2019 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 2019.[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 production of ethanol. Staff's analysis does not address whether

the concentration occurs in a relevant antitrust market (which would include both geographic and

product aspects); instead, it addresses concentration based on production capacity and actual

production. For both measures, HHIs are calculated for producers and marketers. For both

production capacity and actual production, concentration for producer shares is lower than

concentration for marketer shares. Based on production capacity, the HHIs are 464 for producer-

based shares and 701 for marketer-based shares. Based on actual production, the HHIs are 444

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[1] This Report builds upon Commission reports from previous years. Prior reports contain background information not included in 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. 1067, 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*.

for producer-based shares and 725 for marketer-based shares. There has been a slight decrease

in concentration since last year for each of the four HHIs.

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 2019, the RFS mandates 28.0 billion gallons of renewable fuel, 15.0

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[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 § 5.3 (2010), https://www.ftc.gov/sites/default/ files/attachments/merger-review/100819hmg.pdf ("Horizontal Merger Guidelines").

[6] *See* Energy Policy Act of 2005 § 1501, *supra* note 2.

[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).

billion gallons of which can be conventional corn ethanol.[8] The 2019 advanced biofuels

target is 13.0 billion gallons, at least 8.5 billion gallons of which must be cellulosic biofuel.[9]

The annual use of renewable fuels did not keep pace with the statutory RFS requirements,

however, prompting the EPA to decrease the requirements.[10] For 2019, the EPA reduced the

requirement to 19.92 billion gallons of total renewable fuels, 15.0 billion gallons of which can be

conventional corn ethanol.[11] The EPA reduced the requirement to 4.92 billion gallons of

advanced biofuels, at least 418 million gallons of which must be cellulosic biofuel.[12]

Most market participants that staff interviewed believe the U.S. ethanol industry will

meet the EPA's revised RFS requirement in 2019. Market participants variously characterize

the ethanol industry as currently experiencing overcapacity, flat or reduced demand, reduced

production levels, low margins, and the idling or closure of marginal plants. In addition,

heavy rains, flooding, and late planting and harvesting in certain areas reduced the availability

of corn, increased corn prices, and impeded ethanol production during part of the season.

Market participants noted no significant change since 2018 in the demand for E15 and E85

(gasoline with 15 percent and 85 percent ethanol content, respectively). On May 30, 2019,

the EPA finalized regulatory changes to allow E15 to be sold year-round, rather than limited

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[8] *Id*. § 7545(o)(2)(B)(i)(I).

[9] *Id*. § 7545(o)(2)(B)(i)(II)-(III).

[10] The Clean Air Act provides EPA authority to adjust cellulosic, advanced, and total volumes set by Congress as part of the annual rulemaking process. *See* EPA, Overview for Renewable Fuel Standard, https://www.epa.gov/renewable-fuel-standard-program/overview-renewable-fuel-standard (last visited Oct. 15, 2019).

[11] EPA, Renewable Fuel Stand. Prgm., Final Renewable Fuel Standards for 2019, and the Biomass-Based Diesel Volume for 2020, https://www.epa.gov/renewable-fuel-standard-program/final-renewable-fuel-standards-2019-and-biomass-based-diesel-volume (last visited Oct. 15, 2019). The EPA's volume requirements, like the statutory RFS mandate, 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.

[12] *Id*.

to eight months of the year.[13] Market participants interviewed report that the rule change has had little impact on the demand for E15.

Market participants expressed varying views on whether ethanol usage in the United States remains limited by the E10 "blend wall." The E10 blend wall 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. only offer E10 gasoline, which has 10 percent ethanol content.

B.   Prices and Margins

Market participants stated that in 2019 prices have been low and margins have been low or negative. Figure 1 shows daily net cost of corn,[14] ethanol prices, and margins from the beginning of 2014 to October 18, 2019, expressed on a per-gallon basis.[15] Margins are measured by a return over operating costs estimated for a hypothetical dry mill in Iowa, as reported by the Iowa State University Center for Agricultural and Rural Development.[16]

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[13] EPA, Final Rule, Modifications to Fuel Regulations To Provide Flexibility for E15; Modifications to RFS RIN Market Regulations, 84 Fed. Reg. 26980 (June 10, 2019).

[14] Net cost of corn is the daily nearby futures price in Chicago plus Iowa corn basis. Weekly corn basis is calculated as the price that Iowa ethanol plants pay, as reported by the U.S. Department of Agriculture's Livestock and Grain Market News, minus the Chicago Board of Trade nearby futures price.

[15] October 18, 2019 is the last date for which data from Iowa State University were reviewed for purposes of this Report.

[16] *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 Oct. 22, 2019). "Return over operating costs" is specifically defined as the difference between the revenue from ethanol (including revenue from ethanol and dried distillers grains with solubles) and variable production costs (including corn, natural gas, and labor). As of November 2016, revenue includes sales of corn oil, a byproduct of ethanol, which could make margins not comparable before and that date.

Figure 1: Ethanol Price, Corn Cost, and Margin
Jan. 2014 to Oct. 2019
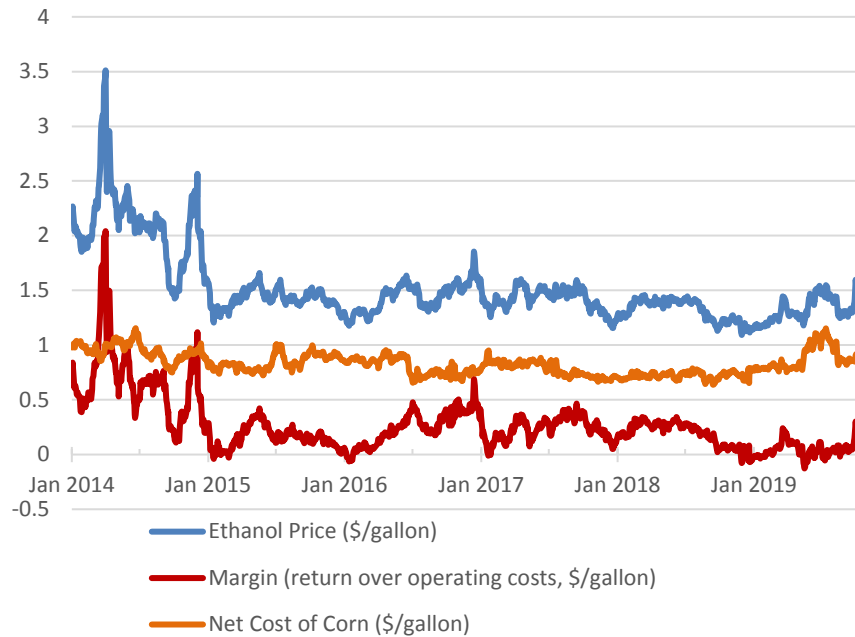
Data from Iowa State University, Center for Agricultural and Rural
Development, Historical Ethanol Operating Margins,
https://www.card.iastate.edu/research/biorenewables/tools/hist_eth_gm.asp
(last visited Oct. 22, 2019).

From the beginning of 2019 through October 18, margins in the U.S. ethanol industry were estimated to have been very low compared to previous years, although recently they are expected to have returned to more normal levels. Estimated margins were low early in the year except for one brief spike in April, but increased significantly in September and October.[17] The average estimated margin for the period was $0.06 per gallon, which is much lower than the $0.25 margin for the same period in 2018.[18]

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[17] *Id.*
[18] *Id.* (margins calculated to October 18 for both years, 2018 and 2019).

C.   Market Trends

Domestic ethanol production capacity and actual production decreased since last year's

Report. Production capacity (including capacity under construction) decreased slightly, from

17.3 to 17.0 billion gallons per year.[19] Actual production from July 2018 through June 2019

decreased slightly from the prior 12 months, from 16.05 to 15.96 billion gallons per year.[20]

This decrease in actual production resulted from reduced domestic and export demand and

reduced availability of corn, which led to low margins and idled plants.

Ethanol exports have also decreased. From July 2018 through June 2019, the U.S.

exported approximately 1.53 billion gallons of ethanol, a six percent decline from the prior year

period.[21] This marked the first annual decline during a July-to-June period after five

consecutive years of increased ethanol exports.[22]

Over 100 firms produced ethanol in 2019. The largest ethanol producer's share of

domestic capacity is approximately 12 percent, up one percent from its 2018 share.[23]

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[19] 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, Ethanol Biorefinery Locations, http://www.ethanolrfa.org/resources/biorefinery-locations/ (last visited Oct. 15, 2019). Staff's capacity total is greater than the U.S. Energy Information Administration ("EIA") annual published estimate of 16.9 billion gallons. EIA, U.S. Fuel Ethanol Plant Production Capacity (Aug. 26, 2019), 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* EIA, EIA Releases U.S. Fuel Ethanol 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). These differences appear to produce slightly different results for capacity, which EIA found to increase slightly for 2019. *See* EIA, Increase in U.S. fuel ethanol production capacity slows (Sept. 20, 2019), https://www.eia.gov/todayinenergy/detail.php?id=41393.

[20] EIA, Monthly Energy Review, Table 10.3 Fuel Ethanol Overview (release date: Oct. 25, 2019), http://www.eia.gov/totalenergy/data/browser/xls.cfm?tbl=T10.03&freq=m.

[21] Calculations based on July 2018-June 2019 monthly exports reported in EIA, 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 (release date: Sept. 30, 2019) (calculating a monthly sum of barrels converted to U.S. gallons (1 barrel = 42 U.S. gallons)).

[22] *Id.*

[23] *See* 2018 Ethanol Report, *supra* note 1, at 5.

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.[24] HHIs can provide a snapshot of market concentration based upon the number of market participants and their respective sales, production, or capacity.[25] 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.[26] Such an assumption precludes consideration of a broader product market that includes other gasoline blending components that might be viable substitutes for ethanol. In the event that ethanol competes with other blending components, HHIs based on fuel ethanol production and marketing would likely misstate concentration 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, based on two different measures of market share (production capacity and actual production), and two different methods of

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[24] 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.

[25] 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.

[26] 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 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.

attributing those market shares to various market participants (producers and marketers). In

regard to measuring market share, for purposes of this Report "production capacity" is defined to

mean a plant's maximum annual output of ethanol minus any required downtime for

maintenance.[27] "Actual production" is defined to mean a plant's actual annual output of

ethanol.[28] In regard to attributing market shares to market participants, "producer" is defined to

mean a firm that in fact manufactures the ethanol. As discussed below, "marketer" is defined to

mean the firm, whether the producer itself or a third-party firm, that sells and transports a

producer's ethanol output.

FTC staff calculated market shares based on domestic ethanol production capacity for

producers and marketers. FTC staff relied on publicly available information and interviews with

producers and marketers to determine the production capacity of each ethanol plant and

marketing activities of marketers. FTC staff then calculated capacity-based HHIs for producers

and marketers.

United States Energy Information Administration ("EIA") staff calculated market shares

based on actual production for producers and marketers. Due to the confidential nature of the

ethanol production data the EIA collects, FTC staff provided to EIA staff the information

necessary to attribute market shares to market participants.[29] EIA staff then separately calculated

production-based HHIs for producers and marketers.[30]

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[27] Production capacity is also sometimes referred to as "operating capacity." For purposes of this Report, production capacity is distinct from "nameplate capacity," a common industry term that may refer to the intended full-load sustained output of a facility. Nameplate capacity may also be variously known as "rated capacity," "nominal capacity," "installed capacity," or "stated design capacity."

[28] Actual production is also sometimes referred to as "operating production."

[29] For producers for which EIA maintains production data, FTC staff provided EIA with the identities of those producers' marketers. EIA staff 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.

A. **Concentration with Market Shares Based on Production Capacity**

FTC staff 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, FTC staff attributed market share to each producer based on the producer's percentage of total production capacity. This method of calculation yielded an HHI of 464, a level regarded as unconcentrated under the Horizontal Merger Guidelines.[35] This HHI is slightly lower than the corresponding HHI of 480 in 2018.[36]

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[31] The RFA 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. Staff obtained the production capacity for some producers directly from firm officials.

[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 begun 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 2019, 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 attributing 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.*

[35] *See id*. § 5.3.

[36] *See* 2018 Ethanol Report, *supra* note 1, at 2. The industry continued to experience shifts in plant capacity through plant expansions, conversions, openings, and closures over the past 12 months. Because the HHI captures these adjustments in the aggregate, it ignores the individual activity of industry participants. For example, the HHI may

2.   *Attributing Market Shares to Marketers*

Under the second approach, FTC staff attributed the market share of each producer to the firm that markets for that producer. Some producers sell the ethanol they produce directly to blenders and end users. Many producers, however, enter into marketing agreements with third parties to sell their output. An ethanol marketer may represent and make limited decisions for multiple individual producers, essentially aggregating those 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 a producer that engages in direct sales, staff attributed the market shares to the producer itself.[37] For a producer that does not engage in direct sales, staff attributed the market shares to the third-party firm that marketed the producer's ethanol output. This approach yields an HHI of 701, unconcentrated under the Horizontal Merger Guidelines. This HHI is slightly lower than the corresponding HHI of 731 in 2018.[38]

B.   <u>Concentration with Market Shares Based on Actual Production</u>

EIA staff calculated producers' 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 can sometimes produce more than their stated design capacity (*i.e.*, nameplate capacity) and sometimes operate at increasing rates as

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include a producer's acquisition of another producer's facilities that coincided with the restart or reconstruction of an idled facility. Alternatively, the HHI may exclude a plant that was 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] *See* 2018 Ethanol Report, *supra* note 1, at 2.

their owners and operators improve the production process and gain expertise in operating their plants.[39] Thus, actual production may reflect a market participant's competitive significance more accurately than would the sum of its plants' stated design 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 impact of new facilities that began production during the last 12 months, nor do they fully reflect the 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 that have been in effect for less than 12 months and capacity-enhancing improvement projects that are not yet in operation. These production-based HHIs reflect actual production volumes from July 2018 through June 2019.

1.   *Attributing Market Shares to Producers*

Where EIA attributed the actual production market share directly to individual producers, the resulting HHI is 444, slightly lower than the 2018 HHI of 459.[40]

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[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] *See* 2018 Ethanol Report, *supra* note 1, at 2.

2. *Attributing Market Shares to Marketers*

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 725, lower than the 2018 HHI of 759.[41]

C. <u>Entry and Imports</u>

The U.S. ethanol industry remains unconcentrated today. This implies that any unilateral or coordinated attempt to exercise market power is 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 sugarcane-based ethanol from Brazil.[42] This responsiveness would likely constrain any potential exercise of market power by a domestic firm. Additionally, to the extent U.S. prices increase because of the exercise of market power among a subset 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).

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[41] *Id.*

[42] Brazil has been the largest exporter of ethanol to the United States every year since 2011. *See* EIA, U.S. Imports by Country of Origin (release date: Sept. 30, 2019), https://www.eia.gov/dnav/pet/pet_move_impcus_a2_nus_epooxe_im0_mbbl_a.htm. Although the United States is a net exporter of ethanol, demand exists for imported ethanol with low greenhouse gas emissions, such as sugarcane-based ethanol. *See* EIA, U.S. exported a record amount of fuel ethanol in 2017 (Apr. 27, 2018), https://www.eia.gov/todayinenergy/detail.php?id=35972.

IV.   Conclusion

Regardless of the particular measure of market share or the market share attribution method used to calculate concentration, the ethanol industry 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 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 Concentration[43]

Concentration Based on Production Capacity	2018 HHI	2019 HHI
Shares attributed to each producer	480	464
Shares attributed to marketers for all marketing agreements	731	701
Concentration Based on Actual Production	**2018 HHI**	**2019 HHI**
Shares attributed to each producer	459	444
Shares attributed to marketers for all marketing agreements	759	725
Note: Production capacity for 2019 includes the annual production capacity as of September 2019 and the capacity additions under construction and expected completions within 12 to 18 months after September 2019. Production data for 2019 are from the annual period of July 2018 through June 2019.		

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[43] *See* 2018 Ethanol Report, *supra* note 1, at 12.

Figure 3: Historical Fuel Ethanol Capacity and HHIs
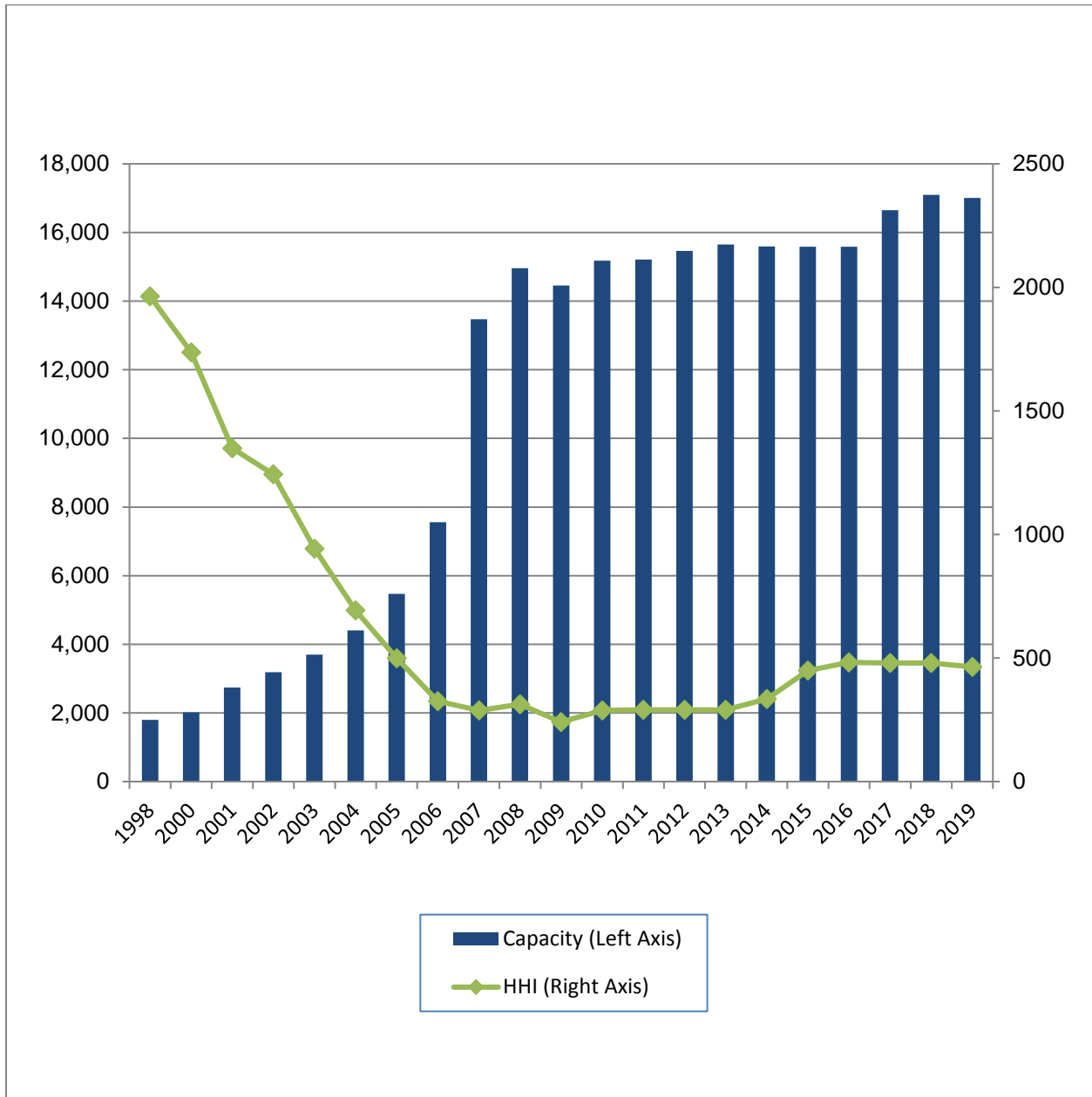
Note: Data are based on annual production capacity, which includes annual operable capacity and capacity under construction at year-end for 1998 to 2004, and as of October for 2005 to 2019. Data for 1998 to 2004 prior to the FTC's first annual ethanol report in 2005 are from the Renewable Fuels Association. HHI calculations attribute market share for production capacity to the producer.