

2017 Report on Ethanol Market Concentration

I. Introduction

This Report presents the Federal Trade Commission’s (“Commission” or “FTC”) concentration analysis of the ethanol production industry for 2017.¹ Section 1501(a)(2) of the Energy Policy Act of 2005 requires that the FTC annually “perform a market concentration analysis of the ethanol production industry . . . to determine whether there is sufficient competition among industry participants to avoid price-setting and other anticompetitive behavior.”² Pursuant to the statute, the FTC must measure concentration using the Herfindahl-Hirschman Index (“HHI”) and consider all marketing arrangements among industry participants in preparing its analysis.³ The FTC’s report is due to Congress and the Administrator of the Environmental Protection Agency (“EPA”) by December 1 of each year.⁴

As in previous reports, FTC staff (“staff”) analyzed concentration based on U.S. ethanol production capacity and actual ethanol production. For each analysis, staff calculated HHIs two different ways, first by allocating market shares among producers and then by allocating market shares among marketers. Under either approach, concentration based on producer shares is lower than concentration based on marketer shares. Based on capacity, the HHIs are 480 for producer-based shares and 699 for marketer-based shares. Based on actual production, the HHIs are 475 for producer-based shares and 719 for marketer-based shares. Concentration is substantially unchanged from a year ago.

¹ This Report builds upon Commission reports from previous years. Prior reports contain background information absent from this Report. *See* FTC, Oil and Gas Industry Initiatives, Competition Policy: Reports, <https://www.ftc.gov/tips-advice/competition-guidance/industry-guidance/oil-and-gas>.

² Energy Policy Act of 2005, Pub. L. No. 109-58, § 1501, 119 Stat. 1069, 1074, *amended by* Energy Independence and Security Act of 2007, Pub. L. No. 110-140, 121 Stat. 1492. For purposes of this Report, we presume that Congress used the term “price-setting” to mean “illegal price fixing.”

³ *Id.*

⁴ *Id.*

The low level of concentration and large number of market participants in the U.S. ethanol production industry continue to suggest that the exercise of market power to set prices, or coordinate on price or output levels, is unlikely. As has been the case each year since the Commission began reporting, the current HHIs indicate that the industry is unconcentrated.⁵ At this level of concentration, a single ethanol producer or marketer likely lacks market power. Successful anticompetitive coordination would require agreement among a very large number of competitors and thus is similarly unlikely. Moreover, imports and the possibility of entry would likely impede the exercise of market power by any group of domestic firms.

II. Industry Updates

A. Renewable Fuel Standard

Since 2005, Congress has required that the national transportation fuel supply contain a minimum annual volume of renewable fuels, including fuel ethanol.⁶ This mandate, known as the Renewable Fuel Standard (“RFS”), increases every year. In 2007, Congress revised the RFS, significantly increasing the minimum volumes of ethanol and adding requirements for advanced biofuels.⁷ For 2017, the RFS mandates 24.0 billion gallons of renewable fuel, 15.0 billion gallons of which can be conventional corn ethanol.⁸ The 2017 advanced biofuels target is 9.0 billion gallons, at least 5.5 billion gallons of which must be cellulosic biofuel.⁹

⁵ The Commission and U.S. Department of Justice characterize markets in which the HHI is below 1500 as unconcentrated. U.S. Department of Justice and Federal Trade Commission Horizontal Merger Guidelines (2010) (“Horizontal Merger Guidelines”) § 5.3, <https://www.ftc.gov/sites/default/files/attachments/merger-review/100819hmg.pdf>.

⁶ See Energy Policy Act of 2005 § 1501, 119 Stat. 1069.

⁷ “Advanced biofuel” refers to a renewable fuel, other than ethanol derived from corn starch, that has lifecycle greenhouse gas emissions that are at least 50 percent less than the average greenhouse gas emissions of the baseline fossil fuel. 42 U.S.C. § 7545(o)(1)(B)(i). Advanced biofuels include, but are not limited to, cellulosic biofuel and biomass-based diesel. *Id.* § 7545(o)(1)(B)(ii)(I)-(VII).

⁸ *Id.* § 7545(o)(2)(B)(i)(I)-(II).

⁹ *Id.* § 7545(o)(2)(B)(i)(II)-(III).

The annual use of renewable fuels did not keep pace with the statutory RFS requirements, prompting the EPA to decrease the requirements.¹⁰ The EPA published these revised requirements in 2016,¹¹ reducing the 2016 requirement from 22.3 billion gallons to 18.1 billion gallons, of which 14.5 billion gallons of conventional corn ethanol could count towards the 2016 RFS.¹² For 2017, the EPA required 19.3 billion gallons of total renewable fuels, 15.0 billion gallons of which can be conventional corn ethanol.¹³

While market participants believe the U.S. ethanol industry will produce more than the RFS requirement in 2017, ethanol usage in the United States remains limited by the E10 “blendwall.” The E10 blendwall refers to the industry’s limited ability to consume fuel blends containing more than 10 percent ethanol because most gas stations in the U.S. offer E10 gasoline, which has 10 percent ethanol content. Market participants noted an increase in the number of service stations offering E15 and E85 (gasoline with 15 percent or 85 percent ethanol content), but nationally their availability remains limited.¹⁴

¹⁰ Renewable Fuel Stand. Prgm., Final Renewable Fuel Standards for 2014, 2015, and 2016 and the Biomass-Based Diesel Volume for 2017, <https://www.epa.gov/renewable-fuel-standard-program/final-renewable-fuel-standards-2017-and-biomass-based-diesel-volume> (last visited Sept. 29, 2017).

¹¹ Renewable Fuel Stand. Prgm., Final Renewable Fuel Standards for 2017, and the Biomass-Based Diesel Volume for 2018 <https://www.epa.gov/renewable-fuel-standard-program/final-renewable-fuel-standards-2014-2015-and-2016-and-biomass-based> (last visited Sept. 29, 2017).

¹² *Id.* In 2016, the U.S. consumed 14.4 billion of these 14.5 billion gallons. U.S. Energy Info. Admin., Monthly Energy Review, Table 10.3 Fuel Ethanol Overview, <http://www.eia.gov/totalenergy/data/browser/xls.cfm?tbl=T10.03&freq=m> (last visited Sept. 15, 2017).

¹³ Renewable Fuel Stand. Prgm., Final Renewable Fuel Standards for 2017, and the Biomass-Based Diesel Volume for 2018, *supra* note 11. The EPA’s volume requirements, like the statutory RFS, set a target for total renewable fuels and include a nested requirement for advanced biofuels. Thus, each gallon of fuel that meets the advanced biofuels requirement also counts toward the total renewable fuels requirements. Once obligated parties meet the minimum requirement for advanced biofuels, they may meet any remaining obligation under the total renewable fuels requirement with conventional corn ethanol.

¹⁴ *See, e.g.*, James Osborne, *Ethanol Triggers Energy Battle*, San Antonio Express-News (June 27, 2017), <http://www.expressnews.com/business/eagle-ford-energy/article/Ethanol-triggers-energy-battle-11250743.php> (“The vast majority of gas stations in the United States only sell gasoline with a 10 percent concentration of ethanol” and “[m]ost retailers have hesitated to sell 15 percent concentrations.”).

B. Margins

Reported average margins in the U.S. ethanol industry through the first eight months of 2017 followed a seasonal pattern similar to that seen in 2016.¹⁵ Margins were low, and occasionally negative, in January of 2017 but increased and remained positive as demand surged during the spring and summer driving season.¹⁶ The average margin for the first eight months of 2017 was \$0.23 per gallon.¹⁷ Over this period, the average net cost of corn – the largest ethanol input cost – was \$0.81 per gallon.¹⁸ Ethanol prices have fluctuated slightly throughout the first eight months of 2017, with an average price of \$1.45 per gallon.¹⁹

Figure 1 shows net corn prices, ethanol prices, and return over operating costs for the period January 2012 through September 2017.

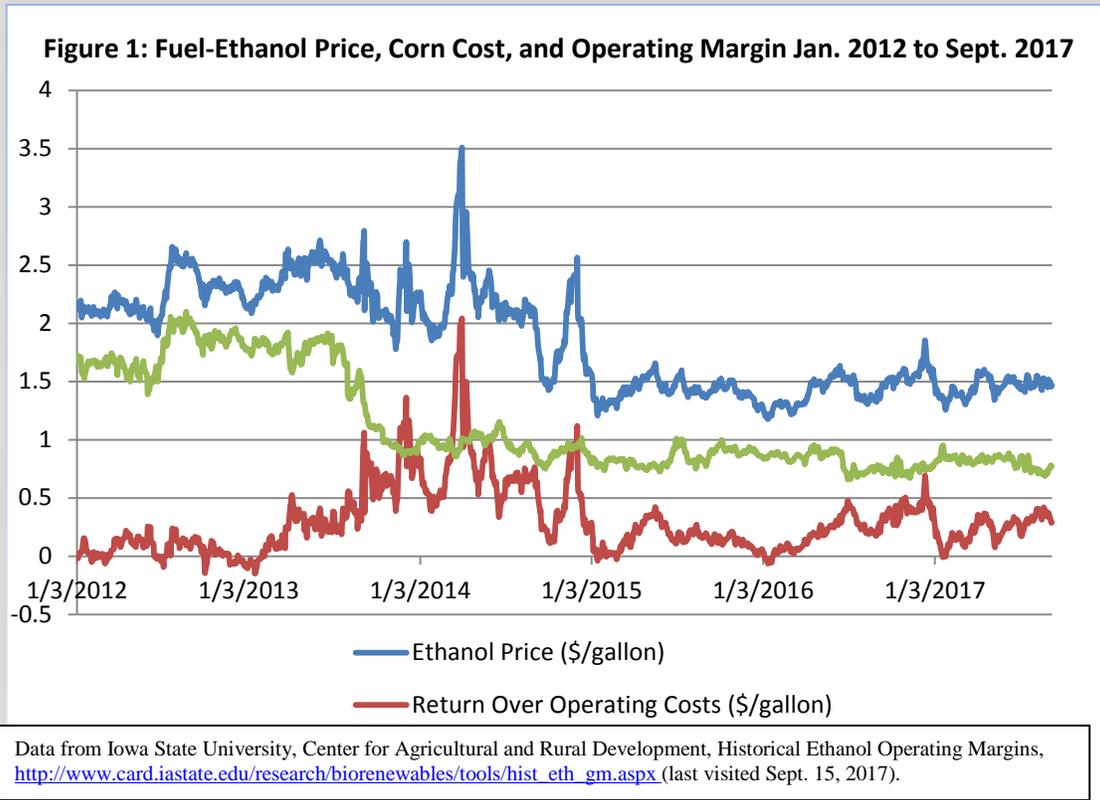
¹⁵ See Iowa State University, Center for Agricultural and Rural Development, Historical Ethanol Operating Margins, http://www.card.iastate.edu/research/biorenewables/tools/hist_eth_gm.aspx (last visited Sept. 15, 2017).

¹⁶ *Id.* Margin, or return over operating costs, is the difference between the revenue from ethanol plants (including revenue from ethanol and dried distillers grains with solubles) and variable production costs (including corn, natural gas, and labor).

¹⁷ *Id.* This is higher than the average margin for the first eight months in 2016, which was \$0.18 per gallon.

¹⁸ *Id.* The cost of corn peaked at \$0.95 per gallon in January 2017 and reached a nadir of \$0.69 per gallon in August 2017.

¹⁹ *Id.* Ethanol prices reached a low of \$1.25 per gallon in January 2017 and a high of \$1.60 per gallon in April 2017. The average price for the first eight months of 2016 was \$1.39 per gallon.



C. Market Trends

Domestic ethanol capacity and production increased since last year’s Report. Domestic ethanol production from June 2016 through May 2017 increased approximately four percent from the prior 12 months, from 15.0 billion to 15.6 billion gallons.²⁰ Domestic ethanol production capacity (including capacity under construction) rose to approximately 16.6 billion gallons per year.²¹ This marks the fourth consecutive year of capacity increases.²²

²⁰ U.S. Energy Info. Admin., Monthly Energy Review, Table 10.3 Fuel Ethanol Overview, *supra* note 12.

²¹ Staff’s total capacity estimate takes into account information obtained through interviews with market participants and publicly available information, including information published online by the Renewable Fuels Association (“RFA”). *See, e.g.*, RFA, Biorefinery Locations, <http://www.ethanolrfa.org/resources/biorefinery-locations/> (last visited Sept. 29, 2017). To estimate capacity, staff used operating capacity rather than nameplate capacity, which led to an estimated total in excess of EIA’s published estimate of 15.5 billion gallons. U.S. Energy Info. Admin., U.S. Fuel Ethanol Plant Production Capacity (June 20, 2017), <http://www.eia.gov/petroleum/ethanolcapacity/>. EIA’s capacity data are a snapshot of capacity as of January 1 of each year and exclude plants that were idle, shut down, or still under construction as of that month. *See* U.S. Energy Info. Admin., EIA Releases U.S. Fuel Ethanol

Ethanol exports have also increased. From July 2016 through June 2017, the U.S. exported 1.3 billion gallons of ethanol, a 40 percent increase from the same period during the prior year.²³ This marked the fourth consecutive year of increased ethanol exports.²⁴

Over 100 firms produce or are capable of producing ethanol. The largest ethanol producer's share of domestic capacity is approximately 11 percent, unchanged from its 2016 share.²⁵

III. Analysis

Section 1501(a)(2) of the Energy Policy Act of 2005 instructs the Commission to use HHIs to measure concentration in the U.S. ethanol production industry.²⁶ HHIs can provide a snapshot of market concentration based upon the number of market participants and their respective sales, production, or capacity.²⁷ An analysis of competition among market participants using these HHIs assumes that the U.S. ethanol production industry is an appropriate antitrust market, a question that this Report does not address.²⁸ Such an assumption precludes

Production Capacity Data (Nov. 30, 2011), <http://www.eia.gov/todayinenergy/detail.cfm?id=4110> (describing EIA's method for calculating total capacity for its first annual reports).

²² U.S. Energy Info. Admin., U.S. Fuel Ethanol Production Continues to Grow in 2017 (July 21, 2017), <https://www.eia.gov/todayinenergy/detail.php?id=32152>.

²³ U.S. Energy Info. Admin., U.S. Exports of Fuel Ethanol, http://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=M_EPOOXE_EEX_NUS-Z00_MBBL&f=M (last visited Sept. 29, 2017) (noting the U.S. exported 31.6 million barrels of ethanol during this period); *see also* U.S. Energy Info. Admin., U.S. Fuel Ethanol Production Continues to Grow in 2017 (July 21, 2017), *supra* note 22.

²⁴ U.S. Energy Info. Admin., U.S. Fuel Ethanol Production Continues to Grow in 2017 (July 21, 2017), *supra* note 22.

²⁵ *See* 2016 Ethanol Report, *supra* note 1, at 7.

²⁶ Energy Policy Act of 2005 § 1501(a)(2), *supra* note 2. A given market's HHI is the sum of the squares of the individual market shares of all market participants. For example, a four-firm market with market shares of 30 percent, 30 percent, 20 percent, and 20 percent has an HHI of 2600 [(30*30) + (30*30) + (20*20) + (20*20) = 2600]. HHIs range from 10,000 in a one-firm (pure monopoly) market to a number close to zero in a highly unconcentrated market.

²⁷ The Commission and the U.S. Department of Justice regularly use HHIs to measure concentration in a relevant antitrust market as part of their analysis of the likely effects of a merger or acquisition on competition in that market. *See* Horizontal Merger Guidelines, *supra* note 5, § 5.3.

²⁸ A relevant antitrust market has both product and geographic aspects. A relevant product market is a product or group of products such that a hypothetical profit-maximizing firm that was the only seller of those products likely could profitably impose at least a small but significant and nontransitory increase in price ("SSNIP"). If such a price

consideration of a broader product market that includes other gasoline blending components that might be economically viable and environmentally acceptable substitutes for ethanol. In the event that ethanol competes with other blending components, HHIs based on a fuel ethanol market would understate the amount of competition in the industry. This assumption also precludes consideration of whether broader or narrower geographic markets than the United States could provide further insight about competition in ethanol production and marketing.

This Report presents four HHIs for the ethanol industry, calculated using two different measures of market share – production capacity and actual production – and two different methods of allocating those market shares by market participant. First, staff calculated market shares based on domestic ethanol production capacity. Staff then attributed the producer’s market share to (1) the producer itself, and (2) the producer or the third-party firm that actually marketed the producer’s ethanol output. Staff relied on publicly available information and interviews with producers, marketers, and other industry participants to determine the production capacity of each ethanol plant and to calculate the market shares based on marketing arrangements.

Second, EIA staff calculated market shares based on actual production, attributing the market shares as described in the preceding paragraph. Due to the confidential nature of the ethanol production data the EIA collects, staff provided to EIA staff the information necessary to

increase would not be profitable because of the loss of sales to other products, the product or group of products would not be a relevant product market. Similarly, a relevant geographic market is a region such that a hypothetical profit-maximizing firm that was the only seller of the relevant product in that region likely could impose at least a SSNIP above the competitive level. If such a price increase would not be profitable because of the loss of sales to sellers outside the region, the region would be too narrow to be a relevant geographic market. *See id.* §§ 4.1-4.2.

allocate market shares.²⁹ EIA staff separately allocated shares by producer and by marketer to calculate production-based HHIs.³⁰

A. Concentration with Market Shares Based on Production Capacity

For each of the HHI calculations described below, staff first calculated producers' market shares based on their fuel ethanol production capacity.³¹ Production capacity provides a useful and easily confirmable indicator of a producer's competitive significance.³² In determining each producer's aggregate capacity, staff included the capacity of existing plants, as well as the projected capacity of plants currently under construction and plants currently undergoing expansion.³³ Incorporating capacity from such projects into current market share calculations is consistent with the approach set forth in the Horizontal Merger Guidelines.³⁴

1. *Attributing Market Shares to Producers*

Under the first approach to market concentration, staff allocated market share to each producer based on the producer's percentage of total production capacity. This method of

²⁹ For producers for which EIA maintains production data, staff provided EIA with the identities of those producers' marketers. EIA used this information, in conjunction with its own data on ethanol production, to calculate the HHIs that attribute market share to marketers.

³⁰ Because the production data are confidential, EIA staff did not disclose the volumes of ethanol attributable to any individual producer or the market shares based on those volumes.

³¹ The RFA's website provides frequently updated data on ethanol plant capacity and capacity expansion plans. Capacity information is also available on many individual producers' websites, some of which also provide details of construction and expansion plans.

³² See Horizontal Merger Guidelines, *supra* note 5, § 5.2. In markets for homogeneous products (such as ethanol), a firm may derive its competitive significance primarily from its available capacity – *i.e.*, its ability and incentive to increase production in the event of a competitor's price increase or output reduction. *Id.*

³³ Staff included the capacity of these construction and expansion projects only where the producer had finalized construction plans, received the necessary financing for construction, and began physical construction. Ethanol producers frequently announce capacity additions, new plants, plant sales, and cancellations of plans to build new capacity. These HHI calculations represent staff's best estimate of the industry's concentration as of September 2017, the cut-off date for our analysis unless otherwise indicated. This approach therefore excludes any more recent publicly available information that might be relevant to industry HHI calculations. These HHI calculations also might not capture the full complexity of industry ownership structures, especially the degree of control by minority interests held by marketers or third-party management service firms. However, the HHI resulting from allocating production to the marketer should capture any such complexity not reflected in the producer HHI.

³⁴ See Horizontal Merger Guidelines, *supra* note 5, § 5.1. Firms that are not currently producing but likely would respond rapidly in the event of a SSNIP have competitive significance even though they do not currently supply the relevant market. *Id.*

calculation yielded an HHI of 480, a level regarded as unconcentrated under the Horizontal Merger Guidelines.³⁵ This HHI is a slight decrease from the 2016 HHI of 482.³⁶

2. *Attributing Market Shares to Marketers*

Many producers enter into marketing agreements with third parties to market their ethanol to blenders and end users, while other producers sell their output directly. An ethanol marketer may represent and make limited decisions for multiple individual producers, essentially aggregating these producers' capacities under a single entity. For purposes of competitive analysis, attributing production capacity to marketers rather than to the actual producers provides a measure of industry concentration that captures this aggregation. For producers that engage in direct sales, staff attributed the market shares to the producers themselves.³⁷

This approach yields an HHI of 699, unconcentrated under the Horizontal Merger Guidelines. This HHI is lower than the corresponding HHI of 737 in 2016.³⁸

B. Concentration with Market Shares Based on Actual Production

Firms that produce more than eight million gallons of oxygenates (such as ethanol) per year must report to EIA their monthly production volumes by product. Using production data is instructive because capacity data have certain limitations, particularly insofar as stated capacity does not necessarily represent actual production capabilities. Ethanol plants often can produce as much as 10 to 15 percent more than their stated design capacities and tend to operate at increasing rates as their owners and operators improve the production process and gain expertise

³⁵ *Supra* note 5.

³⁶ *See* Figure 2. Some of the change to the HHI may be attributable to a producer's acquisition of another producer's facilities. In several instances, these acquisitions coincided with the restart or reconstruction of an idled facility. Some of the change to the HHI may also be attributable to excluding plants that were converted to other uses, formally closed, or judged unlikely to reopen in the near future.

³⁷ Some marketers publicly announce new agreements with producers. Where staff could not determine whether a producer marketed for itself or used an outside marketing firm, staff attributed market share to the producer.

³⁸ 2016 Ethanol Report, *supra* note 1, at 9.

in operating their plants.³⁹ In this respect, actual production may reflect a market participant's competitive significance more accurately than would its plants' capacities.

There are some limitations on the accuracy of HHIs based on actual production, just as there are limitations on capacity-based HHIs. HHIs based on production over a given period may overstate or understate actual concentration due to entry and exit of firms, expansion of existing capacity, and variations in capacity utilization rates during the relevant period. Specifically, the production-based HHIs provided below do not fully reflect the deconcentrating impact of new facilities that began production during the last 12 months, nor do they fully reflect the concentrating impact of plant closures and idling during the period. In both cases, these facilities produced only a fraction of what they otherwise could produce in a full year, leading to an understatement (in the case of new facilities) or an overstatement (in the case of idled facilities) of their competitive significance in the market. Similarly, the HHIs below do not account for the effects on concentration of plant expansions within the last 12 months and capacity-enhancing improvement projects that are not yet in operation.

These production-based HHIs reflect actual production volumes from July 2016 through June 2017. Where EIA attributed the actual production market share directly to individual producers, the resulting HHI is 475, slightly greater than the 2016 HHI of 463.⁴⁰ The production-based HHI calculated by attributing the market share of each producer to the firm that markets for that producer results in an HHI of 719, slightly lower than the 2016 HHI of 739.⁴¹

³⁹ Similarly, some ethanol producers may not be in a position to utilize their full plant capacity. Actual production may be a better indicator of their competitive significance in such cases.

⁴⁰ 2016 Ethanol Report, *supra* note 1, at 10

⁴¹ *Id.* at 11.

C. Entry and Imports

The U.S. ethanol industry is unconcentrated today, suggesting that any unilateral or coordinated attempt to exercise market power is highly unlikely. Should the industry become more concentrated, the possibility of new firms entering the domestic market and the responsiveness of ethanol imports to relative changes in domestic ethanol prices would likely provide additional constraints on anticompetitive behavior by domestic firms. Potential entrants can purchase and restart existing production facilities that were idled due to recent economic conditions or can design and build new plants to enter the market.

Ethanol import levels historically have responded to fluctuations in the price of U.S. ethanol relative to foreign ethanol prices, particularly prices for sugar cane-based ethanol from Brazil.⁴² This responsiveness would likely restrain any potential exercise of market power by a domestic firm. Additionally, to the extent U.S. prices increase because of exercise of market power among a group of U.S. producers or marketers, it is likely that other producers would react by exporting less to take advantage of more favorable U.S. ethanol prices (thereby increasing U.S. supply).

IV. Conclusion

Regardless of the particular measure of market share or the market share allocation method used to calculate concentration, ethanol production remains unconcentrated. The industry is less concentrated today than it was at the time of the first ethanol market concentration report in 2005. Furthermore, the possibility of entry and the availability of ethanol

⁴² Brazil has been the largest exporter of ethanol to the United States every year since 2011. *See* U.S. Energy Info. Admin., U.S. Imports by Country of Origin, http://www.eia.gov/dnav/pet/pet_move_impcus_a2_nus_epooxe_im0_mbb1_a.htm. Though the United States is a net exporter of ethanol, demand exists for imported ethanol with low greenhouse gas emissions, such as sugar-cane-based ethanol. *See* U.S. Energy Info. Admin., U.S. Ethanol Exports Exceed 800 Million Gallons for Second Year in a Row, <https://www.eia.gov/todayinenergy/detail.php?id=25312>.

imports provide additional constraints on the exercise of market power by current industry participants. The low level of concentration and large number of market participants in the U.S. ethanol production industry continue to suggest that the exercise of market power to set prices, or coordination on price and output levels, is unlikely.

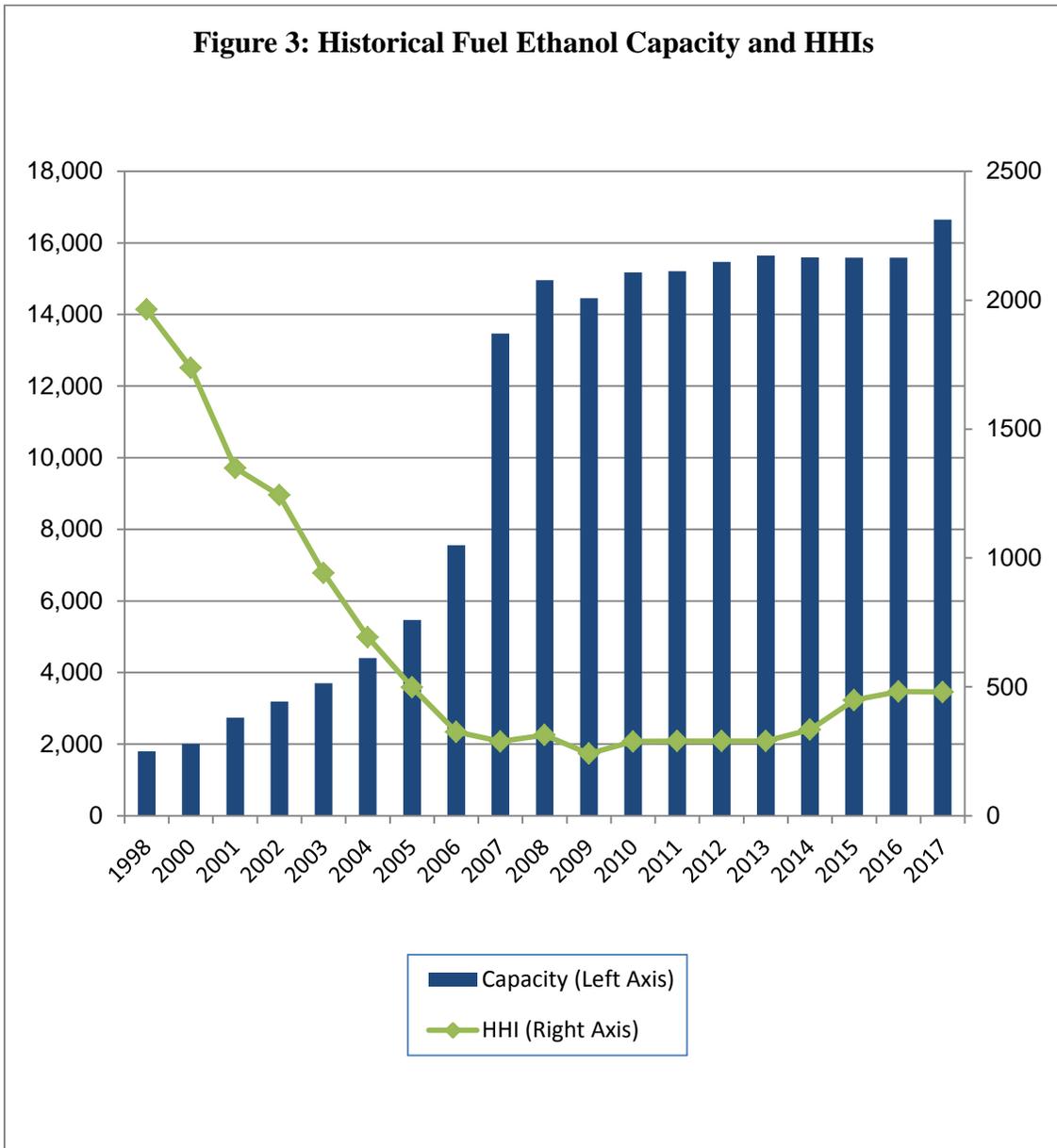
Figure 2: Domestic Fuel Ethanol Concentration⁴³

Concentration Based on Capacity	2016 HHI	2017 HHI
Shares attributed to each producer	482	480
Shares attributed to marketers for all marketing agreements	737	699
Concentration Based on Production	2016 HHI	2017 HHI
Shares attributed to each producer	463	475
Shares attributed to marketers for all marketing agreements	739	719

Note: Capacity for 2016 includes the capacity as of September 2016 and the capacity additions under construction and expected completions within 12 to 18 months after September 2016. Capacity for 2017 includes the capacity as of September 2017 and the capacity additions under construction and expected completions within 12 to 18 months after September 2017. Production data for 2016 are from July 2015 through June 2016; production data for 2017 are from July 2016 through June 2017.

⁴³ *Supra* note 5.

Figure 3: Historical Fuel Ethanol Capacity and HHIs



Note: Annual figures are for operable capacity and capacity under construction at year-end for 1998 to 2004, and as of October for 2005 to 2017. (Capacity additions attributed to 2017 are expected to be completed by mid-2018.) The HHI figures shown are capacity-based, with market share attributed to the producer.