

2007 Report on Ethanol Market Concentration

I. Introduction

Section 1501(a)(2) of the Energy Policy Act of 2005, as codified at 42 U.S.C. § 7545(o) (“Energy Policy Act”), imposes an annual requirement on the Federal Trade Commission (“Commission” or “FTC”) to “perform a market concentration analysis of the ethanol production industry using the Herfindahl-Hirschman Index to determine whether there is sufficient competition among industry participants to avoid price-setting and other anticompetitive behavior.”¹ The statute further requires that the FTC consider all marketing arrangements among industry participants in preparing its analysis. The FTC must report its findings to Congress and to the Administrator of the Environmental Protection Agency by December 1 of each year. This report presents the FTC’s concentration analysis of ethanol production for 2007, building upon the previous two Commission reports on ethanol market concentration, which contain relevant background information which is not fully repeated in this report.²

¹ The Commission and the U.S. Department of Justice regularly use the Herfindahl-Hirschman Index (“HHI”) to measure concentration in a relevant antitrust market for use in analyzing the likely effects of a merger or acquisition on competition in that market. HHIs are calculated by summing the squares of the individual market shares of all market participants. HHIs provide a snapshot of market concentration and, in the context of merger review, the difference between the pre-merger HHI and post-merger HHI suggests the merger’s likely effect on market concentration. While HHIs provide information about market concentration, they are only the starting point for the competitive analysis undertaken by the Commission and the U.S. Department of Justice. Both agencies make their enforcement decisions based on several factors in addition to HHIs, such as ease of entry and competitive effects.

² See FTC, Report on Ethanol Market Concentration (2005) (“2005 Ethanol Report”), available at <http://www.ftc.gov/reports/ethanol05/20051202ethanolmarket.pdf>; Report on Ethanol Market Concentration (2006) (“2006 Ethanol Report”), available at http://www.ftc.gov/reports/ethanol/Ethanol_Report_2006.pdf.

For purposes of this analysis, FTC staff reviewed and analyzed publicly available data and conducted interviews with ethanol producers and marketers. As in previous reports, FTC staff used three different methods of calculating HHIs for the ethanol production industry.³ Most significantly, staff determined that, if each producer's market share is attributed to the firm that markets its ethanol, the HHI for domestic ethanol production (based on production capacity) is 670. If each producer's market share is not attributed to its marketer, but rather to itself, the HHI for domestic ethanol production (again based on production capacity) is 292. Assuming U.S. fuel ethanol production is a relevant market for competition analysis, these figures indicate that the relevant market is unconcentrated.⁴ Moreover, these HHI levels do not justify a presumption that a single ethanol producer or marketer, or a small group of such firms, could wield sufficient market power to set prices or coordinate on prices or output.

II. Recent Industry Developments

Since last year's report, ethanol production has become less concentrated, and both production and demand have continued to increase at a strong pace. One reason why both production and demand increased from 2006 to 2007 is a federal legislative change that eliminated the oxygen requirement for reformulated gasoline ("RFG") as of May 8, 2006.⁵ The 1990 Clean Air Act required that a substantial portion of U.S. gasoline meet certain emissions

³ See Section IV, *infra*.

⁴ In putative markets such as domestic ethanol production, where the HHI level is below 1000, there is a presumption that the market is unconcentrated, or competitive. HHIs between 1000 and 1800 indicate moderately concentrated markets, which may or may not raise competitive concerns. Markets with HHIs over 1800 are highly concentrated and are more likely to pose competitive concerns.

⁵ See Energy Policy Act § 1504.

goals, in part through the inclusion of oxygenates such as methyl-tertiary butyl-ether (“MTBE”) and ethanol.⁶ Refiners largely used MTBE because it was cheaper than other oxygenates, but they faced environmental liability in doing so due to leaks from MTBE storage tanks and the resulting potential for groundwater contamination.⁷ When Congress eliminated the oxygen requirement for RFG, refiners concluded that they could no longer use the federal oxygenate requirement as a potential defense of their use of MTBE.⁸ However, refiners still needed to use MTBE or ethanol to produce RFG that met other clean air standards.⁹ Consequently, refiners greatly reduced their reliance on MTBE and, at the same time, increased their use of ethanol around the beginning of May 2006.¹⁰

The switch from MTBE to ethanol caused a surge in demand for ethanol, and a resulting price spike in ethanol, in the early summer of 2006. Chicago spot prices for ethanol climbed from an average of \$2.53 in February, to a peak of \$4.23 in late June. However, increased domestic supplies and imports quickly brought prices back down to \$2.33 by late August 2006.¹¹ Ethanol prices dropped to around \$1.70 per gallon by August of 2007.¹²

⁶ See Federal Trade Commission, Report on Spring/Summer 2006 Nationwide Gasoline Price Increases at 13 (“2006 Gasoline Price Report”), available at <http://www.ftc.gov/reports/gasprices06/P040101Gas06increase.pdf>.

⁷ See 2006 Gasoline Price Report at 13.

⁸ See *id.* at 14.

⁹ See *id.*

¹⁰ See *id.*; see also Figure 1, *supra*.

¹¹ See *id.* at 15.

¹² See <http://www.ethanolmarket.com/20070828EthanolMarket.pdf>.

The Energy Policy Act provided needed long-term certainty about demand levels that sparked investment in production capacity, and consequently led to increased production in the latter half of 2006. Section 1501(a)(2) requires that the gasoline used domestically contain a minimum amount of renewable fuel. It initially set the minimum amount of renewable fuel usage at 4.0 billion gallons per year in 2006, with yearly increases until 2012, when the requirement reaches 7.5 billion gallons per year. In 2006, domestic ethanol production was 4.9 billion gallons, and domestic demand was 5.4 billion gallons,¹³ both in excess of the required usage of 4.0 billion gallons of renewable fuel. Likely because it is currently economically advantageous for oil companies to blend ethanol into gasoline, ethanol demand in 2006 exceeded the minimum levels established by § 1501(a)(2). Domestic production and demand also are on pace to easily exceed the Energy Policy Act's mandated usage of 4.7 billion gallons in 2007,¹⁴ and will likely exceed the mandated usage for each year through 2012.¹⁵

III. Summary of Market Concentration Trends

Since last year's report, ethanol production has become less concentrated, and growth has continued at a rapid pace. From 2005 to 2006, domestic ethanol production increased

¹³ See <http://www.ethanolrfa.org/industry/statistics/>.

¹⁴ Domestic ethanol demand is on pace to reach over 6 billion gallons in 2007. See <http://www.ethanolrfa.org/industry/statistics/>.

¹⁵ Our prediction that domestic ethanol usage will outpace the minimum requirements of the Energy Policy Act is based on the significant amount of production capacity now under construction, which is actually greater than the amount of ethanol production currently in operation. Thus, if the amount already under construction is completed, domestic production will be far greater than the 7.5 billion gallons per year of renewable fuels required by the Energy Act of 2005.

approximately 26%, from 3.9 billion gallons to 4.9 billion gallons.¹⁶ This increase comes on the heels of a 15% increase between 2004 and 2005.¹⁷ This increased level of production also exceeds the projected 4.6 billion gallons of production estimated for 2006 in last year's report (which was issued before year-end production figures were available).¹⁸ Since 2000, when domestic ethanol production was 1.6 billion gallons,¹⁹ production has increased 206%. With all of the new production continually coming online, domestic production for 2007 likely will be even higher.

Increases in U.S. ethanol production capacity in 2006 were comparable to the increases in actual domestic production. Domestic capacity rose from 4.3 billion gallons per year at the end

¹⁶ See Renewable Fuels Association ("RFA"), Building New Horizons: Ethanol Industry Outlook 2007, at 2 [hereinafter Building New Horizons], available at http://www.ethanolrfa.org/objects/pdf/outlook/RFA_Outlook_2007.pdf.

¹⁷ See Energy Info. Admin. ("EIA"), U.S. Dep't of Energy, *Petroleum Navigator - U.S. Oxygenate Production*, available at http://tonto.eia.doe.gov/dnav/pet/pet_pnp_oxy_dc_nus_mbbbl_m.htm; EIA, *EIA-819 Monthly Oxygenate Report (December 2004)*, available at http://www.eia.doe.gov/pub/oil_gas/petroleum/data_publications/monthly_oxygenate_report/historical/2005/2005_02/pdf/819mhilt.pdf.

¹⁸ See 2006 Ethanol Report at 2.

¹⁹ See EIA, *EIA-819M Monthly Oxygenate Telephone Report (December 2000)*, available at http://www.eia.doe.gov/pub/oil_gas/petroleum/data_publications/monthly_oxygenate_report/historical/2001/2001_01/pdf/oxydata.pdf. (The report shows that 38,886 thousand barrels of ethanol were produced in 2000. Multiplying 38,886 by 1,000, and then by the number of gallons in a barrel (42), yields approximately 1.6 billion.)

of 2005,²⁰ to 5.4 billion gallons per year by the end of 2006,²¹ to 6.8 billion gallons per year by late September 2007.²² The number of ethanol production facilities operating domestically similarly increased, from 95 at the end of 2005,²³ to 110 at the end of 2006,²⁴ to 129 by late September 2007.²⁵ These increases in production capacity are likely to increase at even faster rates in the near term, as there are now approximately 6.6 billion gallons of capacity under construction, roughly equivalent to the entire amount of existing domestic capacity.²⁶

The number of firms producing ethanol also has increased. As of September 2007, 103 firms produced ethanol in the United States, a one-year increase of 13 firms, and a two-year increase of roughly 28 firms. The largest ethanol producer's share of capacity has continued to fall each year as new firms enter the market. Currently, the largest producer accounts for approximately 16% of domestic ethanol capacity, down from 21% in 2006, 26% in 2005, and 41% in 2000.²⁷

²⁰ See Renewable Fuels Ass'n, *From Niche to Nation: Ethanol Industry Outlook 2006*, at 4 [hereinafter *From Niche to Nation*], available at http://www.ethanolrfa.org/objects/pdf/outlook/outlook_2006.pdf.

²¹ See *Building New Horizons* at 3.

²² See Renewable Fuels Ass'n, *Industry Statistics - Ethanol Biorefinery Locations* (estimate as of Aug. 29, 2007), available at <http://www.ethanolrfa.org/industry/locations/>.

²³ See *From Niche to Nation* at 2.

²⁴ See *Building New Horizons* at 2.

²⁵ See Renewable Fuels Ass'n, *Industry Statistics - Ethanol Biorefinery Locations* (estimate as of Aug. 29, 2007), available at <http://www.ethanolrfa.org/industry/locations/>.

²⁶ *Id.*

²⁷ See *2006 Ethanol Report* at 3.

IV. Analysis²⁸

For purposes of calculating the HHIs required by § 1501(a)(2), we must assume that U.S. fuel ethanol production is a relevant antitrust market.²⁹ This assumption precludes consideration of potentially smaller relevant geographic markets within the United States which could provide further insight into the extent of competition among ethanol producers. It also precludes a larger, world ethanol market. With the large increase in ethanol imports, it is possible that the market is broader than the United States, and therefore, that the HHIs reported here overstate concentration in the ethanol industry. Furthermore, the assumption precludes consideration of a broader relevant product market, which includes other gasoline blending components that could be used as an economically viable and environmentally acceptable substitute for ethanol. It is likely that ethanol does compete with other blending components, in which case the HHIs in this analysis could overstate concentration in the ethanol production market.³⁰

²⁸ The background information in this section on how HHIs are calculated and their relevance is virtually identical to the background information in last year's report on ethanol market concentration. *See* 2006 Ethanol Report at 3-5.

²⁹ A relevant antitrust market has both product and geographic aspects. A product market is a product or group of products such that a hypothetical firm that was the only seller of those products would find it profitable to impose at least a small but significant and nontransitory price increase above the competitive level. 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 geographic market is a region such that a hypothetical firm that was the only present or future producer of the relevant product in that region would find it profitable to impose at least a small but significant and nontransitory price increase above the competitive level. If such a price increase would not be profitable because of the loss of sales to producers outside the region, the region would be too narrowly defined to be a relevant geographic market. *See* Horizontal Merger Guidelines §§ 1.1-1.2.

³⁰ This investigation of ethanol market concentration did not require definition of a relevant product or geographic market for purposes of antitrust analysis. Accordingly, this report does not conclude or imply that a national market for fuel ethanol exists for antitrust purposes.

As in the previous reports, FTC staff used three different methods of calculating HHIs for the ethanol production industry. Specifically, staff calculated HHIs based on the production capacity of each individual producer and on the production capacity of each producer when attributing each producer's capacity to the firm responsible for marketing the producer's ethanol. Staff then confirmed these results using the actual production rather than capacity.

A. Concentration Based on Capacity, Attributing Market Shares to Producers

Staff first calculated market shares of producers based on their fuel ethanol production capacity. Production capacity provides a useful and easily confirmable indicator of a producer's competitive significance.³¹

Staff relied on publicly available information and interviews with producers, marketers, and other industry participants to determine the production capacity of each ethanol plant (as well as other information presented herein). On its website, the RFA provides current data on ethanol plant capacity and announced capacity expansions. Other publicly available information is available from the websites of producers, many of which provide information regarding existing plant capacities and construction plans. Some marketers also publicly announce new agreements with producers.

In determining the capacity of individual producers, staff included the capacity of new plants under construction and expansions of existing plants under construction. Staff considered plants or expansions to be under construction only if the firm had finished its construction plans, received necessary financing for the construction, and begun physical construction or expansion.

³¹ See Horizontal Merger Guidelines § 1.41. An ethanol producer's capacity is likely the best measure of its competitiveness, because ethanol is an undifferentiated product (*i.e.*, producers manufacture chemically identical ethanol).

Once a new plant or expansion project has reached this stage, completion is likely within twelve to eighteen months. Including the capacity from such projects in the current market is consistent with the approach adopted in the Horizontal Merger Guidelines.³² Although firms may plan on further expanding capacity substantially over the next few years, staff deemed these plans to be too speculative for this analysis until the producer has secured financing and begun actual construction.

Under this approach, if each U.S. ethanol-producing firm is allocated market share based on its capacity, the HHI would be 292, which is deemed an unconcentrated market under the Horizontal Merger Guidelines.³³ This represents a decrease from the HHI of 326 which staff calculated in last year's report,³⁴ which was already a decrease from the HHI of 499 calculated in the 2005 report.³⁵ Thus, there has been a reduction in concentration in ethanol production for each of the last two years.

³² See Horizontal Merger Guidelines § 1.32. The Horizontal Merger Guidelines specifically discuss "uncommitted entrants" as being in the relevant market. Uncommitted entrants are those firms that are not currently producing or selling, but would do so within one year without the expenditure of significant sunk costs of entry and exit, in response to a "small but significant and nontransitory" price increase. While firms with plants under construction are not technically uncommitted entrants, they pose similar constraints on the ability of current producers or sellers to raise prices.

³³ This number suggests an analytic precision that does not reflect the rate of change in this industry, particularly as producers announce capacity additions, new plants, and cancellations of plans to build new capacity on a seemingly frequent basis. Staff's HHI calculations represent staff's best estimate of the industry's concentration as of September 2007, the cut-off date for our analysis unless otherwise indicated. This approach therefore excludes more recent information publicly available from RFA.

³⁴ See 2006 Ethanol Report at 7.

³⁵ See 2005 Ethanol Report at 9.

B. Concentration Based on Capacity, Attributing Market Shares to Marketers

The second measure of concentration staff determined is also based on production capacity, but attributes each producer's capacity to the firm marketing its ethanol rather than to the producer itself. Many producers, but not all, enter into marketing agreements under which marketers make the arrangements with oil companies, blenders, and brokers. Other producers market their own ethanol directly to the oil companies, blenders, or brokers. Staff attributed the market share of these producers to themselves.

Individual marketers may represent, and make limited decisions for, numerous producers. Such marketers likely concentrate the capacity of numerous producers under a single entity for purposes of competition. Therefore, attributing market share to marketers in measuring concentration, rather than attributing market share to producers, provides a different, although perhaps as meaningful, measure of concentration of the ethanol industry.

Some marketers utilize pooling arrangements, under which they make more significant decisions for their producer clients. Under these agreements, they treat all of their producers' volumes in common, make sales to accounts, and decide which plant is best situated to serve the account. Each producer is then allocated a prorated share from the common revenue pool, based on the volume it contributes, and receives an identical netback (*e.g.*, the sale price less the cost of transportation from the ethanol plant), regardless of where the plant is located or where its ethanol is sold. These producers receive offers from only one source – their marketer, who represents numerous other producers. On the other hand, under a non-pool marketing arrangement, a marketer sells its producers' volumes on a plant-specific basis, and can present each producer with offers from multiple buyers. In the non-pool marketing agreements, a

producer will have a different netback for each sale based on the transportation cost to the buyers it chooses to supply.

Because buyers do not make offers to individual producers within a pooling arrangement, but deal only with the single marketer, it may make sense to attribute production capacity to marketers for those producers in pooling arrangements. In attributing market shares to marketers when they have pooling arrangements with their producers, and attributing market shares to producers not in pooling arrangements to themselves, staff determined the HHI to be 453. This HHI also indicates an unconcentrated market, and represents a decrease from last year's HHI of 635 using the same methodology.³⁶

As each marketing agreement is unique, staff cannot determine with certainty the effect of each marketing agreement on competition in the industry. It is possible that marketing agreements that do not contain pooling arrangements may nonetheless assign decision-making rights such that it is more appropriate to treat the marketer as the key competitive entity for purposes of measuring concentration. Therefore, staff also calculated an HHI which attributes all producers' shares to their marketers, regardless of whether the marketing agreement involves pooling volumes. This approach yields an HHI of 670, again indicating an unconcentrated market under the Horizontal Merger Guidelines, and again down from last year's HHI of 995 using the same allocation method.³⁷

³⁶ See 2006 Ethanol Report at 9.

³⁷ *Id.*

C. Concentration Based on Production, Using EIA Data

Staff also measured concentration in the ethanol industry by using production data, instead of capacity data. Analysis of production data is instructive because there are certain limitations associated with using capacity data. Ethanol plants often can produce more than the stated capacity guaranteed by the builder or designer, and tend to do so as their owners and operators improve the production process and gain expertise in operating their plants. Ethanol plants may run as much as 10 to 15% higher than their stated capacities.³⁸

The EIA provided the production concentration data contained in this report. EIA collects confidential information from firms that produce oxygenates such as ethanol and MTBE. Firms that produce over 8 million gallons of oxygenates per year must report to EIA their monthly production volumes by product. Because the production data is confidential, EIA provided only the final HHI numbers, and did not disclose the volumes of ethanol attributed to each producer or marketer. The EIA concentration numbers are based on production from July 2006 through July 2007.

The HHI based on the actual production of ethanol is 465 if market shares are attributed to the individual producers. If market shares of each producer are attributed to the firm that markets for them only when the marketing is done pursuant to a pooling agreement, the HHI is 736. Finally, if market shares of each producer are attributed to the firm that markets for each producer, the HHI is 1155. These HHIs based on actual production are all lower than the HHIs based on actual production in last year's report. Last year, the HHI based on actual production was 663 when market shares were attributed to each producer, 982 when market shares were

³⁸ See 2006 Ethanol Report at 9; see also 2005 Ethanol Report at 12.

attributed to marketers utilizing pooling agreements and otherwise attributed to the individual producers, and 1345 when market shares were attributed to marketers of each producer. Thus, regardless of whether the measure of concentration is based on capacity or actual production, it is evident that the production of ethanol is continuing to deconcentrate.

There are some limitations to the accuracy of HHI numbers based on actual production, just as there are limitations to HHIs calculated based on capacity. These numbers provide a snapshot of concentration levels at a fixed point in time, and do not capture projected and ongoing changes in production. Specifically, HHIs based on production understate the deconcentrating impact of new facilities that began production during the period measured by EIA, as such facilities only will have produced a fraction of what they would likely produce in a full year. Furthermore, such HHIs only reflect actual production, and cannot take into account the price constraining effect of expansions and new facilities that are under construction but not yet operational.³⁹

D. Ease of Entry and Imports

Other market factors, such as ease of entry and imports, reinforce the presumption that the domestic ethanol production market is competitive. For example, numerous new ethanol production facilities began operation in the past year, and numerous additional facilities are scheduled to begin operating in the coming year. Anecdotal evidence suggests that it takes 12-18 months to build a new ethanol production facility.⁴⁰ Additional ethanol supplies from foreign

³⁹ *See Id.* at 11.

⁴⁰ The time it takes to build a new ethanol production facility appears to have increased slightly over the past year, due to tightness in the supply of both labor and equipment necessary to build such facilities. Expectations in the industry are that this tightness is easing as

sources are also analytically significant. In 2006, the U.S. imported approximately 672 million gallons of ethanol,⁴¹ a sharp increase from the 136 million gallons imported in 2005 and the 149 million gallons imported in 2004.⁴² The ability for new firms to enter the market quickly, and to import ethanol in response to increases in demand, demonstrates that firms are unlikely to have the ability to engage in anticompetitive behavior, even if the domestic ethanol production market were more concentrated than it is at the present. In other words, the threat of entry by domestic producers and the presence of imports corroborate what the HHIs reveal - that this market is competitive.

V. Conclusion

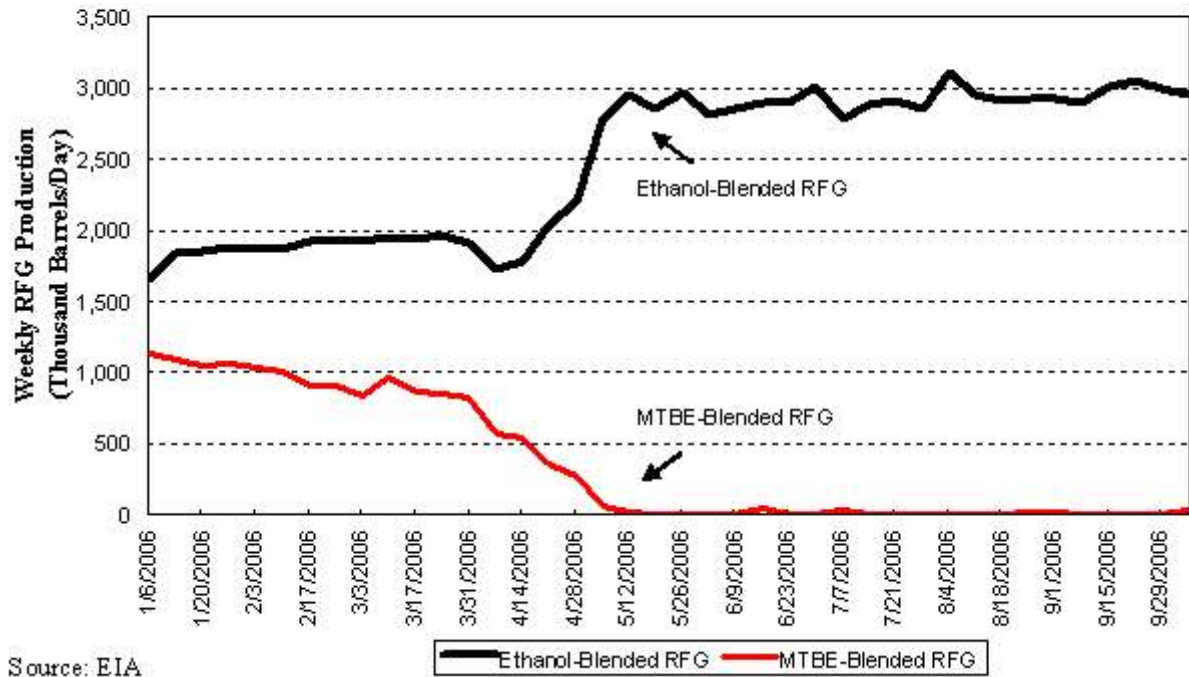
The ethanol production industry is not concentrated, and has become even more unconcentrated over the last year. There is a very large amount of ethanol production capacity now under construction that will further deconcentrate the industry over the next 12 to 18 months. Furthermore, the ease of entry by new firms, and the availability of ethanol imports, provide additional constraints on current market participants. These dynamics make it very unlikely that a single ethanol producer or marketer, or a small group of such firms, could wield sufficient market power to set prices or coordinate on prices or output.

the demand for constructing ethanol production facilities is decreasing due to reduced ethanol margins.

⁴¹ See Building New Horizons at 19. While RFA is the source for these import statistics, RFA also provides slightly different import volumes of 653 million gallons in 2006, 135 million gallons in 2005, and 161 million gallons in 2004, at <http://www.ethanolrfa.org/industry/statistics/>.

⁴² See 2006 Ethanol Report at 5.

Figure 1: 2006 Weekly Domestic Production of MTBE-Blended RFG and Ethanol-Blended RFG



Source: EIA

Figure 2: Domestic Fuel Ethanol Concentration

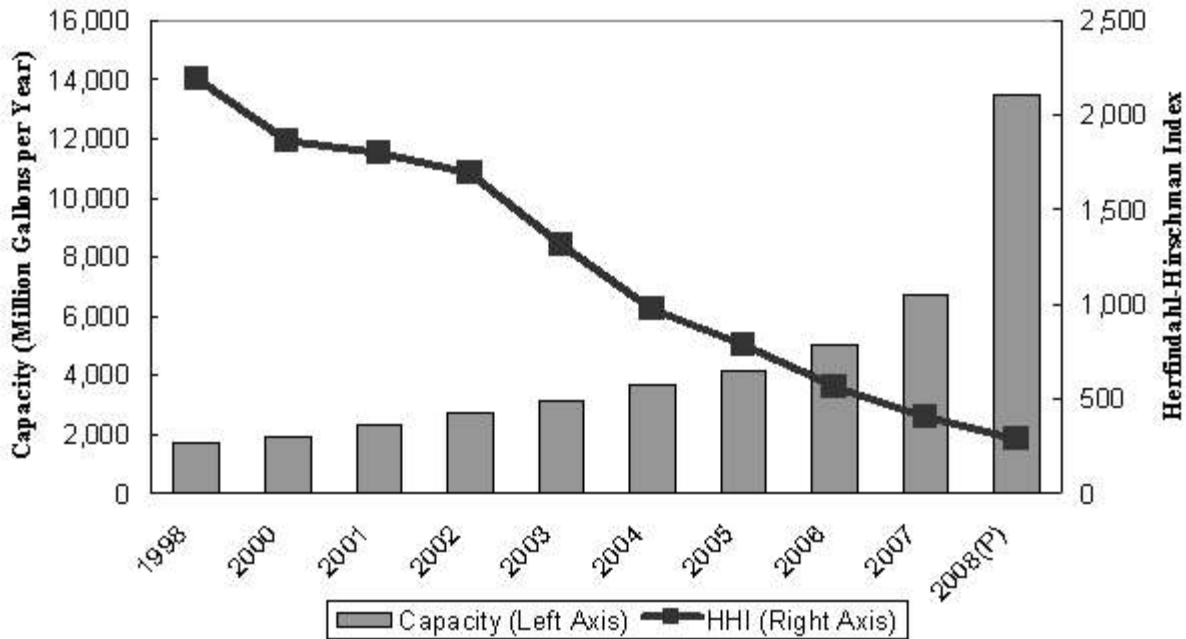
Concentration Based on Capacity	2006 HHI	2007 HHI
Shares attributed to each producer	326	292
Shares attributed to marketers only for pooling agreements	635	453
Shares attributed to marketers for all marketing agreements	995	670

Concentration Based on Production	2006 HHI	2007 HHI
Shares attributed to each producer	683	465
Shares attributed to marketers only for pooling agreements	982	736
Shares attributed to marketers for all marketing agreements	1345	1155

Source: RFA, EIA

Note: Capacity for 2006 includes new capacity additions that, as of July 2006, were expected to be completed by the end of 2007. Capacity for 2007 includes new capacity additions that were under construction as of September 2007, and expected to be completed within 12-18 months of that time. Production data for 2006 are from July 2005 to June 2006, and production data for 2007 are from July 2006 through June 2007.

Figure 3: Historical Fuel Ethanol Capacity and HHIs



Source: RFA

Note: Annual figures are for operating capacity at year-end for 1998 to 2004, and October for 2005 to 2007. Unlike the HHIs discussed elsewhere in this report, the HHIs in Figure 2, other than 2008(P), represent only current capacity and do not include capacity under construction. Thus, 2008(P), which corresponds to the 2007 HHIs in Figure 1, reflects projected capacity for late 2008. This projected capacity includes new plants and expansions under construction as of September 2007.