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The Mitigation of AI Data Center E-Waste on the Federal Level

Executive Summary

On a global scale, the United States is one of the largest producers of electronic waste (e-waste). This has negative implications for environmental quality and public health as e-waste contains toxins such as mercury and lead. There is an absence of federal legislation that manages e-waste, leaving recycling and disposal open-ended and up to the discretion of its owner, with the exception of some state regulations. Poor management of electronic waste therefore degrades various ecosystems and disrupts communities nearby disposal sites due to leakage. Given the rapid growth of artificial intelligence data centers, the amount of e-waste will only multiply in coming years. This brief summarizes electronic waste as a byproduct of data center expansion, identifies consequences of improper disposal, and highlights existing global and state legislation that aim to decrease e-waste.

Background

Electronic waste, or “e-waste” refers to any electronic equipment (e.g., cell phones, computers, and refrigerators) that is discarded due to being outdated, inoperative, or no longer of use. In 2022, the United States alone generated 15.8 billion pounds of e-waste, or 46 pounds per person. As of today, cathode ray tubes are the only form of e-waste that is federally regulated, leaving the management of all other forms of e-waste to state law.

25 state governments have established their own electronics recycling laws, meaning that there are no consistent guidelines or regulations applicable to businesses and

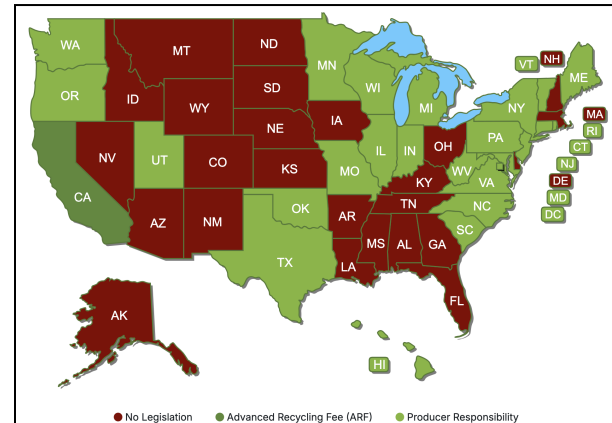


Figure 1. Map of states to show distribution of existing state level e-waste legislation. Source: [Electronic Recyclers International](#)

industries across the country. With the rise of artificial intelligence (AI) data centers, a lack of uniform policy targeting the reduction of e-waste, guidelines for recycling, or standards for proper disposal, will consequently intensify the United States’ production of electronic waste.

Issue Analysis

As of 2025, the United States has established over 4,000 data centers— a quantity that is significantly larger than the rest of the world.

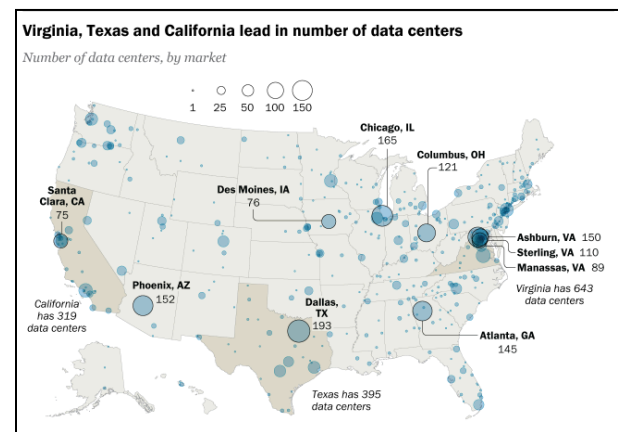


Figure 2. Map of operational and developing AI data centers in the United States. Source: [Data Center Map](#)

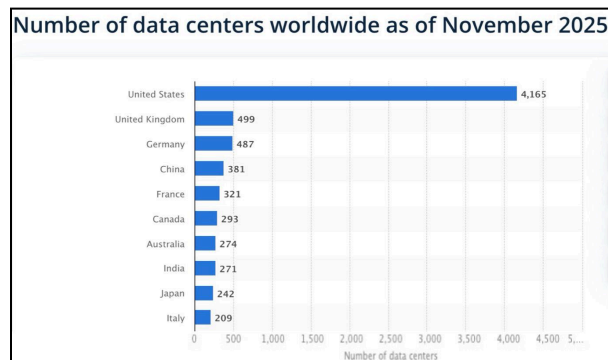


Figure 3. Bar graph visualization of the top 10 countries with the most data centers. Source: [Statistica](#)

AI data centers are physical facilities that store and manage the data, processing units, networking infrastructure, and cooling technology necessary to deploy and train AI models. A 2024 study discovered that [AI data centers may generate anywhere between 1.2-5.0 million tons of e-waste by 2030](#), depending on data center development and waste reduction scenarios.

E-Waste production may be attributed to several factors, including the short lifespan of AI models, constant upgrading of technology, and a lack of recycling and appropriate disposal. Data center graphics processing units (GPUs) are the specialized circuits used for computing AI applications through parallel data processing, and typically last 1-5 years. The GPUs are often replaced due to general wear and tear from constant use on complex workloads, and are superseded by updated hardware with higher capacity for processing more data at a faster rate. The [2024 Global E-waste Monitor](#) shared that only 22.3% of all electronic waste was reported as recycled in 2022. Due to an absence of e-waste recycling and reporting mandates throughout the United States, there is a data gap on the amount of waste produced specifically by the 4,000+ data centers, as

well as little indication to where the e-waste ends up.

Poor e-waste management poses various environmental and public health concerns. To begin with, e-waste from data centers is hazardous as it typically contains neurotoxins such as mercury, lead, and cadmium. If mishandled, people may be exposed to the hazardous substances directly. E-waste may also leak into soil, air, and water sources if dumped into the environment, discarded at landfills, transported to other countries, or through open burning. Exposure to the non-biodegradable materials can worsen lung function, cause birth defects, and increase cancer risk. With that in consideration, a lack of accountability and reporting to practice safe e-waste disposal techniques exacerbates the environmental and public health issues outlined above.

Policy Recommendations

While there are no federal policies that mitigate the impacts of improper e-waste disposal, there are effective policies in other countries that accomplish this.

In 2012, the European Union (EU) enacted a Waste Electrical and Electronic Equipment (WEEE) directive that aims to reduce e-waste. The directive establishes extended producer responsibility (EPR), sets recycling and collection targets, and supports preventative measures against illegal exportation of e-waste.

Switzerland has one of the most efficient e-waste collection and recycling systems due to EPR, the concept that businesses are responsible for the entire lifespan of their products (i.e., from creation to end-of-life management). In 2023, Switzerland had an e-waste recycling rate of over 90%, a success largely due to the



Ordinance on the Return, Taking Back and Disposal of Electrical and Electronic Equipment (ORDEE), implemented in 1998. ORDEE mandates consumers to pay an "advance recycling fee" on electronics purchased within Switzerland, which funds consumers ability to return used electronics to retailers free of charge, so that the waste may be properly recycled.

Comparatively, there is existing state legislation that addresses electronic waste. In California, Senate Bill 20 (SB 20) established the Electronic Waste Recycling Act of 2003. As a result, the Covered Electronic Waste Recycling Program was formed and requires that California residents pay an "electronic waste recycling fee," similar to that of Switzerland's fee. SB 20 also pushes for transparency from manufacturers through mandated annual reports that breakdown the number of devices sold, percentage of recycled materials in the items, and identifies the hazardous substances used. Approved e-waste collectors are also eligible for monetary payments through SB 20, in order to help cover the transportation and recycling costs. This bill places restrictions on exporting e-waste outside the United States, except when reporting the recycling plan to the state and demonstrating that the recycling process complies with international regulations. Since the passage of the Electronic Waste Recycling Act, CalRecycle has recorded recycling a total of 2.2 billion pounds of e-waste.

As AI data centers continue to expand and expel e-waste, federal legislation is needed to prevent loopholes or exceptions from appropriate e-waste management. All in all, successful legislation should:

- **Require proper e-waste recycling.** Setting strict standards for recycling

and banning improper disposal methods will reduce the human and environmental exposure to toxins.

- **Promote transparency.** Mandating annual reports that include e-waste collection, recycling processes, and hazardous makeup of items may improve e-waste rates as producers are expected to share data compliant with regulatory standards.
- **Establish extended producer responsibility.** Holding producers responsible will integrate accountability of products' entire lifespan, which may resolve issues related to planned obsolescence and shift towards a circular economy. If achieved, there may be less e-waste generation overall.

Further Reading

- Crownhart, Casey. 2024 [AI will add to the e-waste problem. Here's what we can do about it](#) MIT Technology Review
- United Nations Institute for Training and Research [Electronic Waste Rising Five Times Faster than Documented E-waste Recycling: UN](#)
- Wang, P., Chen, W., Tzachor, A., Zhang, L. 2024 ["E-waste challenges of generative artificial intelligence"](#) nature computational science 4 (November): 818-823

Authorship

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