DIVISION OF AGRICULTURE
RESEARCH & EXTENSION
University of Arkansas System

Agriculture and Natural Resources

FSA103

AI Power Use and Nitrogen Fertilizer Prices

Eunchun Park
Assistant Professor - Agricultural Economics and Agribusiness, Fryar Price Risk Management Center of Excellence

Artificial intelligence (AI) tools and the data centers that run them use a lot of electricity. Recent growth in AI and data centers has pushed up electricity demand in many regions, according to agencies such as the International Energy Agency and the U.S. Energy Information Administration. Today, global data centers are estimated to use roughly 1.5% of world electricity and have grown at 12% per year over the last five years. When electricity demand rises quickly, power prices can become higher and more volatile.

In many markets, the marginal unit of electricity comes from natural gas power plants. As loads increase, gas-fired plants tend to run harder and more often, which can raise natural gas use and price volatility. Because natural gas is a key input into ammonia—the building block for most nitrogen fertilizer—these energy market swings can later show up in ammonia and urea prices. This fact sheet looks at how monthly changes in natural gas prices relate to nitrogen fertilizer prices and offers practical budgeting tips for producers.

At a Glance

- **Why it matters:** AI data centers use a lot of electricity, and electricity demand is growing quickly. In many regions, that electricity comes from natural-gas power plants, which can push natural gas prices up or make them more volatile.
- **Link to fertilizer:** Most nitrogen fertilizer starts with ammonia, which is made using natural gas for hydrogen, heat, and power.

- **Rule of thumb:** If the natural gas price rises 10% in a month, the nitrogen fertilizer price index tends to rise about 0.5–0.9% across that month and the next month combined. The same-month effect alone is about 0.4–0.5%.
- **Planning tip:** Use a band, not a single number. Stage purchases and watch for big gas moves.

What's Happening

- **AI → Electricity:** Rapid growth in AI and data centers is lifting electricity demand. Data centers are now estimated to use roughly 1.5% of global electricity and have grown at double-digit rates in recent years.
- **Electricity → Gas:** Where gas-fired plants set the marginal power price, higher loads can raise natural-gas use and price volatility.
- **Gas → Fertilizer:** There is a direct link between higher natural gas prices and fertilizer costs. Ammonia (NH)—the building block for nitrogen fertilizer—is mostly produced using natural gas for hydrogen, heat, and power. When gas costs rise, ammonia costs rise, which can pass through to fertilizer prices with a short lag.

The Data

A review of monthly natural gas prices (Henry Hub) and the Producer Price Index for nitrogenous fertilizer manufacturing from 1997–2025 showed the following:

- **Direction:** The prices of natural gas and nitrogen fertilizer usually move together. When gas prices increase, fertilizer prices tend to go up as well (see Figure 1).
- **Size:** The pass-through is modest at the month-to-month horizon:
  - A 10% increase in natural gas prices in a month is typically associated with about a 0.4–0.5% increase in nitrogen fertilizer prices in that same month.
  - Looking across the same month and the following month combined, a 10% gas price increase is typically associated with about a 0.6–0.9% increase in nitrogen fertilizer prices.
- **Summary:** Gas matters, but many other factors (ammonia/urea markets, outages/maintenance, freight, exchange rates, trade policy) move fertilizer prices too.

Figure 1. Gas vs. Nitrogenous Fertilizer Prices. Left axis: Henry Hub ($/MMBtu). Right axis: PPI—Nitrogenous Fertilizer (index). Public monthly data aligned to month-end (Federal Reserve Bank of St. Louis, 2025a; Federal Reserve Bank of St. Louis, 2025b).

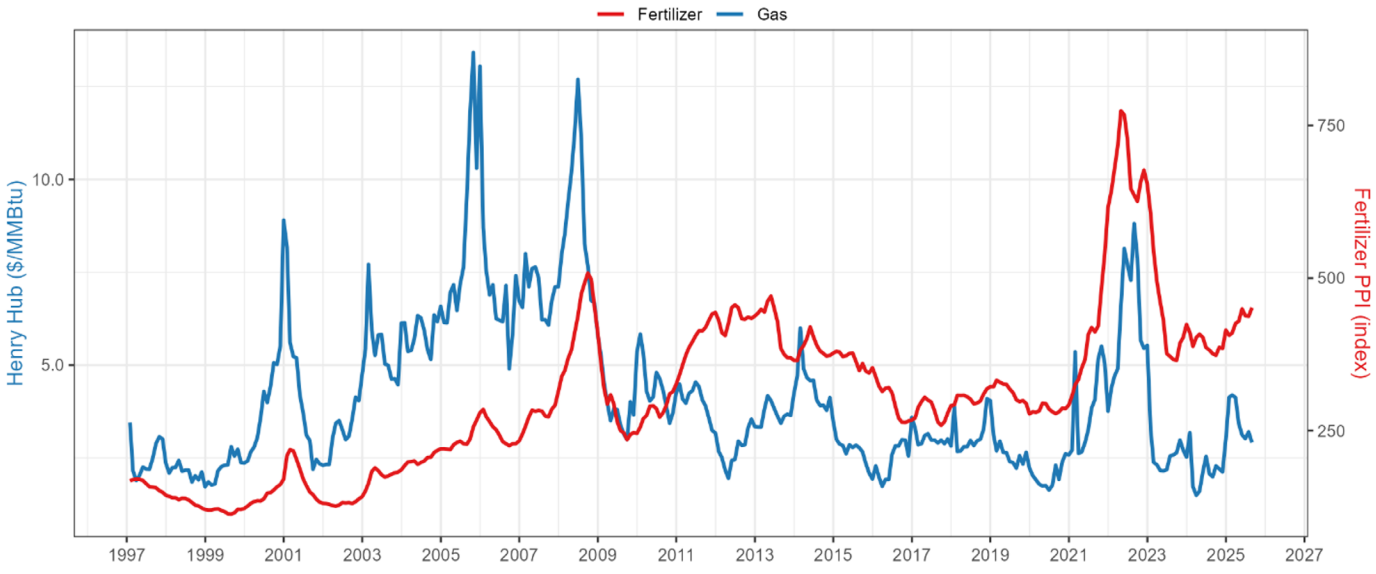

Table 1. Practical Checklist: Gas Price Signals and Fertilizer Actions

	Step	What to Watch / Do	Why It Matters	When to Act
1.	Track gas price changes	Check the Henry Hub natural gas price each month (FRED or news summary).	Gas drives ammonia and nitrogen fertilizer costs.	Every month when new gas prices are released.
2.	Set an alert level	Note when gas price changes by ±10% or more.	Such moves often predict fertilizer price shifts in the next 1–2 months.	Immediately after a ±10% change.
3.	Stage fertilizer purchases	Avoid buying all at once. Split purchases over two months.	Helps smooth the pass-through effect from gas to fertilizer.	During and right after large gas swings.
4.	Review supplier contracts	Ask how your price is linked to ammonia or gas indexes, and what delivery window applies.	Knowing your index helps you understand timing and exposure.	Before signing or renewing any purchase contract.
5.	Use price bands	Budget using a range (e.g., ±2–3%) instead of a single number.	Fertilizer markets respond to many factors beyond gas prices.	When preparing annual or seasonal budgets.
6.	Check freight and local factors	Ask about transportation or regional surcharges.	Local freight and storage costs can offset gas-based savings.	When comparing supplier quotes.
7.	Reassess after shocks	If major events (weather, conflict, energy crisis) occur, revisit your assumptions.	Big global shocks can override normal gas–fertilizer patterns.	As needed after market disruptions.

What Producers Can Do

- **Split purchases:** Avoid all-at-once buys. Stage fertilizer purchases over the next 1–2 months—especially after a ±10% gas move.
- **Set a simple alert:** Track monthly Henry Hub changes; revisit budgets when moves exceed ±10%.
- **Check indexation:** Ask your supplier which index (gas or ammonia) your price references and which delivery window applies.
- **Use bands, not points:** Plan purchases with a price range and update with current ammonia/urea market color, logistics, and foreign exchange (FX)—that is, exchange rates that can affect imported fertilizer costs.

References

[Federal Reserve Bank of St. Louis, 2025a] Federal Reserve Bank of St. Louis (2025a). Henry Hub natural gas spot price (mhhngsp). https://fred.stlouisfed.org/series/MHHNGSP. FRED series MHHNGSP. Source: U.S. Energy Information Administration. Accessed 2025-10-26.

[Federal Reserve Bank of St. Louis, 2025b] Federal Reserve Bank of St. Louis (2025b). Producer price index by industry: Nitrogenous fertilizer manufacturing (pcu325311325311). https://fred.stlouisfed.org/series/PCU325311325311. FRED series PCU325311325311. Source: U.S. Bureau of Labor Statistics. Accessed 2025-10-26.

[International Energy Agency, 2021] International Energy Agency (2021). Ammonia technology roadmap: Towards more sustainable nitrogen fertiliser production. https://www.iea.org/reports/ammonia-technology-roadmap. Discusses ammonia's energy intensity and current reliance on fossil-based hydrogen; executive summary notes feedstock and process energy shares.

[International Energy Agency, 2023] International Energy Agency (2023). Global hydrogen review 2023. https://www.iea.org/reports/global-hydrogen-review-2023. Reports hydrogen demand by sector; ammonia is the largest industrial use of hydrogen globally.

[International Energy Agency, 2025] International Energy Agency (2025). Energy demand from ai. https://www.iea.org/reports/energy-and-ai/energy-demand-from-ai. Accessed 2025-10-26.

[The Royal Society, 2020] The Royal Society (2020). Ammonia: Zero-carbon fertiliser, fuel and energy store. https://royalsociety.org/-/media/policy/projects/green-ammonia/green-ammonia-policy-briefing.pdf. Explains that most energy use and 90% of emissions in ammonia synthesis come from hydrogen production, which is conventionally from fossil fuels via SMR.

[U.S. Department of Energy, EERE, 2025] U.S. Department of Energy, EERE (2025). Hydrogen production: Natural gas reforming. https://www.energy.gov/eere/fuelcells/hydrogen-production-natural-gas-reforming. Overview of steam–methane reforming as the dominant current pathway for hydrogen production in the U.S.

[U.S. Energy Information Administration, 2025] U.S. Energy Information Administration (2025). Shortterm energy outlook (steo). https://www.eia.gov/outlooks/steo/. Accessed 2025-10-26.

DR. EUNCHUN PARK is an assistant professor - agricultural economics and agribusiness at the Fryar Price Risk Management Center of Excellence, University of Arkansas, Fayetteville.