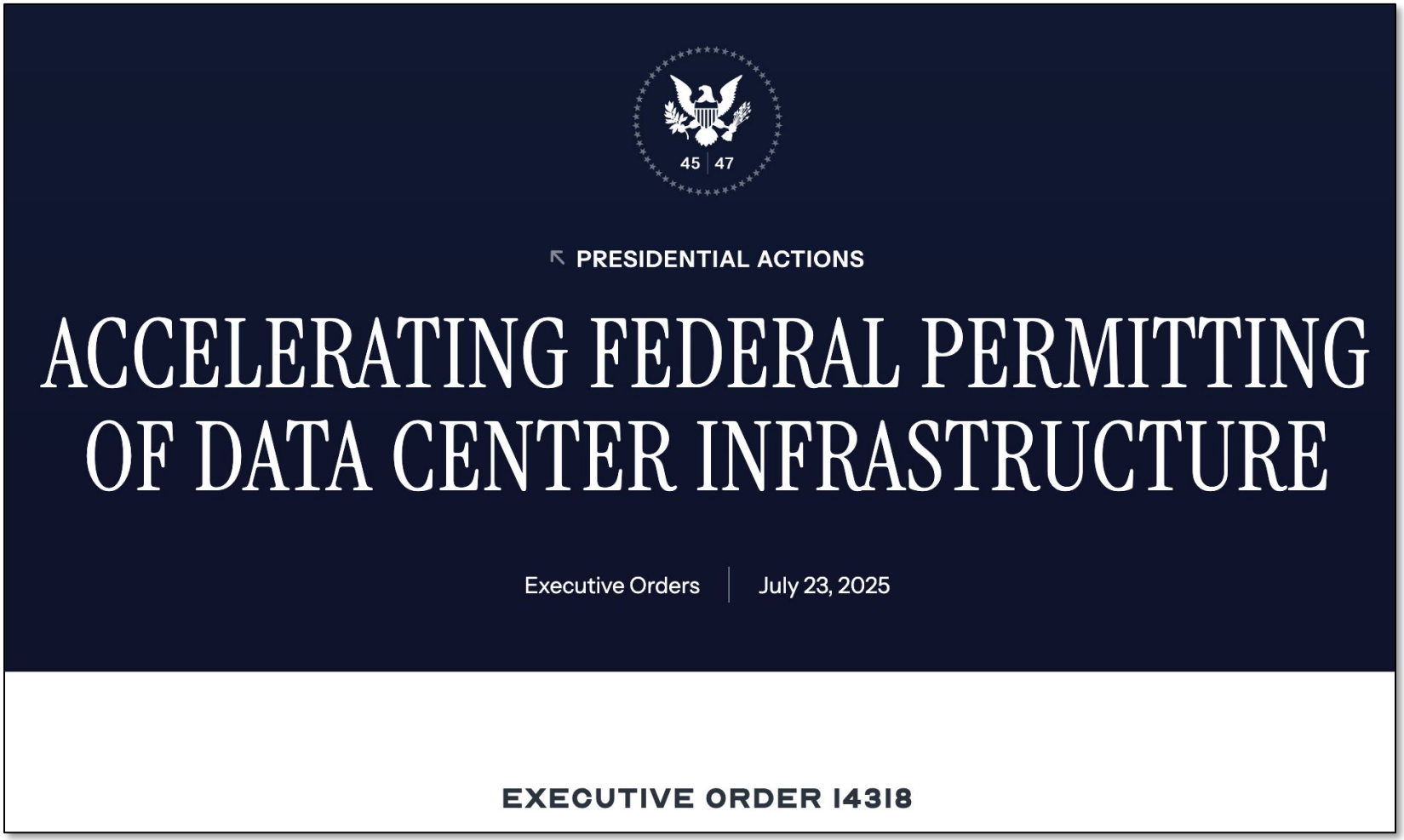
- Governmental AI procurement and use procedures
- International partnerships and competition
- Agenda setting and communications
- **Governmental talent and staffing**
- Public input and sentiment

Energy is an Enabling Input to AI

- **Hardware:** The CPU/GPU design and production chain, from raw materials and rare earth elements to manufacturing.
- **Cloud Infrastructure:** Data centers providing computing power, data storage, and platforms, encompassing energy supply, cooling, security, and redundancy.
- **Internet Infrastructure:** Physical networks (cables, towers, servers, exchange points) and end-user devices enabling internet connectivity and data transfer.
- **Software & Libraries**
- **Applications and Services**

Source: UN (2025)

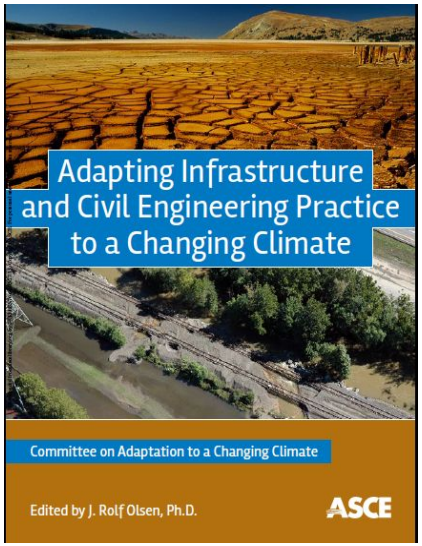
U.S. AI Policy Is Climate and Infrastructure Policy

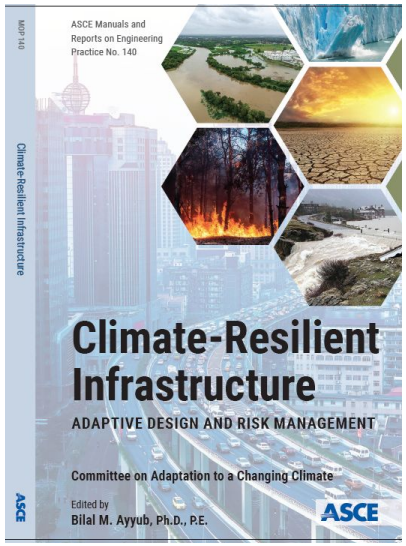


Source: https://www.whitehouse.gov/presidential-actions/2025/07/accelerating-federal-permitting-of-data-center-infrastructure/

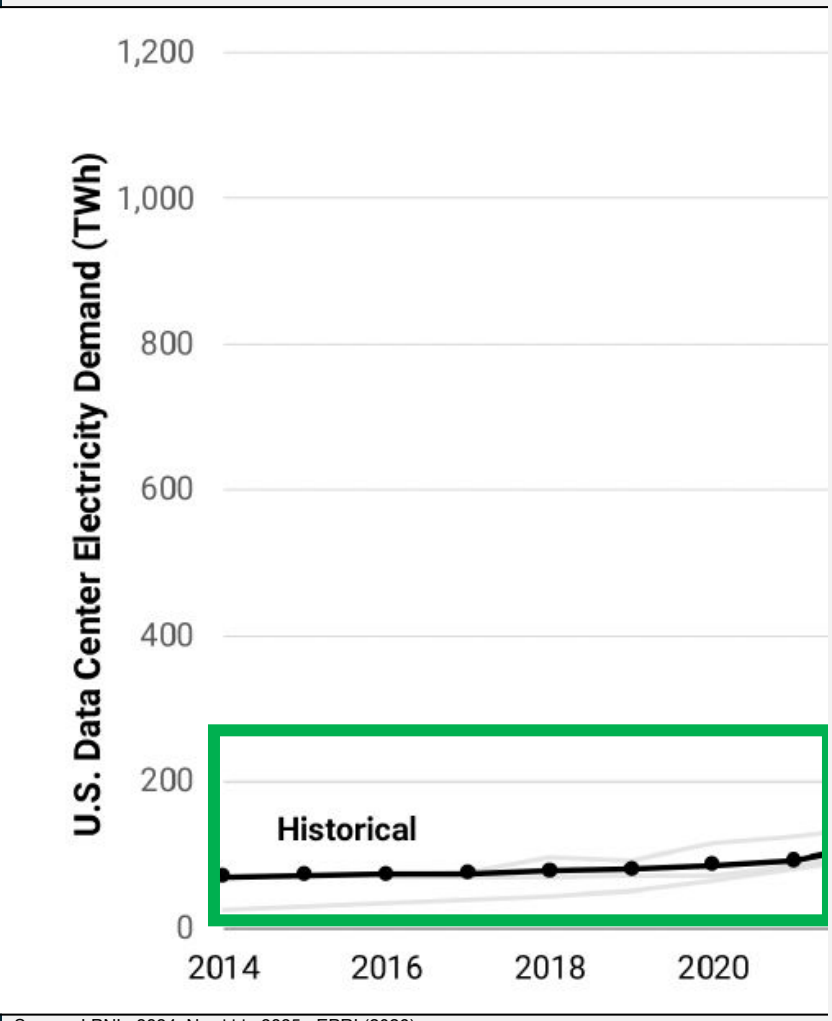
Energy and Supply Chain Infrastructure Has Exposure and Vulnerabilities to Multiple Climate Threats

Increases in extreme heat
Heat waves
Changes in arctic temperatures
Rising sea levels
Storm surge
Extreme precipitation events
High winds
Drought
Wildfires
Earlier snowmelt
Reduced snowpack



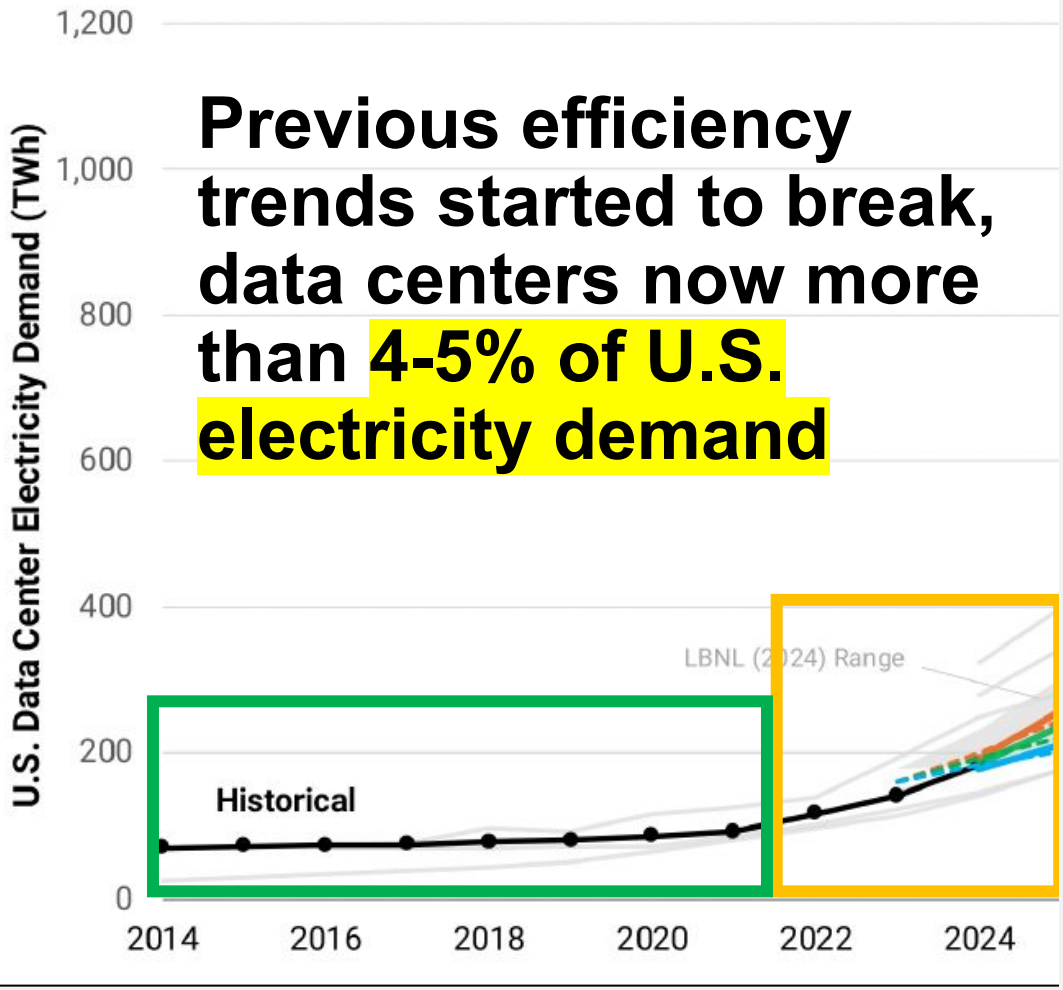


Source: ASCE



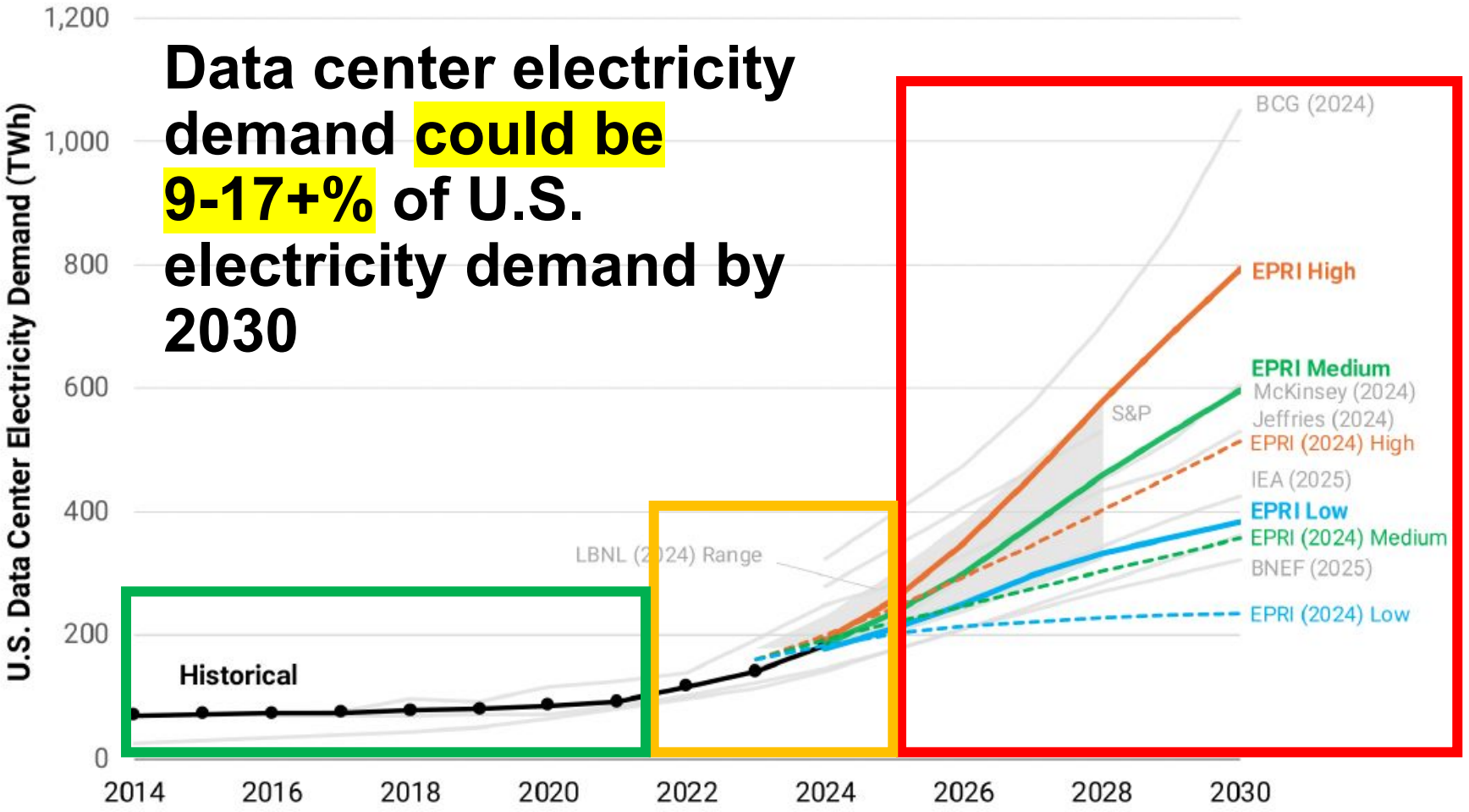
Source: LBNL, 2024; Newkirk, 2025 , EPRI (2026)

From 2010-2020, global internet traffic increased 17-fold but U.S. data center energy use only increased 10%



Source: LBNL, 2024; Newkirk, 2025, EPRI (2026)

Data center electricity demand could be 9-17+% of U.S. electricity demand by 2030



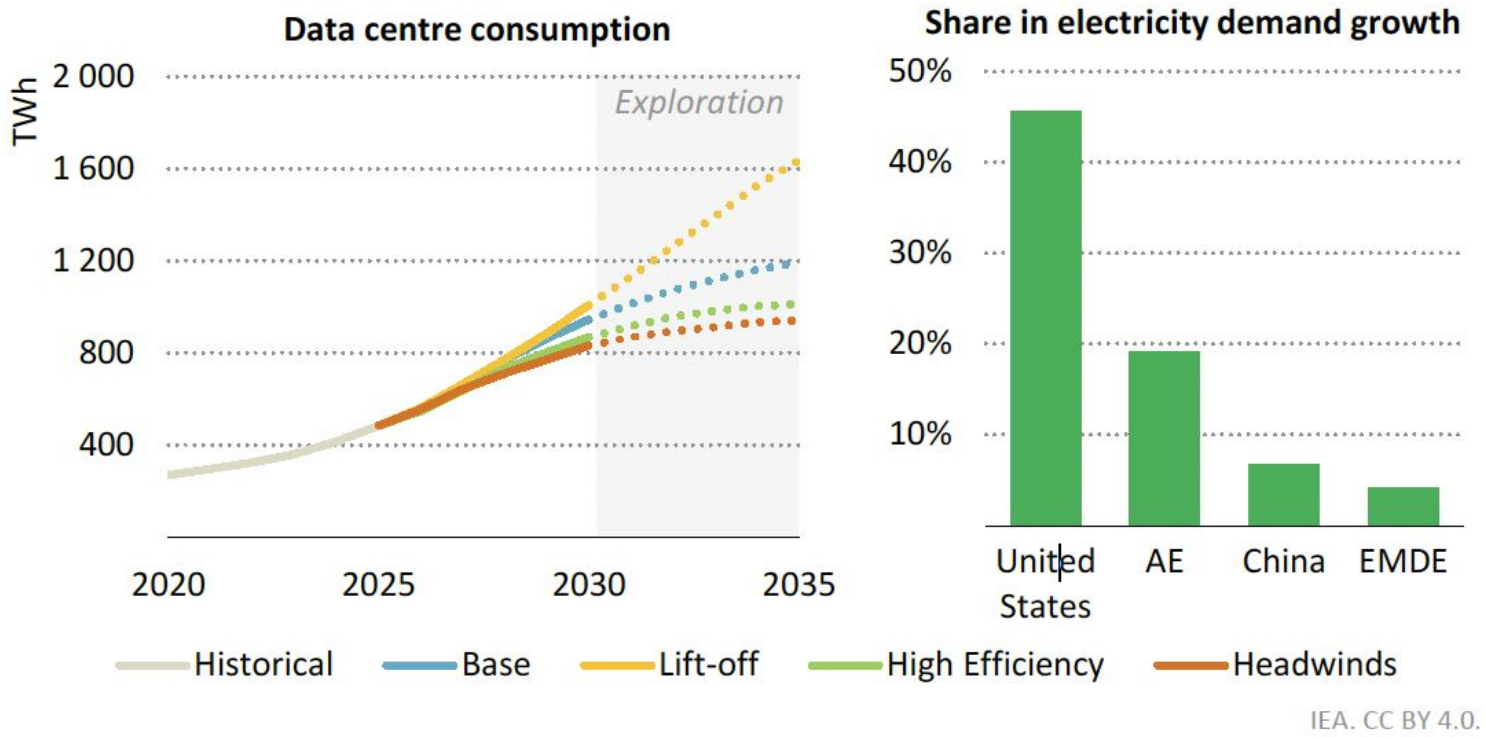
Source: EPRI (2026)

Fossil-Fired Generation Raises Local Pollution, and Water Consumption Creating Challenges In Some Areas



Image source: The Guardian

Projected Growth of Data Center Electricity Demand Varies by Country



The IEA's Base Case continues to provide a sound frame of reference out to 2030, while uncertainty widens after 2030

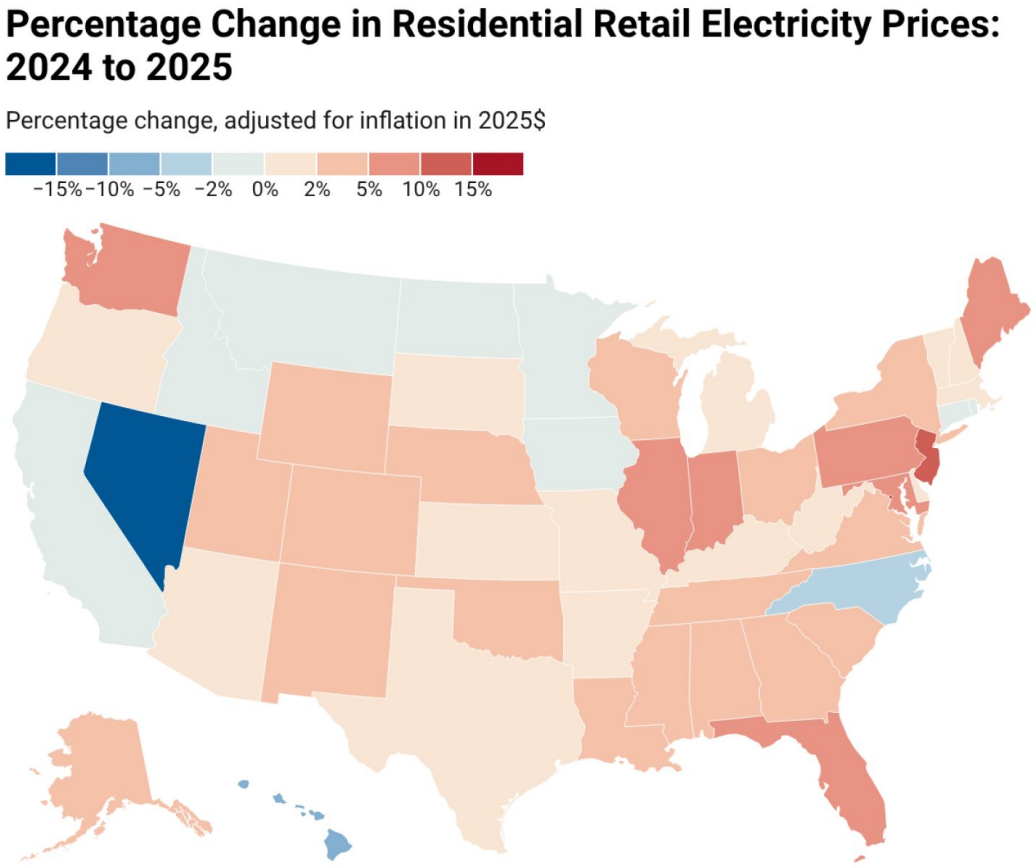
Note: AE = advanced economies; EMDE = emerging market and developing economies. Share in electricity demand growth represents the share of data centres in total electricity demand growth by region to 2030.

Image source: IEA (2026) https://www.iea.org/reports/key-questions-on-energy-and-ai

U.S. Residential Electricity Prices Rising Faster Than Inflation

- 61% of Americans said utility bills add to their financial stress
- More than half of Americans said they have changed spending habits because of utility bills

Source: Powerlines, 2026



Source: Wiser et al. 2026

Fossil-Fired Generation Raises Local Pollution, and Water Consumption Creating Challenges In Some Areas



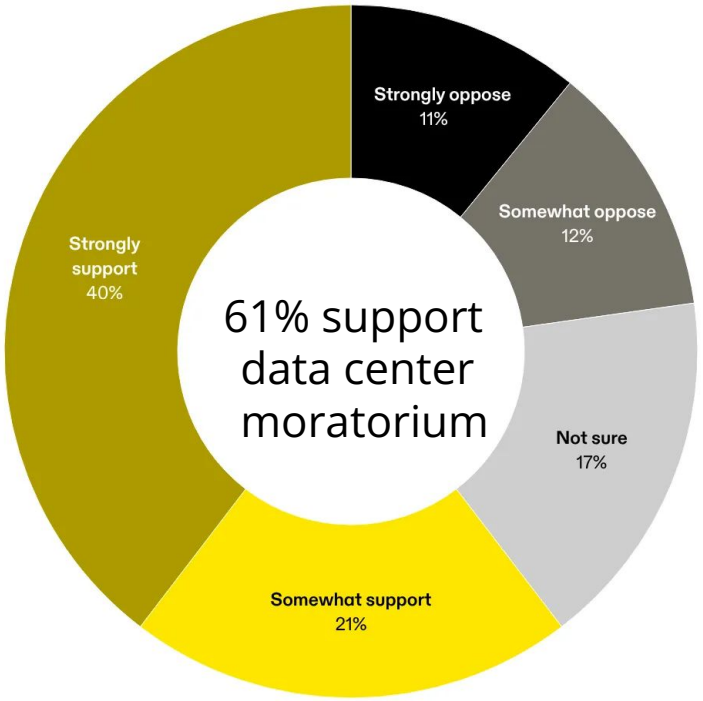
Image source: The Guardian

AI Expansion and the Energy Transition are Firmly Intertwined

- Social license for data centers is eroding and policymakers are responding

- The energy transition and addressing climate change requires **doubling the grid**, and more

Heatmap News asked: "Do you **support or oppose a moratorium**, or temporary pause, on the construction of new data centers nationwide?"



Source: Heatmap Pro / Embold Research

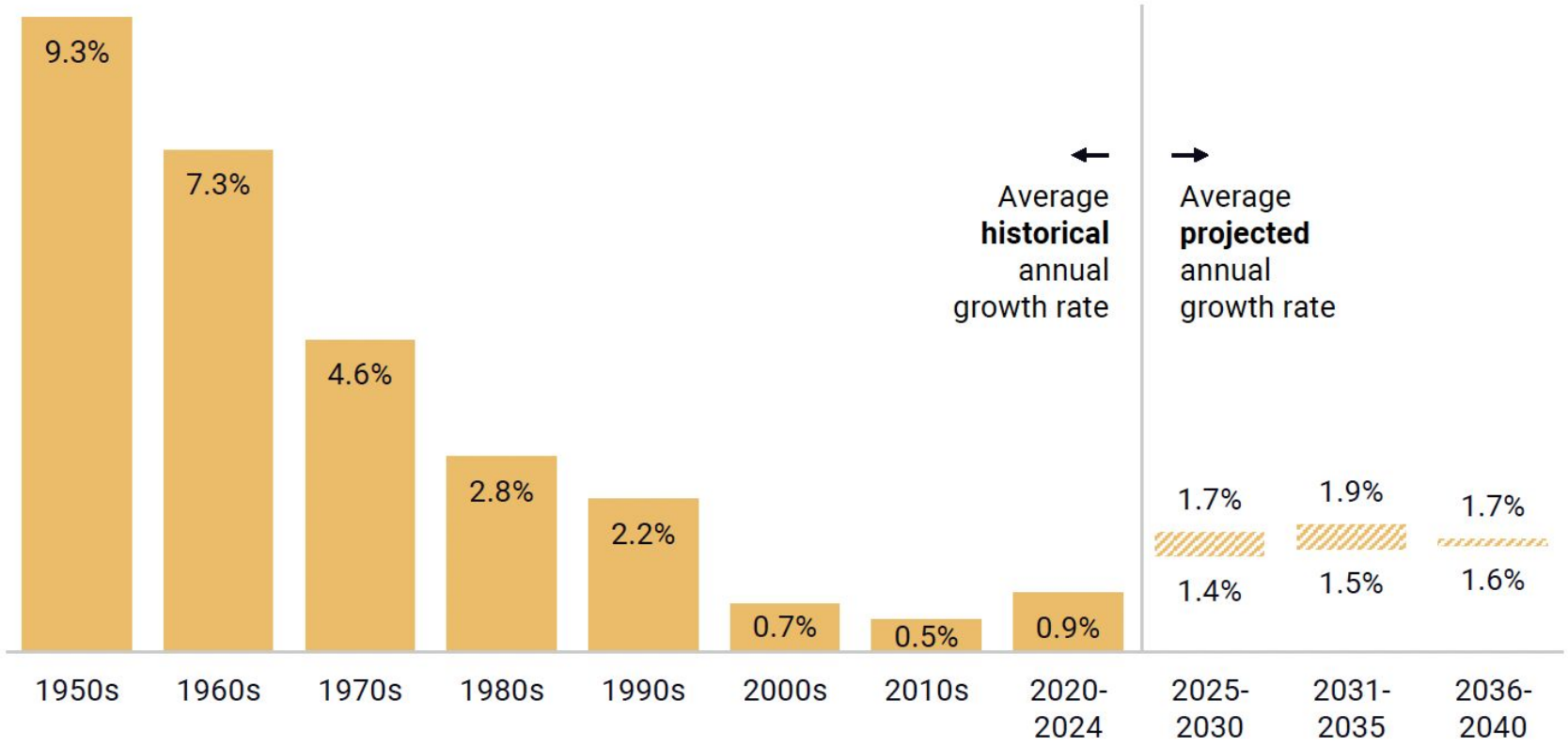
HEATMAP

U.S. Subnational AI Policy and Governance: Safety, Transparency, Moratoriums, and Guidelines

- Frontier-model safety and incident reporting
  - Examples: CA Transparency in Frontier Artificial Intelligence Act, New York Raise Act, Illinois Artificial Intelligence Safety Measures Act
- Automaking decision-making and privacy protection
- **Data center energy and climate actions**

Source and more info: https://www.ncsl.org/financial-services/artificial-intelligence-legislation-database

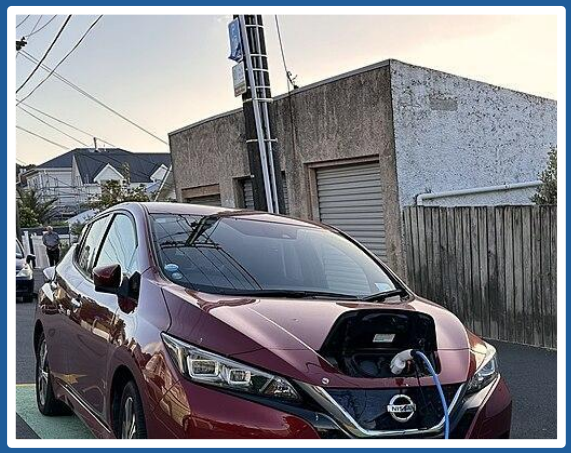
Electricity Demand Growth Requires Policies for Affordability and Reliability



Source: Rhodium Group

Data Centers Are Only Part of Future Anticipated Electricity Growth Needed to Address Climate Change, AI Affects Emissions Broadly

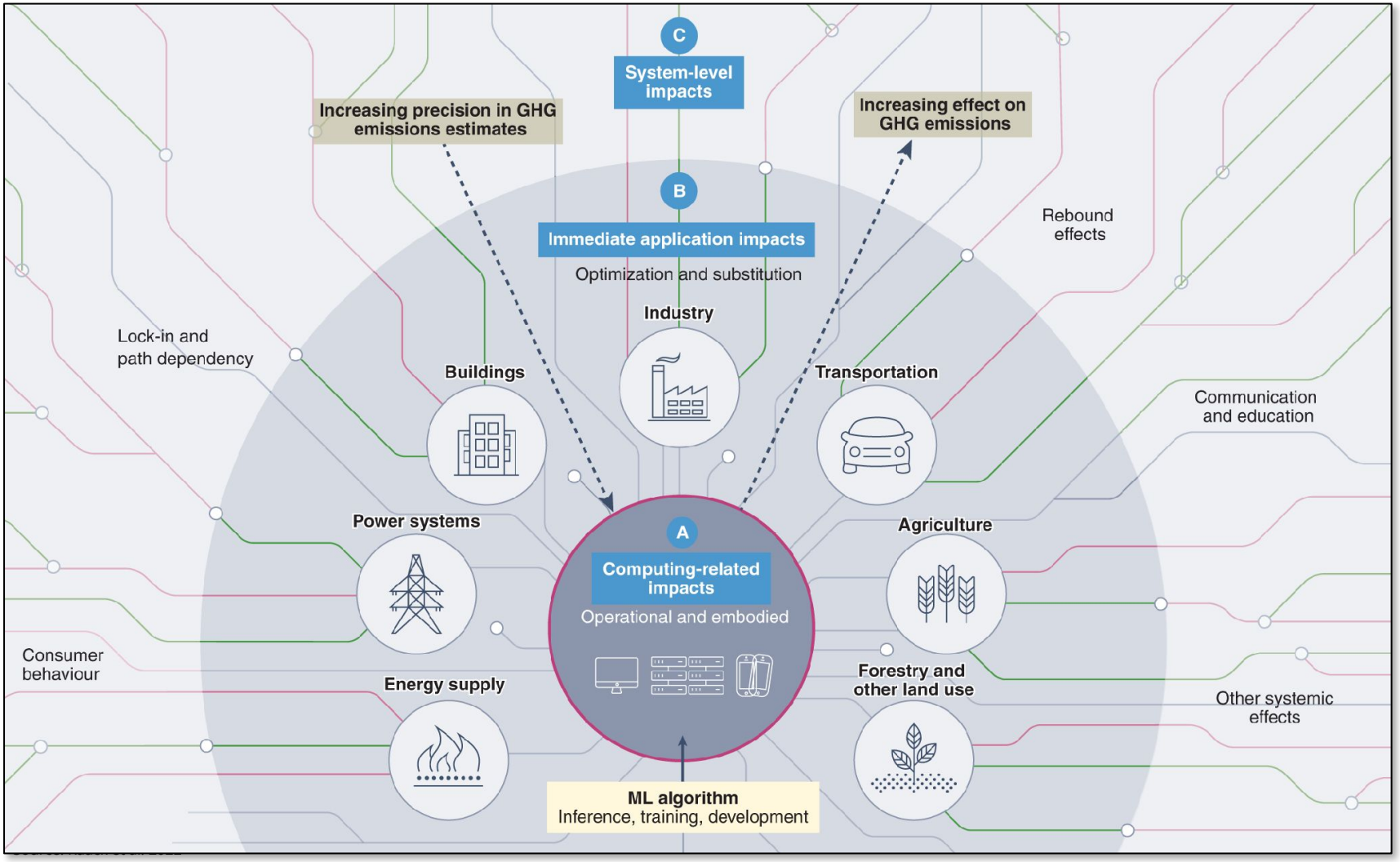








AI and Energy Choices Determine Next Two Decades of Energy, Economic, Security, and Environmental Outcomes



What Does Society Want the Future to Look Like?



What Does Society Want the Future to Look Like?



Image: Wikimedia



Image: Library of Congress



Source: United Nations

Climate and Energy AI Principles That Can Become Policy

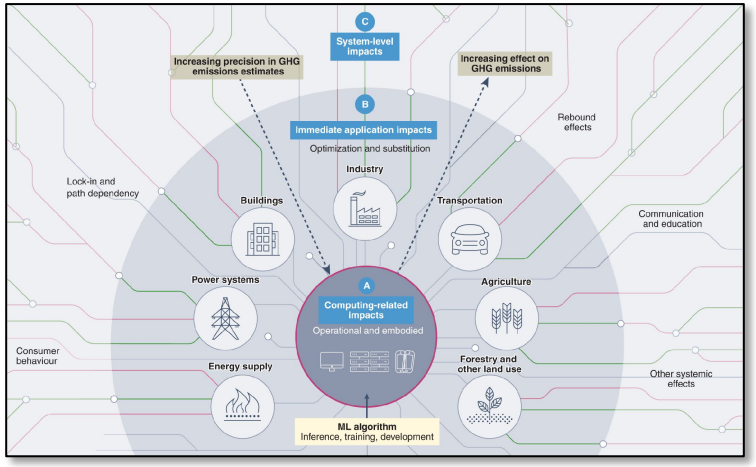
- Enables affordable electricity
- Adds more clean power to the grid than it uses
- Increases reliability, flexibility, and resilience
- Open data and rising efficiency targets
- Treats the power grid as foundational shared clean infrastructure
- Enables current and future local and national environmental objectives



Image: Wikimedia

How AI Policy Can Affect Climate Outcomes

- Chips and IT equipment life cycle emissions
- Location and extent of direct emissions from combustion at from data centers
- Location and growth of fossil and non-fossil power plants in electricity sectors
- Efficiency and spatio-temporal shifting of AI workloads
- Positive and negative sector-wide impacts in the electricity, transportation, buildings, industrial, and agricultural sectors



Source: Kaack et al. 2022

AI Policy is Climate and Infrastructure Policy



Source: NOAA (2022)

What is one aspect of AI that requires policy or regulation?