The Role of AI and Data Centers in the Electric Industry: Comments on Krugman Post

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I write in response to Prof. Paul Krugman's post "AI is Power-Hungry" (Aug. 18, 2025). My purpose is not to debate AI but to correct technical errors relating to my field of practice, the regulation of public utilities. I offer these comments with humility, because I have always been, and continue to be, in awe of Paul Krugman.

Will AI cause increases in electricity costs?

The post seems to blame the need for new generating capacity, and thus the associated rise in electricity cost, on AI. What breaks the camel's back is not the weight of last straw but the total weight of all the straws. Similarly, the cause of the growing gap between existing electric generating capacity and predicted levels of demand is not AI-related demand but the sum of all demand. Blaming AI for the cost of new generating capacity is just as arbitrary, and just as discriminatory, as blaming immigrants for overcrowded Texas classrooms. It is wrong on physics and wrong on economics. As the legendary Alfred Kahn wrote in *The Economics of Regulation*, at any point in time all loads are equally marginal.

It is possible that adding AI demand to existing demand will increase customers' electricity rates. But not necessarily. An individual customer's retail electricity rate is a fraction, such as cents/kWh. To calculate that rate, the regulator constructs that fraction for the utility's entire system. The numerator is the utility's total cost in dollars; the denominator is the

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predicted total kWhs sold. Dividing the billions in total cost-dollars by the hundreds of billions in projected consumption-kWhs gets us the individual customer's rate in cents/kWh. The entry of data centers will require new utility costs (the numerator), but it will also increase the number of kWhs sold (the denominator). If both the numerator (costs) and denominator (kWhs sold) rise by the same proportion, the retail rate will not change. The utility system and its customer base will simply have gotten bigger. In fact, if the increase in demand exploits economies of scale in generation service, the increase in cost could be proportionately less than the increase in consumption—making rates lower, not higher.

On the other hand, the entry of AI will increase rates if the entry increases costs proportionately more than it increases consumption. That result could occur under at least two conditions:

- The new generating capacity necessary to cover the AI-associated demand might be higher cost than the legacy generation that is serving the pre-AI demand. Here it is necessary to take technical care with the phrase "higher cost." State utility regulators set utility rates based on "embedded cost." Embedded cost includes a rate of return on what accountants call depreciated investment. The utility's legacy generation is, by definition, depreciated investment. Simple example: If the legacy generation's original cost was $900 million, and if the regulator assumed that the generation would last 30 years, and if 15 years have gone by, that generation's depreciated cost will be $450 million. Pre-AI rates will reflect that $450 million. But when the utility adds new generating units to serve the AI-increased total demand, those new units will go into the utility's embedded cost at their new cost (which would be, assuming the same technology and ignoring inflation, not $450 million but $900 million). So all else equal, rates will rise for that reason alone. That result occurs any time utilities add new generating units to meet new demand, whether demand from AI, or other new industries, or population growth—or even just replacing retired generating units with new units.

- The technology associated with the new generation might be a more expensive technology; or the utility might have to deploy generating units that were idled because they operated less efficiently. (Throughout any day, starting at midnight, the utility dispatches its generating units in "merit order"—starting with units with the lowest per-unit operating cost, then moving up the supply curve to units having higher per-unit operating cost. So a higher demand can raise average operating costs, and therefore rates, for that reason.)

If at any point in time all loads are equally marginal, then to blame the cost increase on the most recent demand—the AI demand—is to discriminate based on the character of the customer rather than the nature of the customer's conduct. In regulation as in economics, we want each customer's price to reflect the costs that that customer causes. In utility service, what causes cost is total demand.

Where is the real risk of subsidy?

The post says that "U.S. electricity pricing effectively subsidizes AI." The term "subsidy," shorn of its political baggage, has a variety of technical meanings. Applied to data centers and AI, the relevant version of "subsidy" will occur if electricity costs caused by data centers are borne by other customers. Data centers do present this risk. But the post's reference to an undefined "subsidy" doesn't describe the real problem. The real problem—data centers causing costs that other customer bear—can occur under at least two scenarios:

- States eager to attract the data centers might pass laws requiring their utilities to offer data centers rate discounts. Those discounts have to be funded by the other customers. Absent a federal law preempting those state laws, data centers can play states off against each other, getting larger and larger discounts without necessarily contributing comparable societal value.

- A data center might arrive, the utility then incurs new generating capacity costs to carry out its state-law obligation to serve the new total load, then the data center departs before it has paid for its pro rata share of those new costs. A variation on this scenario is the data center remaining in the state but, after the utility has incurred the new costs, building its own generation for its own use—again escaping its share of the new cost. In each of those variations, the utility will want to raise everyone else's rates to cover the costs that the data center no longer covers. One solution—a controverted one—is to require the incoming data center to sign a contract committing it to pay for the costs at issue—either by remaining in place for a specified number of years, or paying an exit fee before it departs.

An entirely separate issue concerns the structure of the market to serve these data centers. About a dozen states allow retail competition for electric service. In those states competitive service providers (CSPs) compete with the franchised utility—in some states, to serve all customers; in other states, to serve only large industrial or commercial customers. In Virginia, where I am an expert witness on this subject, data centers can choose to buy their electricity from the local utility monopoly or from CSPs. It takes no imagination to recognize that in the competition to serve data centers, the utility monopoly will try to use its government-anointed status to win. One way might be to offer the data centers a discount, and to recover the cost of that discount from its other customers (who, in Virginia, are captive, because the law grants the right to shop only to large customers). The CSPs have no captive customers because they are not franchised monopolies. The local franchised utility also might find ways to penalize data centers that choose to shop with CSPs. Anticipating, detecting, preventing, and penalizing these types of anticompetitive conduct will take careful regulatory attention.

Side point on "natural monopoly" (only for nerds)

The post says that "utilities" are "natural monopolies." This labeling becomes the basis for the post's conclusion that the cost of the new electric generating capacity will be passed on to other customers. This line of reasoning has two errors.

- First, in economics generally and in the public utilities field specifically, the concept of "natural monopoly" is most precisely applied not to a utility company but to a product or service supplied by that company. A product or service is a natural monopoly if its per-unit cost declines over the market's entire demand—where the "market" is defined by product, geography, and sometimes time. (An example of a market is "electric generating capacity able to serve customers in Virginia during the summer.") "Utilities are a natural monopoly' is not a meaningful statement, because it focuses on the company rather than the product, and because it doesn't define the market.

- Second, and fundamentally, the product described in the post is electric generating capacity. No one in the electric industry anymore considers generating capacity to be a natural monopoly service. Competitive wholesale markets for generating capacity, at various levels of formality and competitive vigor, have existed in the U.S. for over 30 years. The remaining natural monopolies in electricity are transmission service and distribution service (respectively, long-distance and local transportation of electric current), though under certain conditions storage and so-called "nonwires alternatives" are becoming reasonable substitutes for both transmission and distribution service. So the suggestion that small customers will necessarily bear data centers' electricity costs because "utilities" are "natural monopolies" is incorrect.

It is true that in a majority of states, retail electric service is provided by a state-franchised utility that has a legal monopoly over customers of that service. But the utility has that monopoly not because the service it provides is a "natural monopoly" service but because the state's statute prohibits competition in the supply of retail electric service. Some of these utilities are vertically integrated—they own their own generation, transmission, and distribution, bundling those three services into one monopoly service. But that legally authorized bundling does not make the full bundle a natural monopoly service. In fact, many of these state-franchised monopoly companies buy some or all of their electric generating capacity from independent sellers operating in wholesale competitive markets.