

No new data centers without enough clean power to run them.

Let Physics Regulate the AI Industry

By Frank Wilczek

Call it the artificial-intelligence crime wave. AI agents are breaking through safeguards, sneaking into outside systems and hiding from monitoring. This has led AI executives including Dario Amodei, Sam Altman and Elon Musk to call for slowing the development of these systems.

Meanwhile, in Abilene, Texas, construction of the Stargate data center is proceeding at a breakneck pace. It draws power from the Texas grid and from 10 on-site natural-gas turbines, with 62 diesel backup generators. Its developers have sought permission to add 41 more gas turbines and 18 more generators. Many other giant data centers are under construction or are being planned and financed aggressively.

There is a contrast here between the professed desire for caution in theory and pedal to the metal in practice. Over the next few years, one can reasonably expect improvements in technological fundamentals, with AI helping to drive them.

Algorithms will improve, as will power electronics, cooling systems and data efficiency. Computation will be cleaner, more useful and more energy-efficient. Meanwhile, a slower pace could give us time to understand AI better and develop meaningful systems of governance.

That prospect ought to be attractive to AI planners. Yet their actions suggest that the competitive frenzy to secure market share has displaced rational assessment of long-term social benefit. The strength of that incentive suggests that voluntary restraint is unlikely to succeed. The same competitive pressures that drive the accumulation of computing power will also encourage the invention of ways to circumvent, erode or evade vague or complex rules.

Regulation works best when attached to measurable physical acts. Bans on atmospheric testing, numerical limits on delivery systems, and the general understanding that first use will be severely condemned and punished have held off nuclear catastrophe. Sharply defined restrictions on biological weapons, ozone-destroying chemicals, leaded gasoline and tobacco marketing have also succeeded. "Develop AI responsibly" is fog. Gigawatts are measurable.

There is a golden opportunity for physics to establish a red line for AI technology: no new sustainable power, no new data center. No large data center, or major extension of an existing one, should receive the permits or grid connection it needs unless its developer brings enough new carbon-free generation, energy storage and transmission online to meet its additional electricity demand—and pays the full cost.

By itself, this won't solve all the problems AI poses. Controlling AI remains difficult. But we can use the physical bottleneck of energy to impose a clear and simple restraint on an industry that has otherwise proved elusive to regulate.

Mr. Wilczek is a 2004 Nobel laureate in physics.

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