

AGRICULTURE & RURAL AFFAIRS

Incent and invest: Laws show states aiming to reduce use of conventionally produced nitrogen fertilizers, expand options through local production

by Rebecca Leis (rleis@csg.org)

In Nebraska and Minnesota, new state incentives are encouraging farmers to reduce their use of synthetic fertilizers.

A goal of recent laws in Minnesota and North Dakota is to ramp up in-state fertilizer production.

And at the federal level, over the past three years, nearly a half-billion dollars has been invested in projects that boost U.S. manufacturing of fertilizers. In all, 31 projects across the 11-state Midwest have received money through the U.S. Fertilizer Production Expansion Program.

Various factors have led lawmakers to pursue these policies. Most significant was a spike in fertilizer costs, which more than doubled between 2021 and 2023. Although prices have eased since then, the supply-chain problems and the war in Ukraine highlighted vulnerabilities.

Other goals for state leaders include protecting local water resources and reducing greenhouse gas emissions.

FEEDING THE WORLD

“Synthetic nitrogen fertilizers produce food that feeds about half of the global population, or 3.9 billion people,” says Dr. Lorenzo Rosa of Carnegie Science, whose research found that 132 million metric tons of this product were needed to meet global food demand in 2021.

The Midwest’s farmers produce a large share of the world’s food. To do so, they rely on synthetic nitrogen fertilizers often manufactured in other regions or countries.

For example, U.S. production is concentrated along the Gulf Coast, where natural gas is abundant. (Natural gas is both a building block for nitrogen fertilizer and an energy source to fuel its production.)

The result is a mismatch in consumption vs. production in the Midwest: This 11-state region consumes close to two-thirds of U.S. nitrogen fertilizer, while producing an estimated 20 percent of it. A considerable amount also is imported to this country. Canada, for instance, supplies U.S. growers with nearly 10 percent of their nitrogen fertilizer needs, according to The Fertilizer Institute.

TRADE-OFFS TO CONSIDER

Understanding the magnitude of synthetic nitrogen fertilizers’ role in the global food system starts with the

basics of plant nutrition. Plants need nitrogen, phosphorus and potassium to grow, with nitrogen being the most critical of the three for increased yields.

In the late 1800s, Fritz Haber and Carl Bosch developed a method to convert abundant atmospheric nitrogen into plant-usable nitrogen by combining it with hydrogen (typically derived from natural gas) to form ammonia. The Haber-Bosch process is still used today, even though it is highly energy-intensive.

Transporting synthetic nitrogen fertilizers can easily double the cost of total production, Dr. Rosa notes, so the distance between where they are produced and applied can greatly impact costs.

And the use of this product has trade-offs.

Synthetic nitrogen fertilizers account for approximately 2 percent of global greenhouse gas emissions, can harm water quality with overuse, and are a considerable expenditure for farmers. According to the U.S. Department of Agriculture, fertilizer was the top input expense in 2024, comprising anywhere from 18.4 percent to 36.8 percent of operating costs depending on soil type and the crop being produced on the farm.

NEW INCENTIVES IN TWO STATES

As part of a working group seeking to address a rise in the nitrate levels of private wells, Nebraska Sen. Teresa Ibach noticed that many of the policy responses to the problem were reactive.

A farmer herself, she understood nitrogen fertilizer use and sought a proactive solution: address the sources of nitrates in the first place. She asked, “How do we incent producers to use something besides synthetic nitrogen to produce equal or better yields more efficiently?”

One of the policy responses in Nebraska was passage of the Nitrogen Reduction Incentive Act (LB 1368 of 2024), which provides annual \$10-per-acre payments to farmers who reduce commercial fertilizer use.

To be eligible, a producer must cut use by 40 pounds per acre or 15 percent of a baseline amount. These reductions come “by incorporating a qualifying product in the farmer’s nutrient plans.” One such product is a microbial additive applied to soil or seed that promotes biological nitrogen fixation — where microbes near roots convert atmospheric nitrogen into a usable form.

This is a promising way to reduce the carbon footprint associated with nitrogen fertilizer, Rosa says. However, he adds that while biological nitrogen fixation occurs naturally between soil microbes and legumes, it remains under-researched and insufficient alone at meeting the full nitrogen requirement for cereal crops such as

corn without genetic engineering.

Still, Ibach believes policy incentives promoting nitrogen fertilizer alternatives lead to reduced synthetic fertilizer use and improved soil health. In the Nebraska program’s first year, 148,000 acres were enrolled, surpassing expectations. She notes that high commodity prices give farmers more flexibility to try new, potentially riskier

practices, while incentives are crucial when prices are low.

Similarly, the goal of a new law in Minnesota is to assist farmers in making their operations more sustainable and efficient.

Farmers can’t control market prices, Minnesota Rep. Paul Anderson notes, but they can manage costs.

Signed into law in May, HF 2446 directs the Minnesota

agriculture commissioner to create a per-acre incentive payment for agriculture producers who can verify a reduction in rates of commercial nitrogen fertilizer use — the lesser of 15 percent or 30 pounds per acre.

Similar bills also were introduced this year in Illinois (HB 2745) and Iowa (HF 942).

INVESTMENTS IN PRODUCTION

In 2023, two Midwestern states launched plans to increase local fertilizer production.

North Dakota’s \$125 million program (part of HB 1546) was for projects that produce nitrogen fertilizer using water electrolysis. That same year, Minnesota allocated \$7 million in grants (HF 2310) for agricultural and rural electric cooperatives to invest in facilities that use local renewable energy for fertilizer production.

Among the goals of these state investments were to lower fertilizer costs (by reducing transportation costs) and boost rural economies through local production.

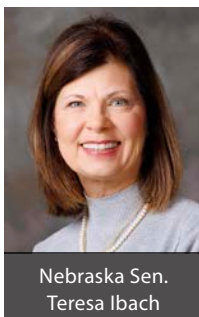
Since passage of these laws, North Dakota’s main grant recipient withdrew, citing normalized fertilizer prices and reduced federal hydrogen tax credits. In Minnesota, \$4 million in grants were rescinded due to budget shortfalls.

Across the Midwest, projects to expand fertilizer production have received funding under a 2022 federal law (see table). In Iowa, for example, a “green” nitrogen plant opened in early 2025 and now produces 20 tons of ammonia every day using renewable energy, water and air. It was the recipient of a \$4.9 million federal grant.

Rebecca Leis is CSG Midwest staff liaison to the Midwestern Legislative Conference Agriculture & Rural Affairs Committee. Nebraska Sen. Teresa Ibach and North Dakota Sen. Paul Thomas serve as committee co-chairs. Minnesota Sen. Robert Kupec and Illinois Rep. Brad Fritts are the co-vice chairs.



Minnesota Rep. Paul Anderson



Nebraska Sen. Teresa Ibach



NITROGEN FERTILIZER CONSUMPTION VS. PRODUCTION IN MIDWEST

63%

MIDWEST SHARE OF TOTAL U.S. CONSUMPTION OF NITROGEN FERTILIZER¹

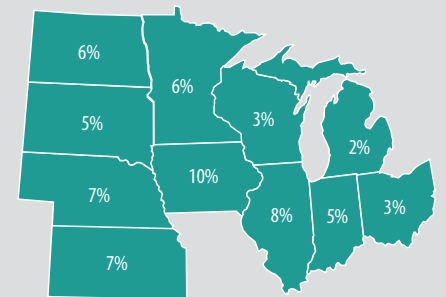
20%

MIDWEST SHARE OF U.S. PRODUCTION OF NITROGEN FERTILIZER²

¹Data on consumption comes from The Fertilizer Institute; see state-by-state data below.

²Data on production comes from the “2023 Fact Book” done by the company Nutrien, which counted 11 fertilizer plants with ammonia and/or urea capacity in the Midwest: one in Illinois, four in Iowa, two in Kansas, two in Nebraska, one in North Dakota, and one in Ohio.

SHARE OF TOTAL U.S. CONSUMPTION OF NITROGEN FERTILIZER



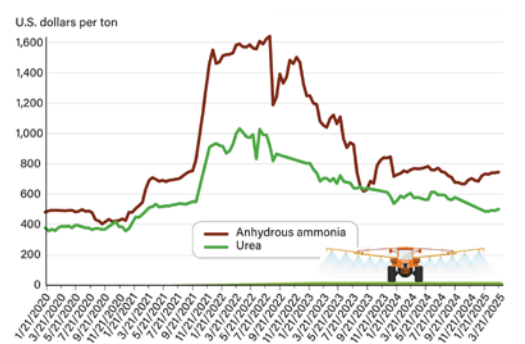
Source: The Fertilizer Institute

INVESTMENTS, BY STATE, UNDER FEDERAL FERTILIZER PRODUCTION EXPANSION PROGRAM

State	# of projects	Investment
Illinois	5	\$32.6 million
Indiana	2	\$9.5 million
Iowa	4	\$18.4 million
Kansas	2	\$4.7 million
Michigan	2	\$42.3 million
Minnesota	2	\$6.8 million
Nebraska	2	\$7.9 million
North Dakota	1	\$1.5 million
Ohio	4	\$13.3 million
South Dakota	1	\$3.0 million
Wisconsin	6	\$29.2 million
Midwest total	31 (41% of U.S. total)	\$169.2 million (38% of U.S. total)
U.S. total	76	\$447.3 million

Source: U.S. Department of Agriculture

MONTHLY AVERAGE FERTILIZER PRICES: 2020-2025*



* Anhydrous ammonia is a nitrogen-rich gas that is transformed into a liquid fertilizer when compressed. Urea is nitrogen fertilizer in pellet form (easier to transport). It contains less nitrogen by weight (46%) than anhydrous ammonia (82%).