

Staying Home

How Ethanol will Change
U.S. Corn Exports



Institute for Agriculture and Trade Policy



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About this publication
Staying Home: How Ethanol will Change U.S. Corn Exports

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Executive Summary

U.S. ethanol production is expanding at a phenomenal pace, doubling between 2001 and 2005 and likely to double again in the next few years. While some corn needed to meet higher ethanol demand could come from increased production, the U.S. Department of Agriculture (USDA) states that much of the additional corn needed for ethanol production will be diverted from exports.

Despite this fact, there has been little focus on or discussion of the impact of corn-based ethanol on U.S. corn exports. But these impacts could be significant, and ethanol's potential impact on corn exports should cause policymakers to reconsider their long-standing focus on exports.

The U.S. already has over 100 active ethanol plants capable of producing more than five billion gallons of ethanol per year. An additional 58 plants currently under construction or expansion will add nearly four billion more gallons of capacity, bringing total capacity to nearly nine billion gallons—and surpassing the Renewable Fuels Standard requirement of 7.5 billion gallons by 2012, far ahead of schedule. In addition, if all 150 currently proposed ethanol plants were to be built, U.S. ethanol capacity would surpass 19 billion gallons per year.

While ethanol from cellulosic sources looks promising, corn will continue to be the primary source of ethanol in the near future. Given the continued enormous expansion of ethanol capacity, this will result in significant shifts in the corn market.

In a break from past projections, many of the major agricultural organizations are now projecting flat corn export levels or even a decline in corn exports, citing ethanol as a key to this change. But even these new projections are likely to underestimate the impact of ethanol on exports, because they do not take into consideration the many ethanol plants currently on the drawing board.

Factoring in the impact of proposed ethanol plants yields some stunning results. For example, if only a quarter of the plants currently proposed in the Midwest do come on line, and if the corn needed to supply these plants and the plants currently under construction were to be diverted from exports, Midwest corn exports could be cut in half. This shift would impact some states more than others. For example, Nebraska could see negative corn exports (meaning corn needed for ethanol plants would exceed corn for exports) if only a fraction of its proposed plants come online.

The growing demand for corn from the ethanol industry will result in several shifts in the Midwest agricultural economy. First, higher prices will likely induce more farmers to grow corn. Second, the livestock industry may reduce its Midwest corn demand, either by using alternative feed sources or raising less Midwest livestock. Yet even with these shifts, it appears very likely that ethanol will reduce the availability of corn for export.

The shift of agricultural land into energy production and bio-based products is not likely to reverse course anytime in the near future. Whatever the crop—be it corn or switchgrass—domestic markets are likely to provide more opportunities to farmers than the export of agricultural commodities. Our agricultural, transportation and trade policies also need to shift to address this new reality and truly invest in the future of U.S. agriculture.

Introduction

U.S. ethanol production is expanding at a phenomenal pace. U.S. ethanol production doubled between 2001 and 2005, and will likely double again within the next few years.¹ The USDA's Chief Economist recently called ethanol "the most stunning development in agricultural markets today."²

The rapid growth in ethanol production has been embraced by grain farmers, who benefit from the strong corn demand, and has raised concerns for the livestock industry, which relies on low-cost corn for animal feed. Currently, about half of U.S. corn is used for animal feed, about 28 percent for food and industrial uses, and 18 percent for export.³

While some of the corn needed to meet the increased ethanol demand will come from yield and acreage increases, much of it will likely come from exports. The USDA, in a recent article entitled "Ethanol Reshapes the Corn Market," stated, "The most recent USDA Baseline Projections suggest that much of the additional corn needed for ethanol production will be diverted from exports."⁴

Despite the emphasis that U.S. agricultural and trade policy has placed on export markets, these policies have largely failed, as U.S. farm exports have remained flat over the last few decades and the U.S. share of the global trade of most agricultural commodities has been in decline. Nevertheless, U.S. agricultural policy continues to be designed to push prices down in order to capture export markets. Congress and the Army Corps of Engineers have repeatedly pushed to expand the Mississippi River's navigation system because of anticipated export traffic on the river. And U.S. trade negotiators have aggressively pushed for greater market access for farm exports at the bilateral and multilateral level. Ethanol's potential diversion of corn from export markets should cause policymakers to reconsider their long-standing focus on exports.

Ethanol capacity is expanding quickly

According to the Renewable Fuels Association, there are currently 107 active ethanol plants capable of producing 5.1 billion gallons of ethanol per year.⁵ An additional 50 plants under construction and eight plant expansions will add over 3.8 billion more gallons of capacity, bringing total capacity to nearly 9 billion gallons⁶—and surpassing the Renewable Fuels Standard requirement of 7.5 billion gallons by 2012, far ahead of schedule.

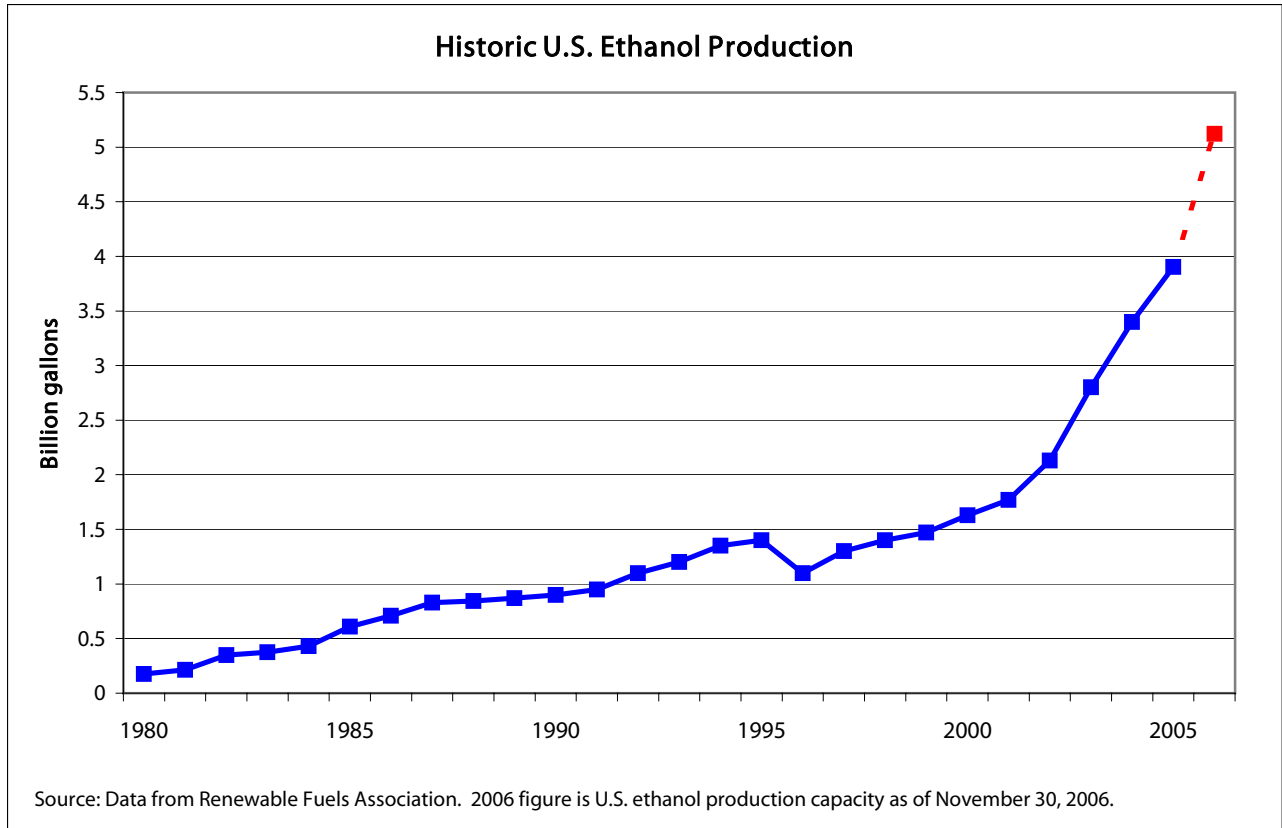


Figure 1: U.S. ethanol capacity has expanded dramatically in recent years, doubling from 2001 to 2005 and likely to double again by 2009.

While those numbers are impressive, they pale in comparison to the number of proposed ethanol plants currently on the drawing board. Announcements about newly proposed plants are in the news nearly every day. Iowa alone has over 20 ethanol plants in some stage of discussion—with a total proposed capacity of over two billion gallons per year.⁷ To put this in perspective, the entire U.S. ethanol industry produced fewer than two billion gallons in 2001.⁸

Although the number of proposed plants changes almost daily, as of November 30, 2006, data compiled from the Renewable Fuels Association, *Ethanol Producer Magazine*, and various news articles identified over 150 proposed plants in the U.S. with a total capacity of over 10 billion gallons per year.⁹ Added to the nearly nine billion gallons that will be produced by existing plants and those currently under construction or expansion, total U.S. ethanol capacity could surpass 19 billion gallons in the next couple of years.

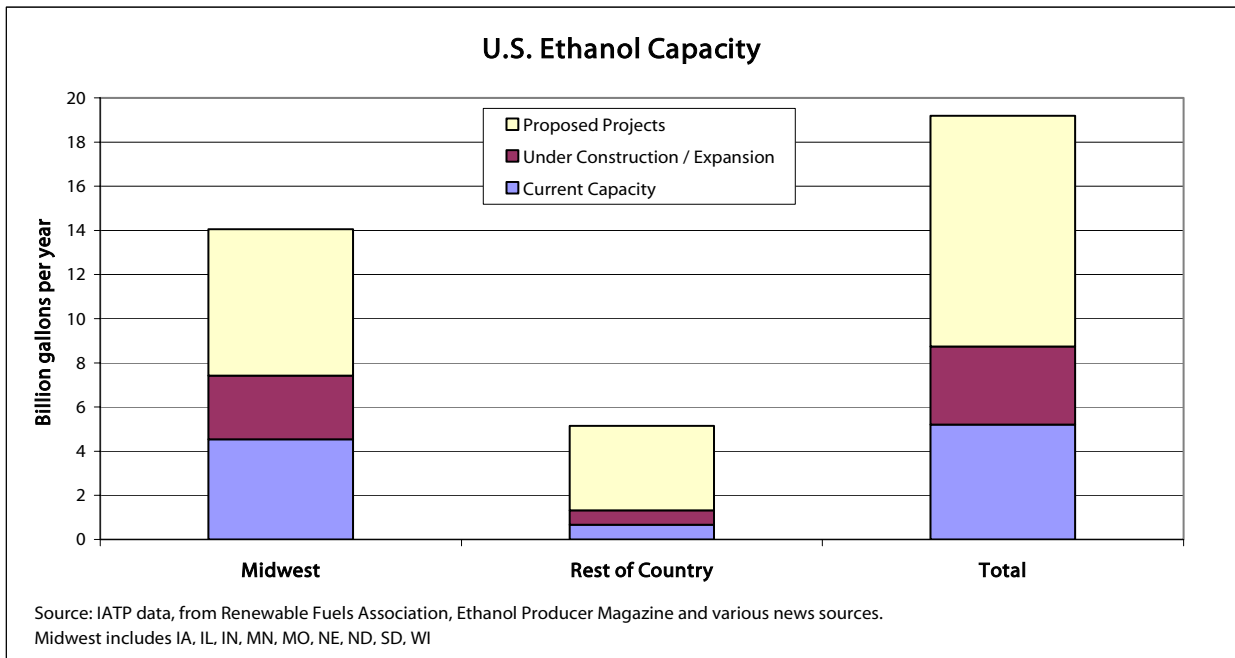


Figure 2: If all currently proposed ethanol plants were to be built, U.S. ethanol capacity would surpass 19 billion gallons per year.

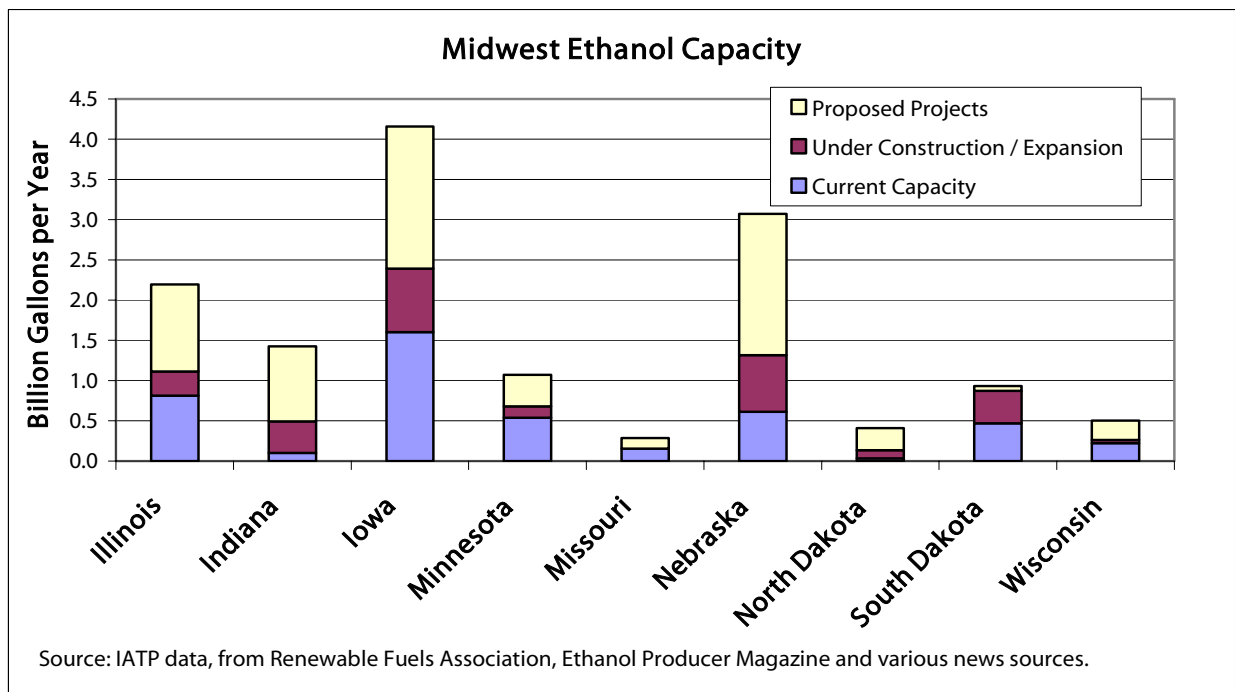


Figure 3: Individual Midwest states could see enormous increases in ethanol capacity if currently proposed plants are built. Iowa alone could surpass four billion gallons— the quantity the entire U.S. produced in 2005.

While it is unlikely that *all* of the proposed ethanol plants will be built, the sheer number on the drawing board is evidence that ethanol capacity is only going to continue to increase. Perhaps more importantly, ethanol capacity is expanding even faster than the number of plants being considered might imply. Whereas ethanol plants built a few years ago had maximum capacities primarily in the 40-50 million gallons per year (mgy) range, many of the plants currently under construction and on the drawing board plan to start with a capacity of at least 100 mgy.¹⁰ Archer Daniels Midland (ADM) is currently constructing two plants with capacities of 275 mgy each.¹¹

What's fueling ethanol growth?

As part of the Energy Policy Act of 2005, Congress passed a Renewable Fuels Standard (RFS) that sets benchmarks for a minimum amount of U.S. fuel that must be provided by renewable sources. The RFS starts with four billion gallons of renewable fuels in 2006, increasing to 7.5 billions gallons by 2012.

However, as a recent news article from the U.S. Department of Energy states, “growth in [the] ethanol industry makes [the] national mandate moot.”¹² The U.S. is on track to produce over five billion gallons already this year.¹³

A number of factors are behind this rapid expansion. While the Renewable Fuels Standard certainly provided some impetus, the rapid rise in fossil fuel prices, the phase-out of gasoline additive MTBE and subsidies for ethanol production have played a significant role as well. Concerns about energy security and climate change and enthusiasm for renewable energy production as a rural economic opportunity also contribute to ethanol's popularity. Whatever the reasons, ethanol has indeed moved, as the title of the Renewable Fuels Association's 2006 Outlook says, “from niche to nation.”¹⁴

Renewable Fuels Standard	
Year	Billion Gallons Ethanol
2006	4
2007	4.7
2008	5.4
2009	6.1
2010	6.8
2011	7.4
2012	7.5

Figure 4: U.S. ethanol production will far exceed the Renewable Fuels Standard. U.S. ethanol capacity is already over five billion gallons, and will reach nearly nine billion gallons once the plants currently under construction are completed.

Where will the corn come from?

U.S. ethanol production consumed less than five percent of the U.S. corn crop 10 years ago. In contrast, ethanol production consumed about 14 percent of the U.S. corn crop in 2005. USDA estimates that 2006 will see over 20 percent—and over 2 billion bushels—of U.S. corn going to ethanol production.¹⁵ The amount of corn sold to ethanol plants is expected to surpass corn sent to export for the first time this year.¹⁶

While the research and development of cellulosic sources of ethanol looks promising, corn will continue to be the primary source of ethanol in the foreseeable future.¹⁷ Given the continued expansion of ethanol capacity, this will result in significant shifts in the corn market. USDA recently declared, “To meet the sector's growing demand for corn, some U.S. corn is likely to be diverted from exports.”¹⁸

Corn exports projected to decline

The two primary sources of agricultural export projections—USDA's Agricultural Baseline and the Food and Agriculture Policy Research Institute (FAPRI)'s Agricultural Baseline—have been repeatedly criticized for what many experts agree to be overly optimistic export projections.¹⁹ Indeed, despite the fact that corn exports have been flat for over two decades, USDA and FAPRI have continued to project large increases in exports. Until now.

FAPRI revised its January 2006 projections in July 2006, stating, “Ethanol production growth is projected to be much stronger than in FAPRI's estimates from early 2006, due to higher prices and the pace of plant construction.”²⁰ Similarly, USDA's 2006 corn export projections are significantly lower—and its ethanol production projections significantly higher—than in previous years. The National Corn Growers Association, in its report *How Much Ethanol Can Come From Corn?*, affirmed, “export use...[is] not expected to increase significantly.”²¹

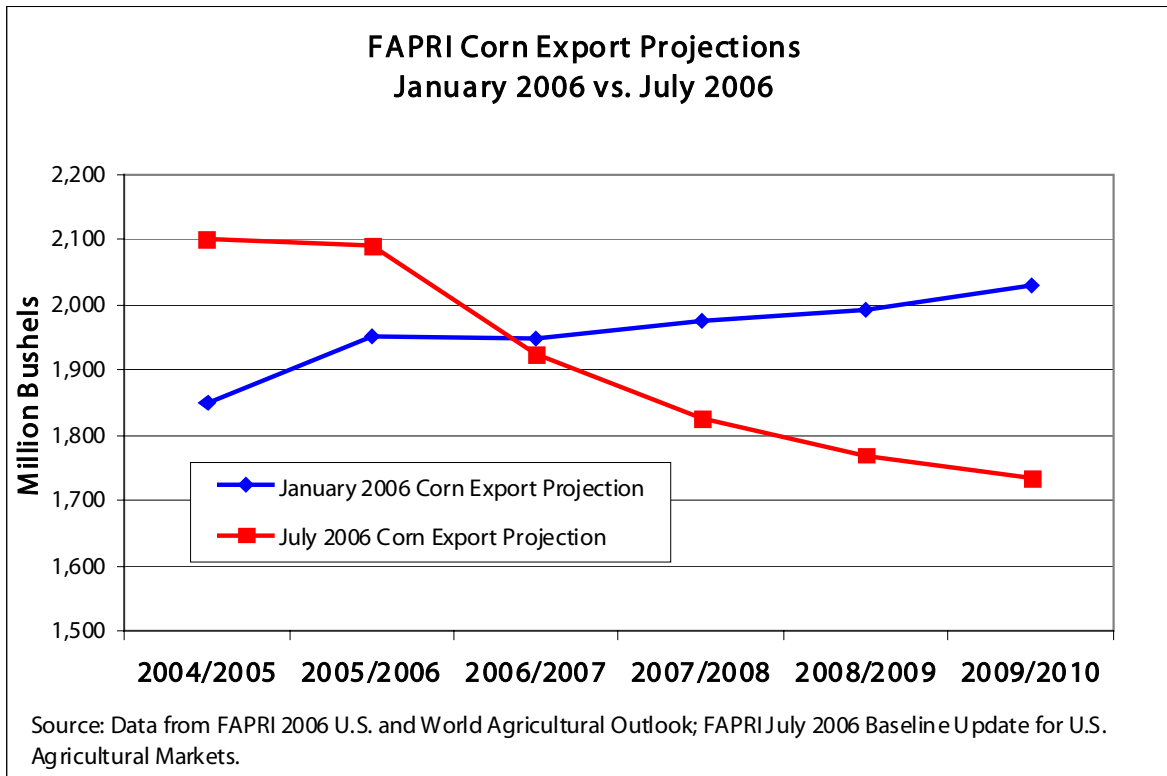


Figure 5: FAPRI—one of the preeminent sources of agricultural projections—revised its U.S. corn export projections downward mid-way through 2006, citing the strong growth of ethanol production as a reason for the change.

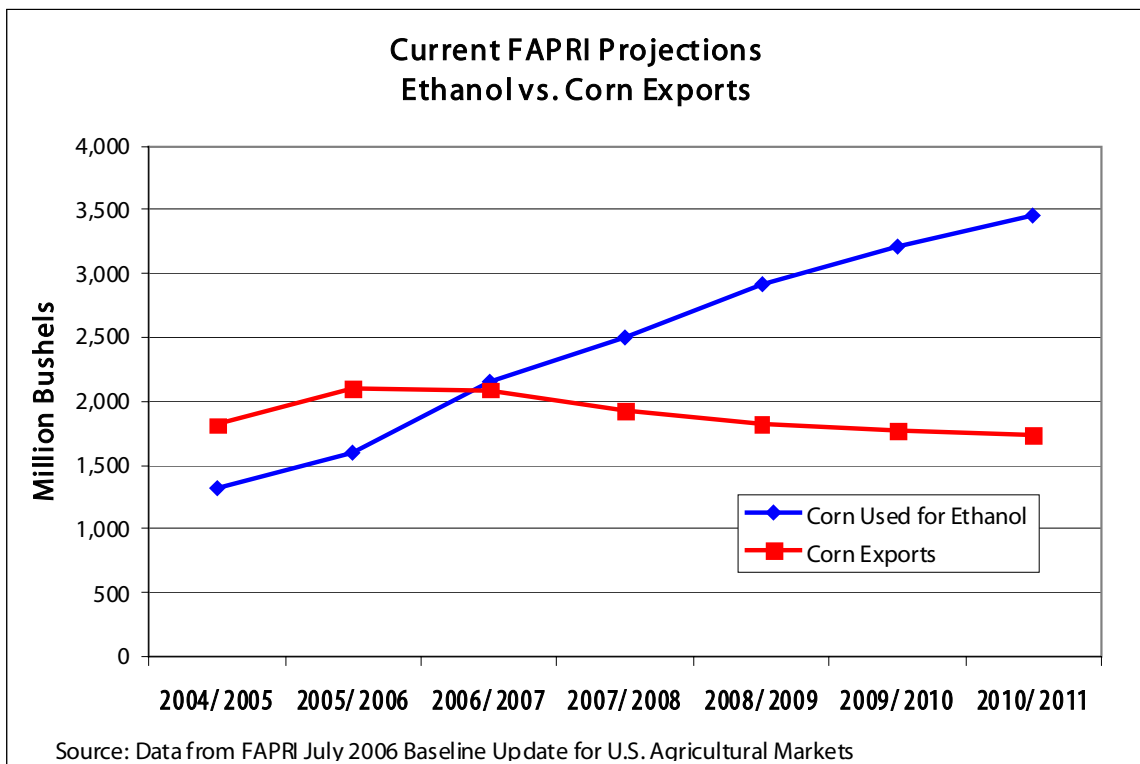
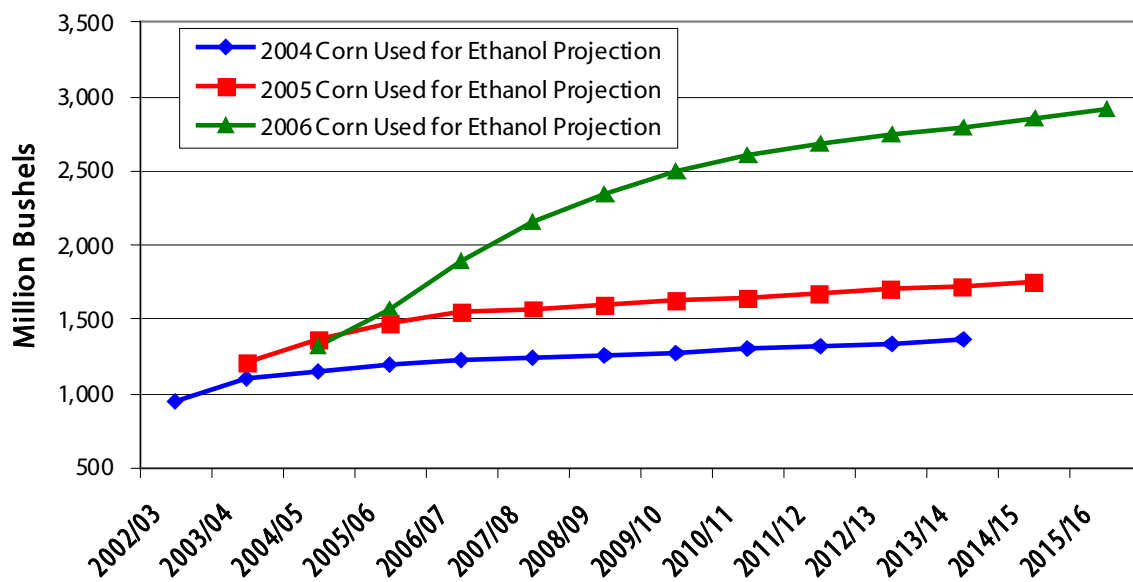


Figure 6: FAPRI's July 2006 Baseline Update projects declining corn exports—for the first time in FAPRI's history of agricultural projections. Corn used for ethanol is projected to surpass exports in the 2006/2007 marketing year.

USDA Ethanol Production Projections 2006 vs. Previous Years



Source: Data from USDA Agricultural Outlooks 2004, 2005, 2006.

Figure 7: USDA's 2006 projection of corn used for ethanol is significantly higher than its projections from 2005 and 2004.

Projections still underestimate ethanol production and impacts on exports

Ethanol production levels and the impact of ethanol on export levels are likely much greater than the USDA and FAPRI projections imply, because the projections do not take into account the proposed ethanol plants—i.e. those currently on the drawing board. Including only a fraction of these proposed plants yields much greater ethanol production and much lower corn export estimates than either USDA or FAPRI.

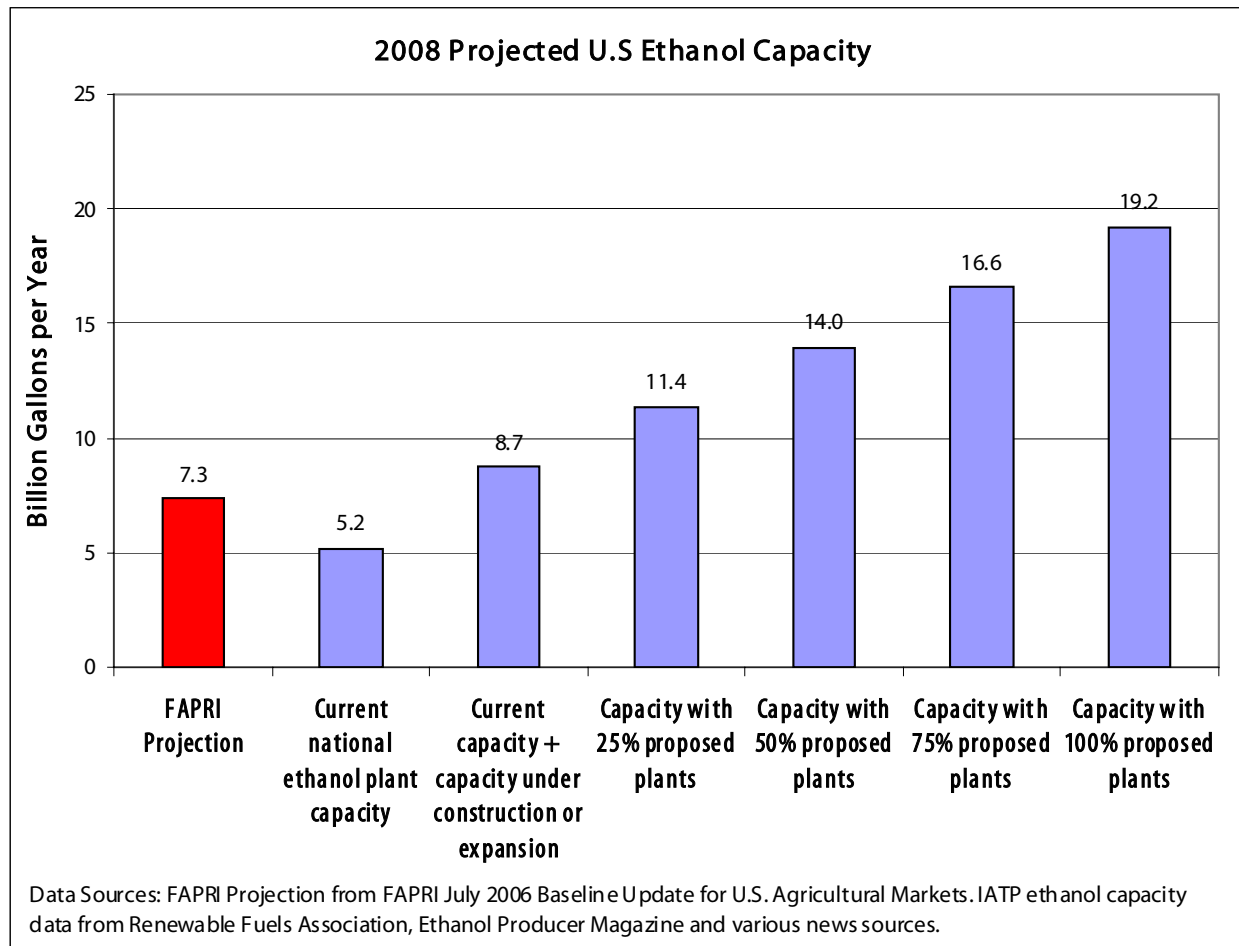


Figure 8: Even with their revised numbers, FAPRI and USDA likely underestimate U.S. ethanol production. Ethanol capacity will be significantly higher than either FAPRI or USDA project if even a fraction of the currently proposed ethanol plants come on line.

Implications of ethanol for corn exports

The impacts of ethanol production on corn exports could be significant. For example, assuming all of the plants currently under construction or expansion will be on line by 2008, if only a quarter of the proposed plants in the Midwest are also built by then and if the corn needed to supply all of this new capacity were to be diverted from exports, Midwest corn exports could be cut in half.

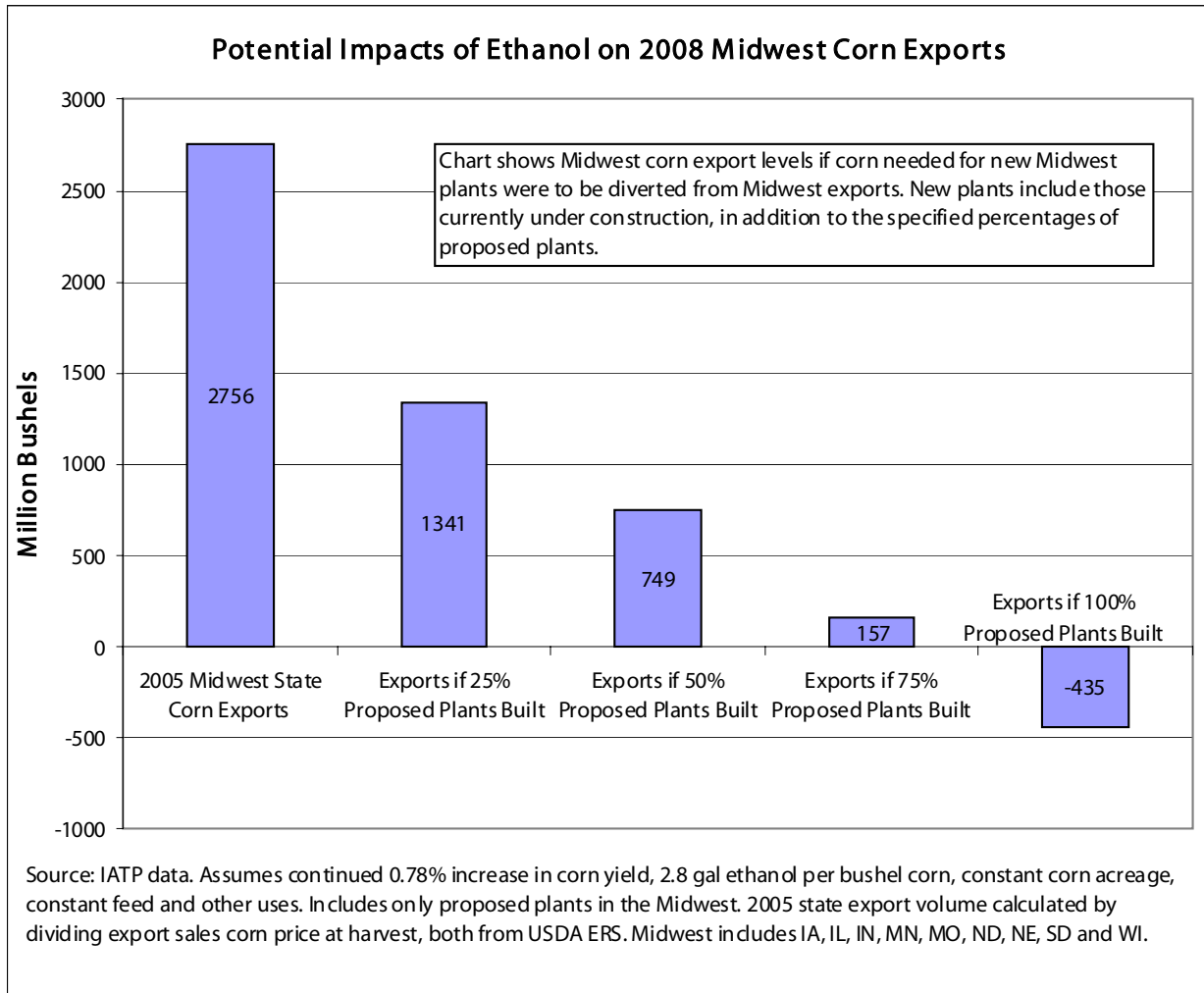


Figure 9: If only a quarter of the currently proposed plants in the Midwest come on line by 2008, and if the corn needed to supply these plants and the plants currently under construction were to be diverted from exports, Midwest corn exports could be cut in half.

While it might be unlikely that 100 percent of *all* new ethanol capacity will be met by corn diverted from exports, these numbers paint a good picture of the potential impacts. The sheer magnitude of future ethanol capacity makes it highly likely that even with possible increases in yields, acreages, and ethanol conversion efficiencies and other technological advances, some corn will have to be diverted from export. Even if only a portion of future ethanol capacity is met by corn diverted from exports, corn exports could drop dramatically.

Performing the same analysis for individual states produces even more stunning results. Most Midwest states could see dramatic declines in state exports if only a fraction of their proposed ethanol plants come on line. Nebraska could see negative corn exports (meaning corn needed for ethanol plants would exceed corn for exports) if even half of its proposed plants come online. (Data for other individual states are available in the appendix of this paper.)

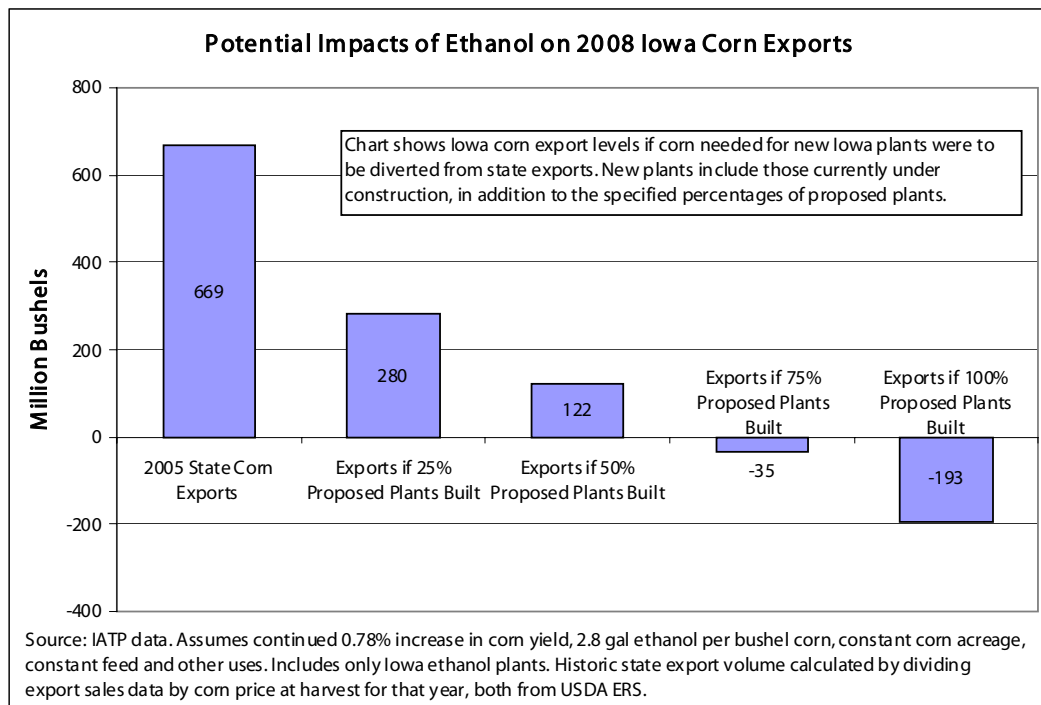


Figure 10: Iowa could see a dramatic decrease in corn exports if even a quarter of its proposed ethanol plants come on line.

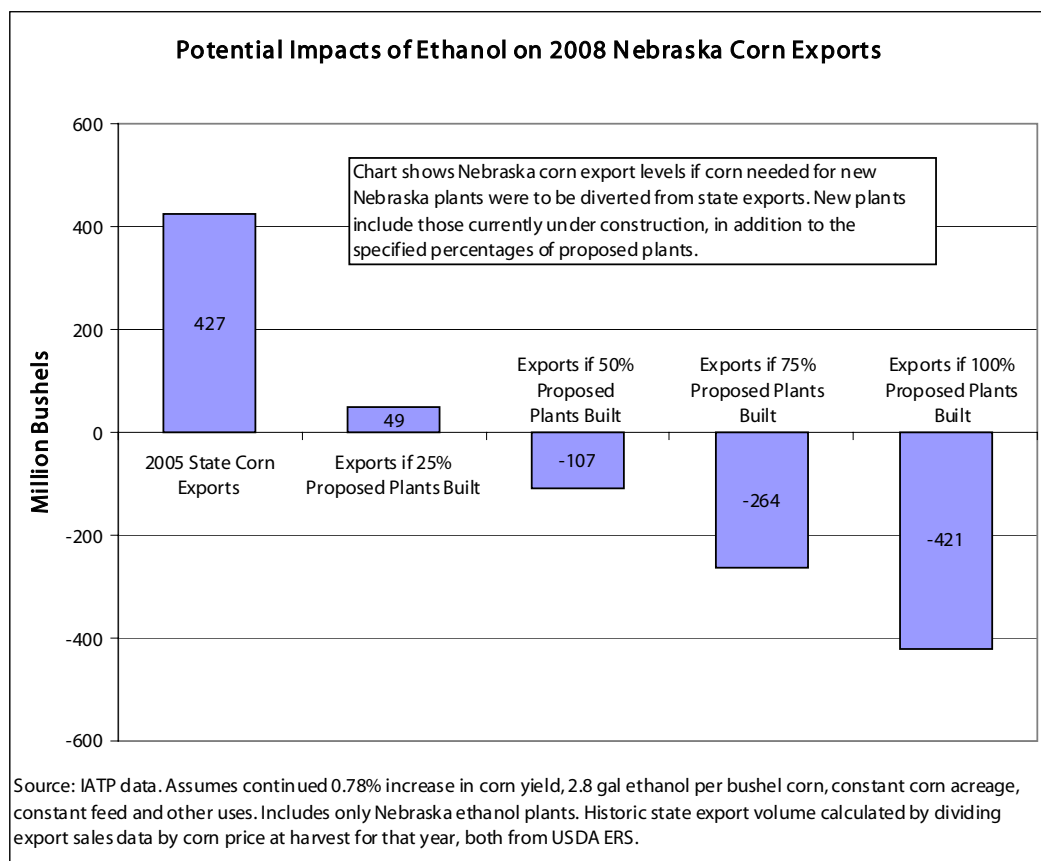


Figure 11: Nebraska could see negative corn exports (meaning corn needed for ethanol plants would exceed corn for exports) if even half of its proposed ethanol plants come on line. (Data for all Midwest states are available in the appendix of this paper.)

Implications for government policy

The USDA recently stated that “how the market adapts to this increased demand [for ethanol] is likely to be one of the major developments of the early 21st century in U.S agriculture.”²² USDA’s Chief Economist recently declared, “We are embarking on a profound change in our agricultural economy.”²³

Expanded ethanol production will have a variety of impacts on the Midwest agricultural economy. Most importantly, corn will most likely be more expensive. An agricultural export industry, as well as several domestic corn uses, has been built on the presumption that corn will remain cheap. That premise no longer appears valid.

Domestically, high corn prices might have the most profound impact on the livestock industry, which uses about half of the U.S. corn crop. Major poultry and livestock companies like Tyson Foods have already complained about tightening corn markets.²⁴ The shift in prices and supplies may cause the livestock industry to look for alternative feed crops, or even limit Midwest livestock production. The increased use of distillers grains as a high-protein livestock feed, however, could induce more livestock production near ethanol plants, so the overall impact on the livestock industry is still unclear.

What seems clearer is that international processors and livestock companies will be further challenged to compete for U.S. corn against growing domestic uses. Even with substantial growth in Midwest corn acreage and a cooling of the ethanol market, it is hard to imagine as much corn available for export in the coming decades as there has been in past years.

Federal tax credits for ethanol are largely responsible for allowing the ethanol industry to grow and compete against the enormous and heavily subsidized fossil fuel industry. Despite this, much of federal agriculture, trade, and transportation policy is instead directed toward expanding low-cost exports rather than the growing domestic markets. Since the early 1970s, exports have been considered the future markets for Midwest grain and oilseed farmers, and commodity policy, export credits, and trade agreements have all been used to encourage low-cost crops for international markets. However, bulk commodity Midwest exports have been flat or in decline since 1980.²⁵ The growth of the domestic ethanol market makes it likely that these trends will continue.

Future opportunities for farmers lie not in bulk commodity exports, but in a more diverse and localized system of agriculture. The shift of agricultural land into energy production and bio-based products is not likely to reverse course anytime in the near future. Whatever the crop—be it corn or switchgrass—domestic markets are likely to provide more opportunities to farmers than the export of agricultural commodities. Our agricultural, transportation and trade policies also need to shift to address this new reality.

In general, the explosive growth in domestic corn consumption and the resulting higher prices have been an economic boon for rural Midwest communities, particularly when the ethanol plants are owned locally. And they have the potential to remain so. But with larger players getting into the ethanol industry, efforts must be made to ensure that benefits remain with farmers and rural communities. Similarly, with continued increases in both the number and the size of ethanol plants, efforts must be made to ensure that conservation plays a key role in energy crop production and ethanol plant operation. Proposals to pull land out of the Conservation Reserve Program, or to plant consecutive seasons of corn, or fuel ethanol plants with coal, raise serious environmental concerns, as does the amount of water future ethanol plants might consume. The recent increase in

ownership of ethanol plants outside of the local area raises concerns about benefits being diverted from farmers and rural communities.

Three important pieces of federal legislation that will impact agricultural markets are due for discussion in the next year. The Farm Bill, which determines commodity and agricultural conservation policy and will include renewable energy legislation, will be renewed in 2007. Second, the Water Resources Development Act, which almost received Congressional approval this past year, will be discussed, and will likely again include a proposal for authorization to extend the length of several locks on the Mississippi and Illinois Rivers to facilitate more grain and oilseed export, at a cost to U.S. taxpayers of several billion dollars. And third, legislation that authorizes the President to negotiate trade agreements with foreign countries without consulting Congress, called Trade Promotion Authority, is set to expire in July 2007.

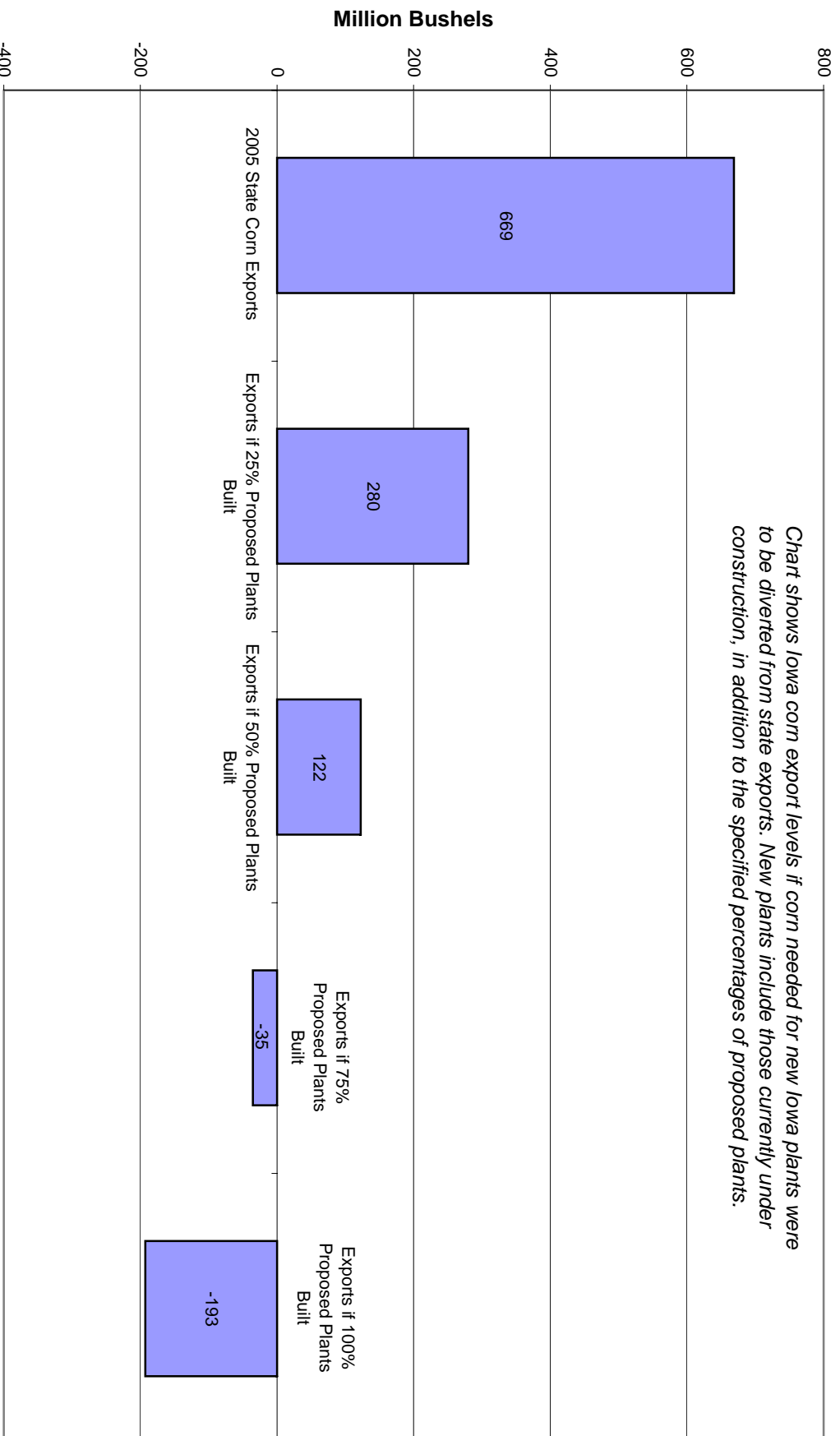
Using taxpayer money in a futile attempt to kick start export-oriented agriculture was a questionable tactic five years ago in the last Farm Bill. Now, given the change in agricultural markets, spending money on items like longer locks is downright foolish. Farmers and rural communities will benefit much more from incentives for local ownership of ethanol plants, investments in regional transportation networks, fair market prices for their products, and value-added opportunities. Congress should reconsider the pieces of legislation and direct federal investment toward initiatives that will provide substantially more benefits to rural Midwest communities.

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Potential Impacts of Ethanol on 2008 Iowa Corn Exports

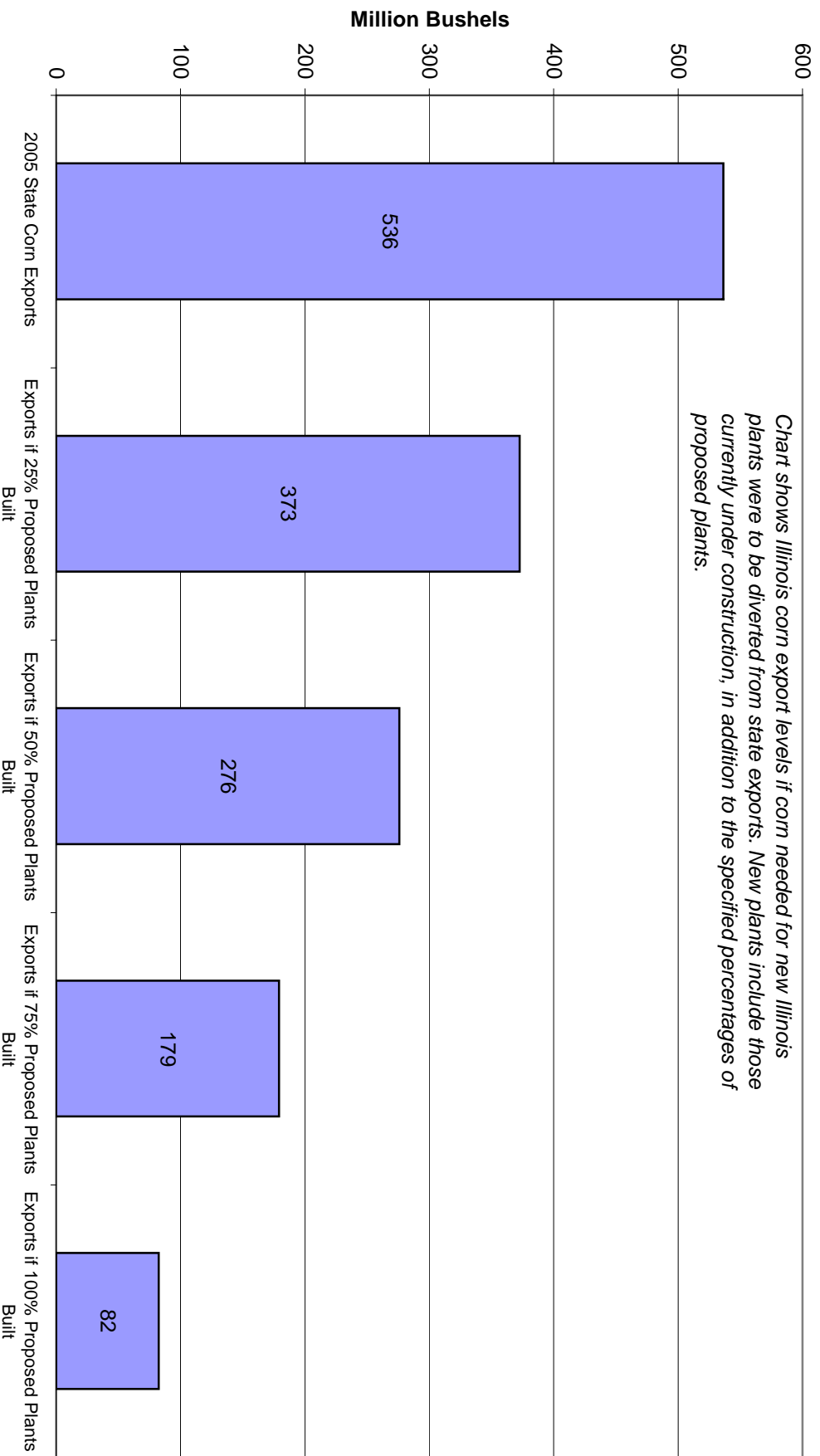
Chart shows Iowa corn export levels if corn needed for new Iowa plants were to be diverted from state exports. New plants include those currently under construction, in addition to the specified percentages of proposed plants.



Source: IATP data. Assumes continued 0.78% increase in corn yield, 2.8 gal ethanol per bushel corn, constant corn acreage, constant feed and other uses. Includes only Iowa ethanol plants. Historic state export volume calculated by dividing export sales data by corn price at harvest for that year, both from USDA ERS.

Potential Impacts of Ethanol on 2008 Illinois Corn Exports

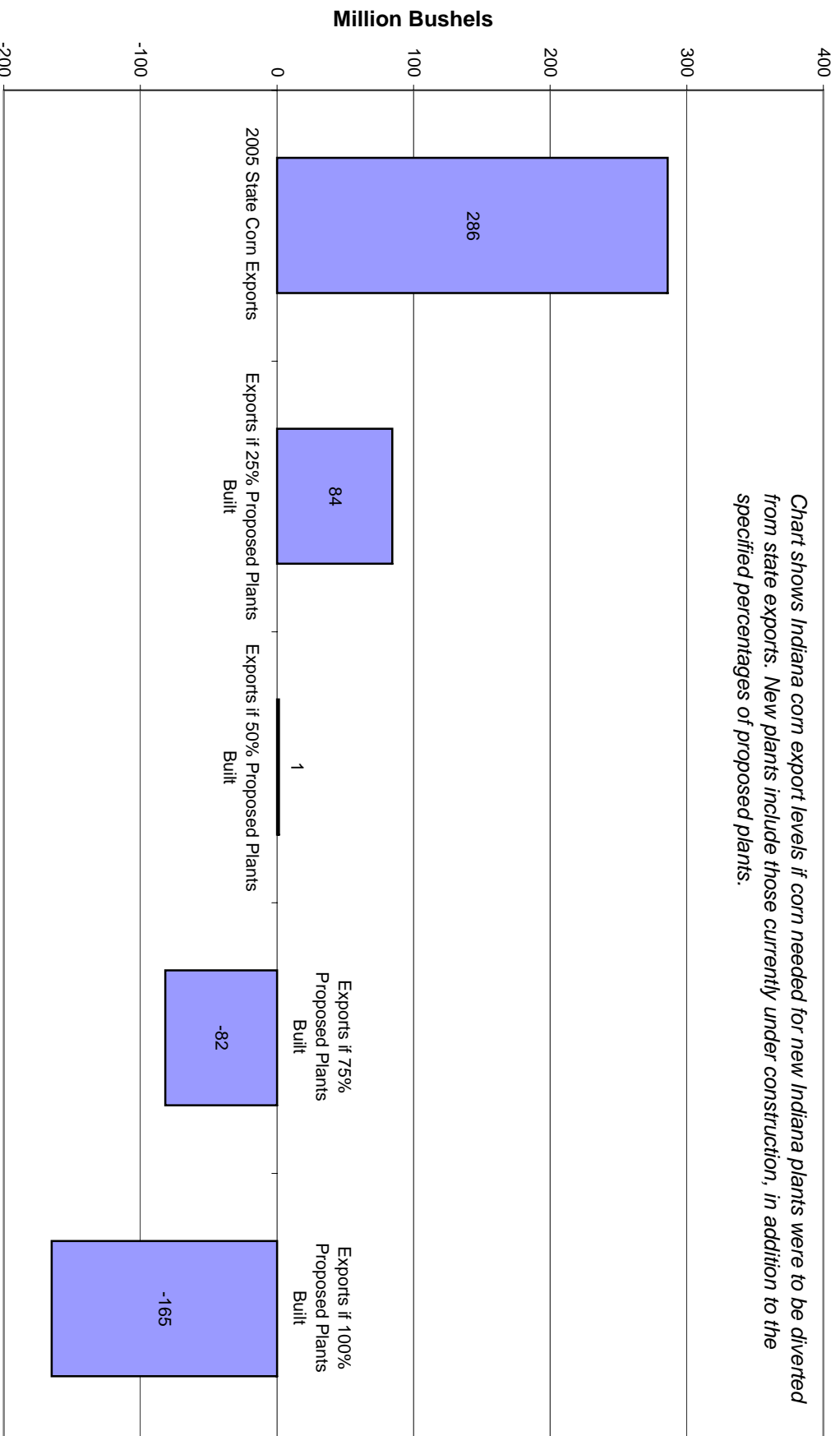
Chart shows Illinois corn export levels if corn needed for new Illinois plants were to be diverted from state exports. New plants include those currently under construction, in addition to the specified percentages of proposed plants.



Source: IATP data. Assumes continued 0.78% increase in corn yield, 2.8 gal ethanol per bushel corn, constant corn acreage, constant feed and other uses. Includes only Illinois ethanol plants. Historic state export volume calculated by dividing export sales data by corn price at harvest for that year, both from USDA ERS.

Potential Impacts of Ethanol on 2008 Indiana Corn Exports

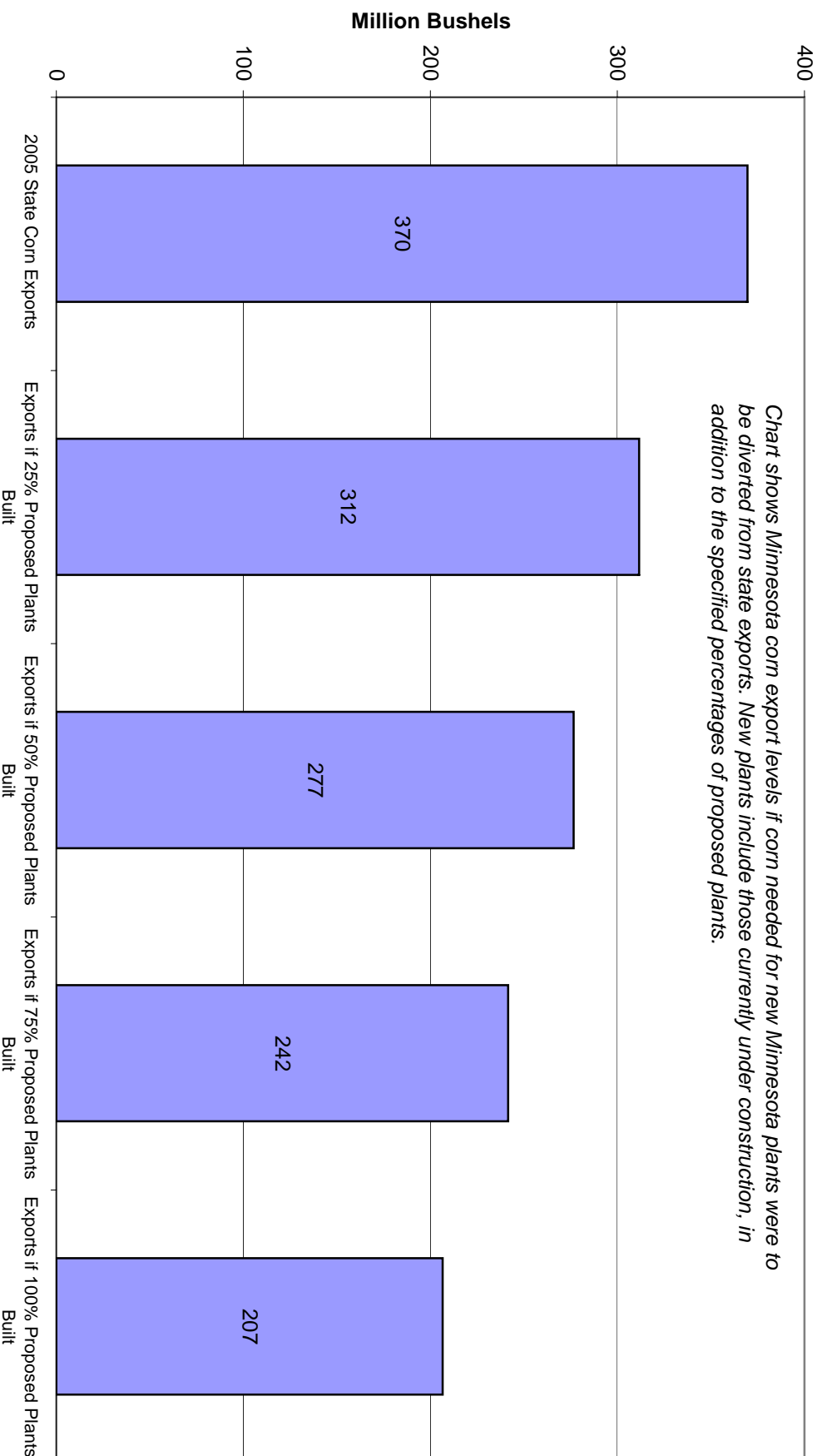
Chart shows Indiana corn export levels if corn needed for new Indiana plants were to be diverted from state exports. New plants include those currently under construction, in addition to the specified percentages of proposed plants.



Source: IATP data. Assumes continued 0.78% increase in corn yield, 2.8 gal ethanol per bushel corn, constant corn acreage, constant feed and other uses. Includes only Indiana ethanol plants. Historic state export volume calculated by dividing export sales data by corn price at harvest for that year, both from USDA ERS.

Potential Impacts of Ethanol on 2008 Minnesota Corn Exports

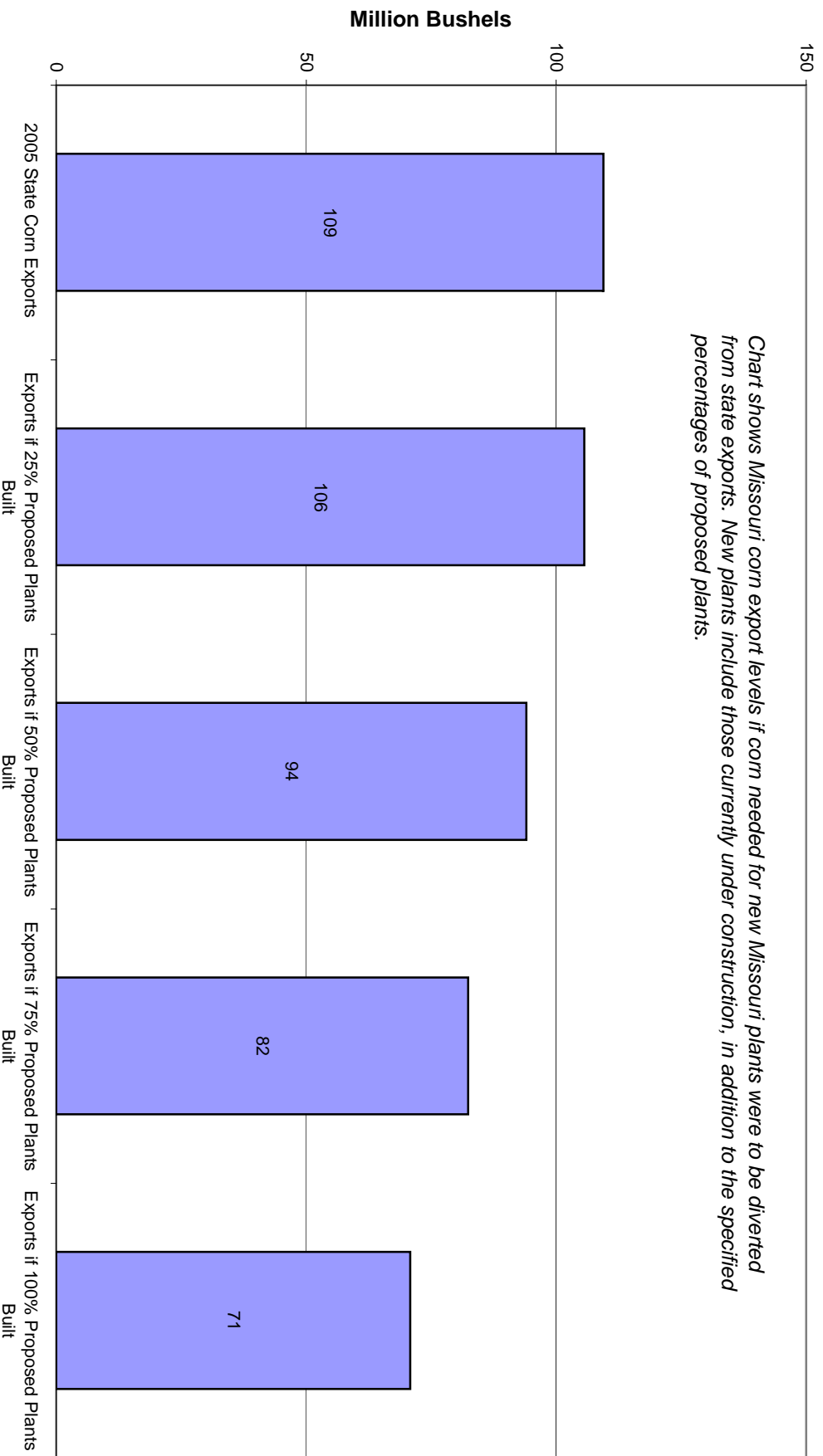
Chart shows Minnesota corn export levels if corn needed for new Minnesota plants were to be diverted from state exports. New plants include those currently under construction, in addition to the specified percentages of proposed plants.



Source: IATP data. Assumes continued 0.78% increase in corn yield, 2.8 gal ethanol per bushel corn, constant corn acreage, constant feed and other uses. Includes only Minnesota ethanol plants. Historic state export volume calculated by dividing export sales data by corn price at harvest for that year, both from USDA ERS.

Potential Impacts of Ethanol on 2008 Missouri Corn Exports

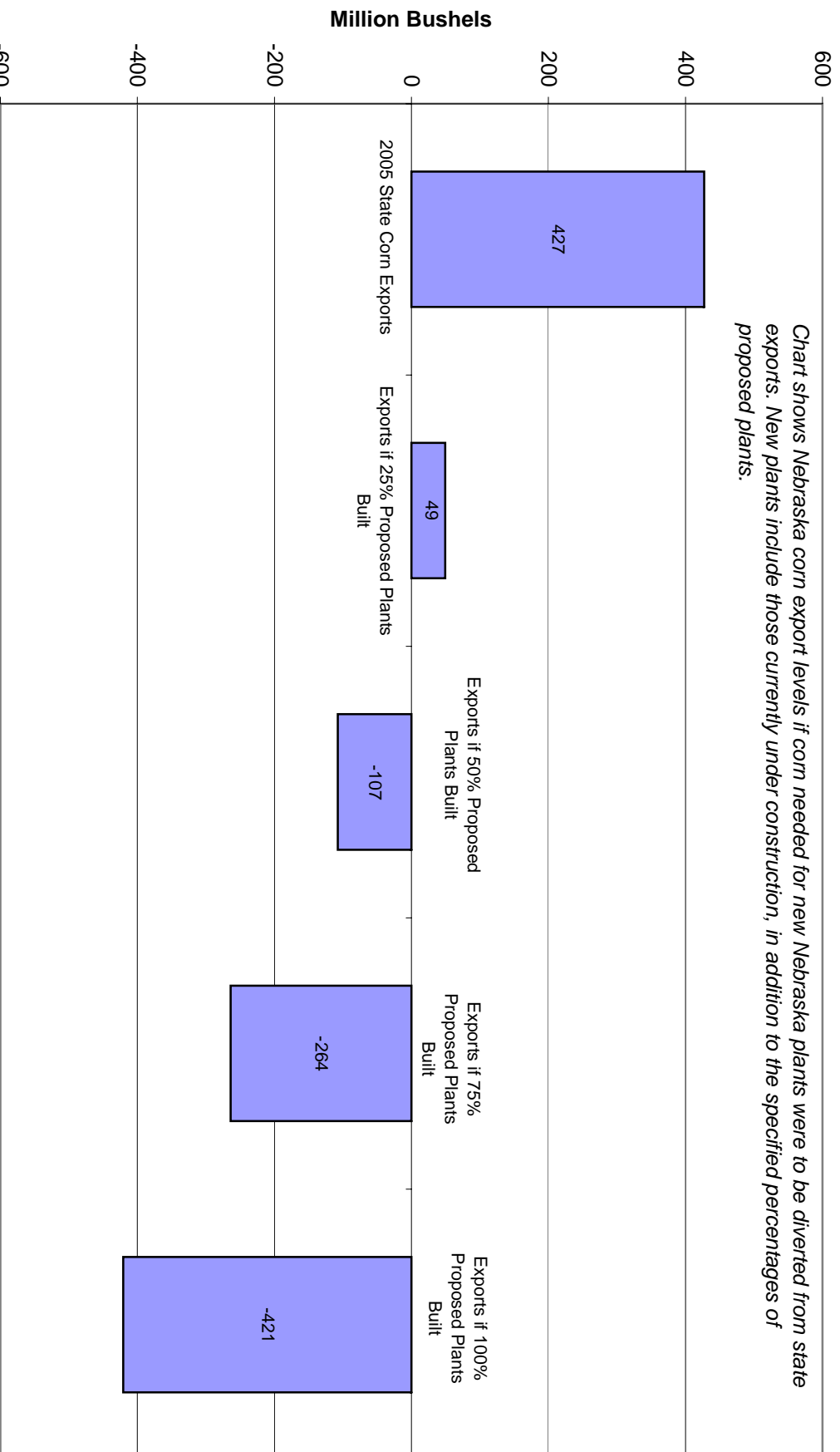
Chart shows Missouri corn export levels if corn needed for new Missouri plants were to be diverted from state exports. New plants include those currently under construction, in addition to the specified percentages of proposed plants.



Source: IATP data. Assumes continued 0.78% increase in corn yield, 2.8 gal ethanol per bushel corn, constant corn acreage, constant feed and other uses. Includes only Missouri ethanol plants. Historic state export volume calculated by dividing export sales data by corn price at harvest for that year, both from USDA ERS.

Potential Impacts of Ethanol on 2008 Nebraska Corn Exports

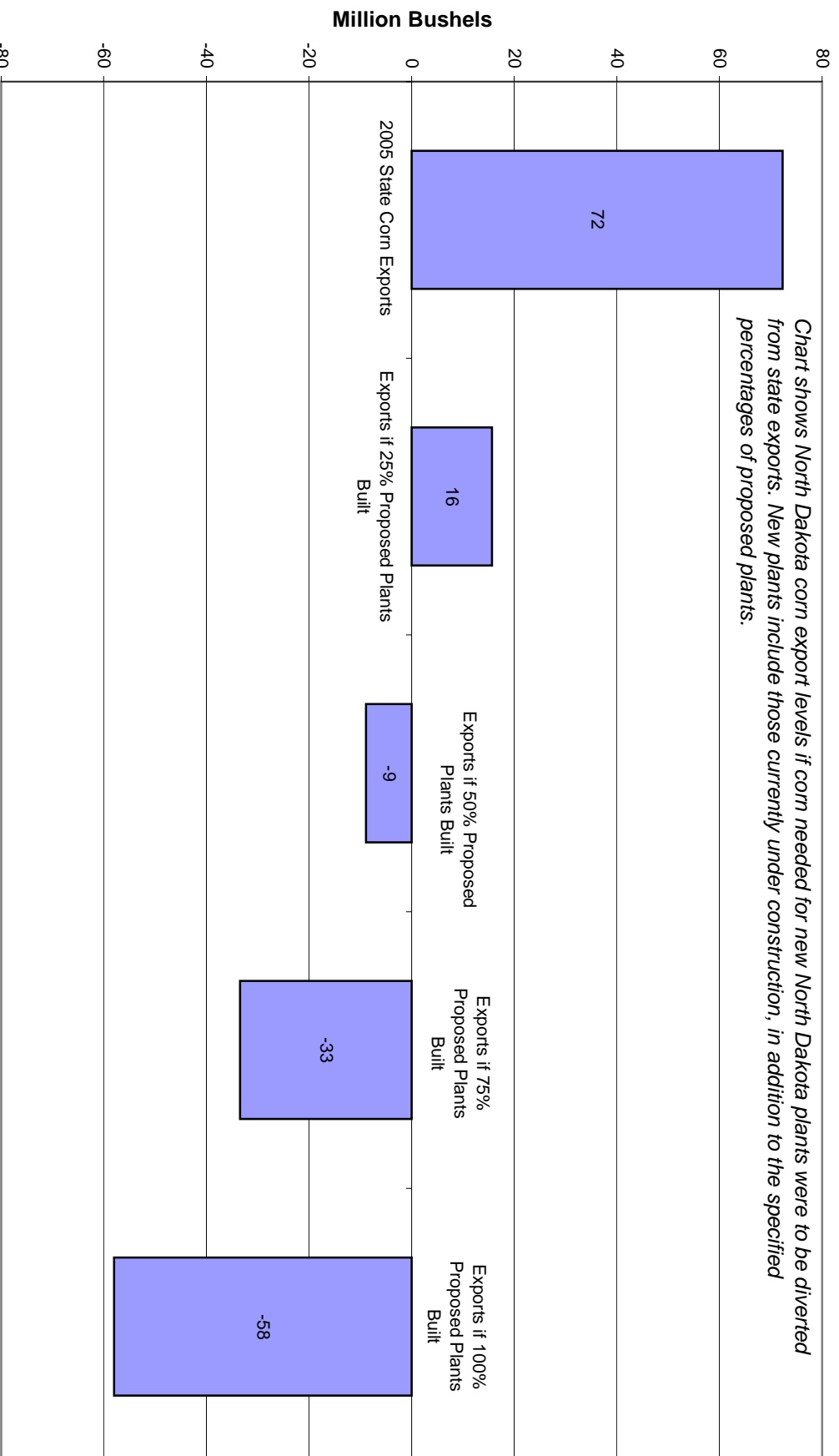
Chart shows Nebraska corn export levels if corn needed for new Nebraska plants were to be diverted from state exports. New plants include those currently under construction, in addition to the specified percentages of proposed plants.



Source: IATP data. Assumes continued 0.78% increase in corn yield, 2.8 gal ethanol per bushel corn, constant corn acreage, constant feed and other uses. Includes only Nebraska ethanol plants. Historic state export volume calculated by dividing export sales data by corn price at harvest for that year, both from USDA ERS.

Potential Impacts of Ethanol on 2008 North Dakota Corn Exports

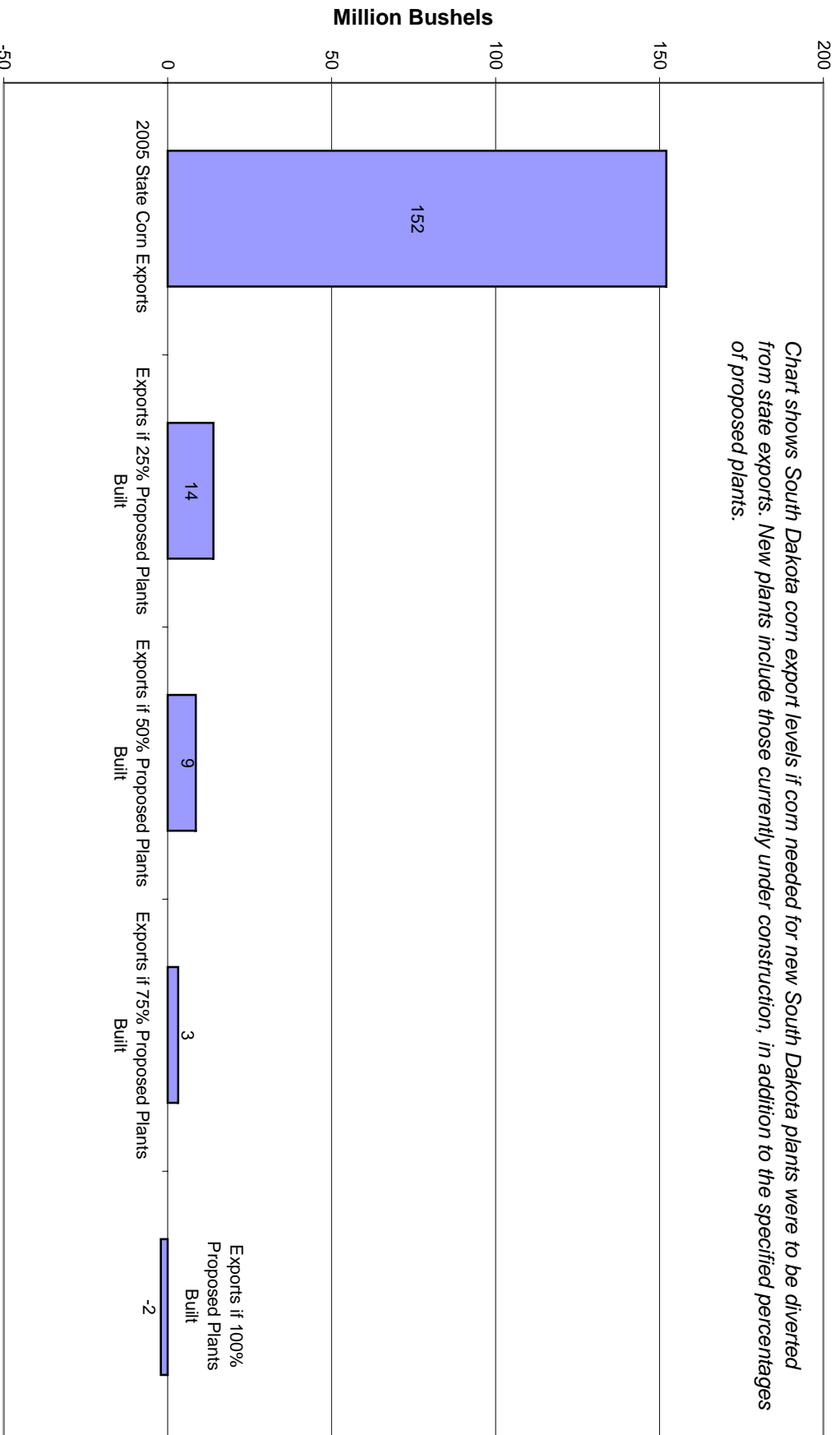
Chart shows North Dakota corn export levels if corn needed for new North Dakota plants were to be diverted from state exports. New plants include those currently under construction, in addition to the specified percentages of proposed plants.



Source: IATP data. Assumes continued 0.78% increase in corn yield, 2.8 gal ethanol per bushel corn, constant corn acreage, constant feed and other uses. Includes only North Dakota ethanol plants. Historic state export volume calculated by dividing export sales data by corn price at harvest for that year, both from USDA ERS.

Potential Impacts of Ethanol on 2008 South Dakota Corn Exports

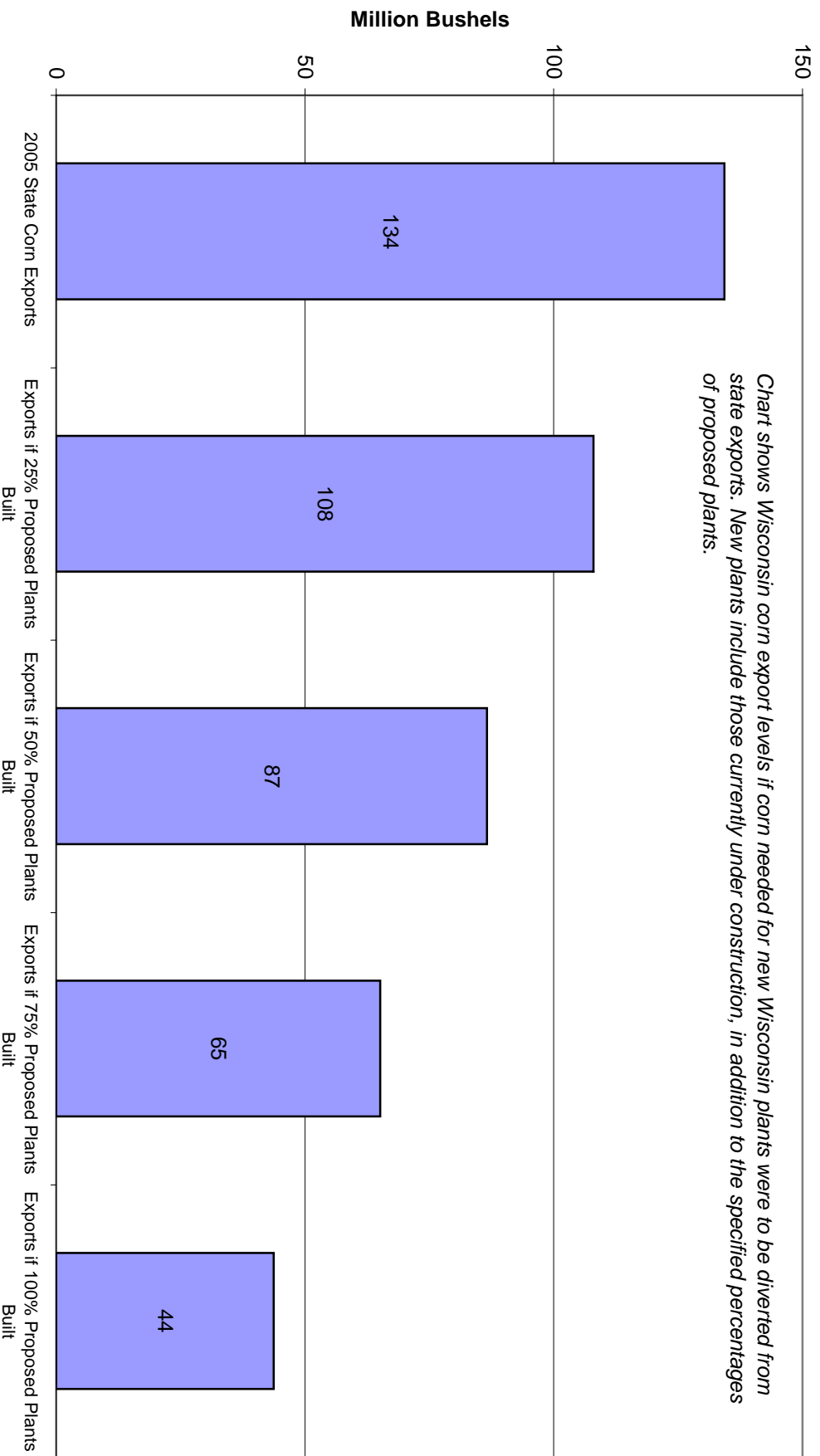
Chart shows South Dakota corn export levels if corn needed for new South Dakota plants were to be diverted from state exports. New plants include those currently under construction, in addition to the specified percentages of proposed plants.



Source: IATP data. Assumes continued 0.78% increase in corn yield, 2.8 gal ethanol per bushel corn, constant corn acreage, constant feed and other uses. Includes only South Dakota ethanol plants. Historic state export volume calculated by dividing export sales data by corn price at harvest for that year, both from USDA ERS.

Potential Impacts of Ethanol on 2008 Wisconsin Corn Exports

Chart shows Wisconsin corn export levels if corn needed for new Wisconsin plants were to be diverted from state exports. New plants include those currently under construction, in addition to the specified percentages of proposed plants.



Source: IATP data. Assumes continued 0.78% increase in corn yield; 2.8 gal ethanol per bushel corn; constant corn acreage; constant feed and other uses. Includes only Wisconsin ethanol plants. Historic state export volume calculated by dividing export sales data by corn price at harvest for that year, both from USDA ERS.



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