

## **2008 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), 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 [(“HHI”)] to determine whether there is sufficient competition among industry participants to avoid price-setting and other anticompetitive behavior.” The statute also 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. This report presents the FTC’s concentration analysis of ethanol production for 2008. This report builds upon previous Commission reports on Ethanol Market Concentration, which contain relevant background information that is not repeated in this report.<sup>1</sup>

For purposes of this analysis, FTC staff (“staff”) reviewed and analyzed publicly available data and conducted interviews with ethanol producers, marketers, and other industry participants. As in previous reports, FTC staff used three different methods of calculating HHIs for the ethanol production industry.<sup>2</sup> Most significantly, staff determined that U.S. ethanol production remains unconcentrated under each of these methods. If each producer’s market

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<sup>1</sup>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](http://www.ftc.gov/reports/ethanol/Ethanol_Report_2006.pdf); Report on Ethanol Market Concentration (2007) (“2007 Ethanol Report”), available at <http://www.ftc.gov/reports/ethanol/2007ethanol.pdf>.

<sup>2</sup>See Section IV, *infra*.

share (based on production capacity) is attributed to the firm that markets its ethanol, the HHI for domestic ethanol production is 723. If each producer's market share (again based on production capacity) is not attributed to its marketer, but rather to itself, the HHI for domestic ethanol production is 313. These HHI levels both show a slight increase in concentration from the HHIs calculated in last year's report. Assuming U.S. fuel ethanol<sup>3</sup> production is a relevant market for competition analysis, these figures indicate that the relevant market is unconcentrated.<sup>4</sup> 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, Congress significantly increased the minimum amount of renewable fuel that must be used domestically, whether in the form of ethanol blended into gasoline or in the form of biodiesel. The minimum amount, known as the Renewable Fuel Standard ("RFS"), was previously set by the Energy Policy Act of 2005 at 5.4 billion gallons for 2008, and was set to rise each year until reaching 7.5 billion gallons in 2012.<sup>5</sup> The Energy

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<sup>3</sup>This report analyzes fuel ethanol concentration, rather than concentration of all ethanol. Fuel ethanol contains about 5 percent denaturant, such as gasoline, rendering it undrinkable and not subject to the beverage alcohol tax. <http://www.ethanolrfa.org/resource/made/>. Thus, fuel ethanol and alcohol used in beverages are not substitutes for each other.

<sup>4</sup>The Commission and the Department of Justice characterize markets where the HHI level is below 1000 as 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. 1992 U.S. Department of Justice and Federal Trade Commission Horizontal Merger Guidelines ("Horizontal Merger Guidelines") § 1.51.

<sup>5</sup>Energy Policy Act § 1501(a)(2).

Independence and Security Act of 2007 raises the RFS to 9.0 billion gallons in 2008, and increases the RFS each year until it reaches 36 billion in 2022. Additionally, starting in 2016, all of the increases in the RFS must be met with advanced biofuels, defined as cellulosic ethanol and other biofuels derived from feedstock other than corn starch.<sup>6</sup>

In recent years, the amount of ethanol blended into domestic gasoline has exceeded the requirements set forth by the RFS because of the positive economics of blending ethanol. This trend continued in 2008, when more refiners, blenders, and marketers blended ethanol into gasoline in more geographic areas than in previous years. During 2008, the industry blended more ethanol in each month than in the previous month (with the exception of February), and blended more in each month than in the same month in 2007.<sup>7</sup> Industry participants believe that we may exceed the RFS set forth in the Energy Independence and Security Act of 2007.

Through discussions with multiple industry participants, staff learned that firms generally found that prevailing ethanol production profit margins did not justify breaking ground to build new ethanol plants in 2008, a significant change from past years. At least in part as a result of slimmer profit margins, some firms either abandoned or put on hold existing plans to build new plants. The lower margins resulted from higher prices for the inputs necessary to produce ethanol (primarily natural gas and corn) and the relatively low price of ethanol. Ethanol prices likely remained low due to an increase in production, a function of the many ethanol plants that were previously under construction and came online in 2008 and contributed to domestic supply. Firms generally expect these low margins to continue, as there is a considerable amount of

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<sup>6</sup>Energy Independence and Security Act of 2007 § 202.

<sup>7</sup><http://tonto.eia.doe.gov/dnav/pet/hist/mferius1m.htm>.

additional ethanol production capacity still under construction that will come online soon.

Despite the lower margins, in the past year ethanol producers completed many plants which were already under construction, generally continued to run existing plants either close to or at capacity, and did not close down plants already in operation.

Discussions with industry participants also revealed that the decrease in the number of firms beginning construction on new ethanol plants is not likely persist for long if the current RFS remains in effect. While there is enough ethanol production capacity in operation and under construction to meet the RFS minimums through the next several years, more ethanol production capacity will be required to meet the RFS requirements going forward. In addition to investment in the construction of traditional ethanol plants, significant investment continues in the research and development of cellulosic ethanol production. Once the technology is sufficiently advanced to produce cellulosic ethanol economically, investment into commercial scale production of cellulosic ethanol is likely to follow shortly.

### **III. Summary of Market Concentration Trends**

Since last year's report, concentration of ethanol production has changed little. In this case the lack of significant change in concentration does not mean that the industry has been stagnant. In fact, ethanol production has increased significantly since last year's report. Rather, a potential decrease in concentration from more firms bringing more capacity online seems to have been largely offset by industry consolidation and capacity increases made by incumbent firms, which have the effect of increasing concentration in the industry.

From 2006 to 2007, ethanol production increased approximately 33 percent, from 4.9 billion gallons to 6.5 billion gallons.<sup>8</sup> This increase comes on the heels of a 26 percent increase between 2005 and 2006. Since 2000, when domestic ethanol production was at 1.6 billion gallons,<sup>9</sup> production has increased 406 percent. With additional production continually coming online from plants completing construction, domestic production for 2008 likely will be higher once again.

U.S. ethanol production capacity also rose in 2007. Domestic capacity rose steadily from 5.4 billion gallons per year at the end of 2006,<sup>10</sup> to 7.8 billion gallons per year at the end of 2007,<sup>11</sup> to an estimated 11.8 billion gallons per year by the end of this year.<sup>12</sup> The amount of capacity currently under construction, once online, will bring domestic production capacity to 13 billion gallons.<sup>13</sup>

The number of firms producing ethanol has increased since last year's report, from 103 firms producing ethanol in September 2007, to 160 firms producing or expected to produce ethanol within the next year, as of September 2008. The largest ethanol producer's share of domestic capacity fell again, as new firms entered the market and existing firms have added capacity. Currently, the largest producer accounts for 11 percent of domestic ethanol production

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<sup>8</sup>See Renewable Fuels Association ("RFA"), *Changing the Climate: Ethanol Industry Outlook 2008* ("Changing the Climate"), at 3.

<sup>9</sup>Changing the Climate, at 3.

<sup>10</sup>RFA, *Building New Horizons: Ethanol Industry Outlook 2007*, at 3.

<sup>11</sup>Changing the Climate, at 2.

<sup>12</sup>Changing the Climate, at 2.

<sup>13</sup>Changing the Climate, at 2.

capacity,<sup>14</sup> down from 16 percent in 2007, 21 percent in 2006, 26 percent in 2005, and 41 percent in 2000.<sup>15</sup>

#### **IV. Analysis<sup>16</sup>**

Section 1501(a)(2) of the Energy Policy Act instructs the Commission to measure concentration in ethanol production using HHIs. The Commission and the U.S. Department of Justice regularly use HHIs to measure concentration in a relevant antitrust market to analyze the likely effects of a merger or acquisition on competition in that market.<sup>17</sup> HHIs are calculated by summing the squares of the individual market shares of all market participants.<sup>18</sup> HHIs show 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.

The agencies characterize markets with an HHI level below 1000 as 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

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<sup>14</sup>Unless indicated otherwise, measures of capacity in this report represent both current capacity and capacity under construction.

<sup>15</sup>See 2007 Ethanol Report, at 6; Changing the Climate, table entitled "U.S. Fuel Ethanol Industry Biorefineries and Production Capacity."

<sup>16</sup>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 2007 Ethanol Report at 7-8.

<sup>17</sup>See Horizontal Merger Guidelines § 1.5.

<sup>18</sup>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.

concentrated and are more likely to pose competitive concerns.

To calculate the HHIs required by § 1501(a)(2), we must assume that U.S. fuel ethanol production is a relevant antitrust market.<sup>19</sup> This assumption precludes consideration of potentially smaller relevant geographic markets within the United States which could provide further insight into how ethanol producers compete. This assumption also precludes consideration of a broader product market, which includes other gasoline blending components that might be economically viable and environmentally acceptable substitutes for ethanol. It is likely that ethanol does compete with other blending components, in which case the level of concentration in ethanol production would understate the amount of competition ethanol producers face.

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, on the production capacity of each producer when attributing each producer's capacity to the firm responsible for marketing the producer's ethanol, and on the actual production of each individual producer.

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<sup>19</sup>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 at §§ 1.1-1.2.

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.<sup>20</sup>

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 Renewable Fuels Association ("RFA") provides updated 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. 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.<sup>21</sup> Although firms may plan on

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<sup>20</sup>See Horizontal Merger Guidelines § 1.41. A firm's capacity is likely the best measure of its competitiveness, because ethanol is an undifferentiated product (*i.e.*, producers manufacture chemically identical ethanol).

<sup>21</sup>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 within one year without the expenditure of significant sunk costs of entry and exit, in response to a "small but

further expansions 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 is 313, which reflects an unconcentrated market under the Horizontal Merger Guidelines.<sup>22</sup> This represents a slight increase from the HHI of 292 which staff calculated in last year's report,<sup>23</sup> but it is still less than the HHI of 326 reported in 2006.<sup>24</sup>

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

The second measure of concentration staff calculated is also based on production capacity, but attributes each producer's capacity to the firm marketing its ethanol rather than to the producer itself. While many producers enter into marketing agreements under which marketers sell their output to oil companies, blenders, and brokers, not all do. Some producers market their own ethanol directly to the oil companies, blenders, or brokers. Staff attributed the market share of these producers to themselves.<sup>25</sup>

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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.

<sup>22</sup>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 2008, the cut-off date for our analysis unless otherwise indicated. This approach therefore excludes any more recent information publicly available from RFA.

<sup>23</sup>2007 Ethanol Report at 9.

<sup>24</sup>2006 Ethanol Report at 7.

<sup>25</sup>In some instances, staff was unable to determine whether a producer marketed for itself or used an outside marketing firm. In these instances, staff also 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, which represents numerous other producers. On the other hand, under a non-pooling marketing arrangement, a marketer sells its producers' volumes on a plant-specific basis, and can present each producer with offers from multiple buyers.

Since 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 the producers themselves, staff determined the HHI to

be 527. This HHI also indicates an unconcentrated market. It represents a relatively small increase from last year's HHI of 453, but it remains below the 2006 HHI of 635.<sup>26</sup>

As each marketing agreement is unique, staff cannot determine with certainty the effect of each marketing agreement on the industry, whether or not it contains a pooling arrangement. Therefore, staff also calculated an HHI that attributes all producers' shares to their marketers, regardless of whether the marketing agreement involves pooling volumes. This approach yields an HHI of 723, again indicating an unconcentrated market under the Horizontal Merger Guidelines, and again slightly up from last year's HHI of 670<sup>27</sup> but below the 2006 HHI of 995<sup>28</sup> using the same allocation method.

C. Concentration Based on Production, Using Data from the Energy Information Administration ("EIA")

Staff also measured concentration in the ethanol industry by using production data, in lieu of capacity data. Use 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 produce as much as 10 to 15 percent more ethanol than their stated capacities.<sup>29</sup>

The EIA provided the production concentration data contained in this report. EIA collects confidential information from firms that produce oxygenates such as ethanol. Firms that

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<sup>26</sup>2006 Ethanol Report at 9.

<sup>27</sup>2007 Ethanol Report at 11.

<sup>28</sup>2006 Ethanol Report at 9.

<sup>29</sup>2007 Ethanol Report at 12; 2006 Ethanol Report at 9; 2005 Ethanol Report at 12.

produce over 8 million gallons of oxygenates per year must report to EIA their monthly production volumes by product. Since the production data are confidential, EIA provided only the final HHI numbers, and did not disclose the volumes of ethanol attributed to each producer or marketer.<sup>30</sup> The EIA concentration numbers are based on production from July 2007 through June 2008.

The HHI based on the actual production of ethanol is 376, if market shares are attributed to the individual producers. If market shares of each producer are attributed to the firm that markets for each producer, the HHI is 952. Finally, if market shares of each producer are attributed to the firm that markets for each producer only when the marketing is done pursuant to a pooling agreement, the HHI is 658. These HHIs based on actual production are all lower than the HHIs based on actual concentration in last year's report. Last year, the HHI based on actual production was 465 when market shares were attributed to each producer, 1155 when market shares were attributed to marketers of each producer, and 736 when market shares were attributed to marketers utilizing pooling agreements and otherwise attributed to the individual producers. Thus, actual production concentration has decreased since last year, while capacity concentration has increased. Regardless of the measure of concentration used, it is evident that the production of ethanol is unconcentrated.

There are some limitations to the accuracy of HHI numbers based on actual production, just as there were limitations to HHIs calculated based on capacity. These limitations serve to

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<sup>30</sup>For those producers for which EIA maintains production data, staff provided EIA with information regarding the identity of their marketers, and with information regarding whether they entered into pooling agreements with their marketers. EIA used this information, in conjunction with its own data on ethanol production, to calculate the HHIs that attribute market share to marketers.

increase the HHIs above what they would otherwise be. Specifically, HHIs based on production understate the deconcentrating impact of new facilities that began production during the period measured by EIA, as such facilities will have produced only a fraction of what they would likely produce in a full year. Furthermore, such HHIs look only at actual production, and do not account for expansions and new facilities under construction but not yet operational.<sup>31</sup>

D. Ease of Entry and Imports

Other market factors, such as ease of entry and imports, strongly corroborate the presumption that the domestic ethanol production market is competitive. For example, numerous new ethanol production facilities began operation in the past year, and several additional facilities are scheduled to begin operating in the coming year.

Additional ethanol supplies from foreign sources are also analytically significant. In 2007, the U.S. imported approximately 426 million gallons of ethanol, a decrease from the record 653 million gallons imported in 2006,<sup>32</sup> but still significantly more than the amount imported in prior years.<sup>33</sup> The ability of 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 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.

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<sup>31</sup>2007 Ethanol Report at 13.

<sup>32</sup><http://www.ethanolrfa.org/industry/statistics/#F>.

<sup>33</sup>The U.S. imported 136 million gallons of ethanol in 2005, and 160 million gallons of ethanol in 2004. <http://www.ethanolrfa.org/industry/statistics/#F>.

## **V. Conclusion**

The ethanol production industry has remained unconcentrated over the last year. However, depending on the measure of concentration one uses, the trend of the industry to become more and more unconcentrated each year is now slowing or even slightly reversing. While firms were generally not breaking ground on new ethanol production facilities during 2008, there is still a large amount of ethanol production capacity under construction that is expected to become operational in the next twelve to eighteen months. Furthermore, the ease of entry by new firms, and the availability of ethanol imports, serve to provide additional constraints on current market participants. These dynamics make it extremely unlikely that a single ethanol producer or marketer, or a small group of such firms, could wield sufficient market power to be able to engage in price-setting or other anticompetitive behavior.

**Figure 1: Domestic Fuel Ethanol Concentration**

<b>Concentration Based on Capacity</b>	<b>2007 HHI<sup>34</sup></b>	<b>2008 HHI</b>
Shares attributed to each producer	292	313
Shares attributed to marketers only for pooling agreements	453	527
Shares attributed to marketers for all marketing agreements	670	723

<b>Concentration Based on Production</b>	<b>2007 HHI</b>	<b>2008 HHI</b>
Shares attributed to each producer	465	376
Shares attributed to marketers only for pooling agreements	736	658
Shares attributed to marketers for all marketing agreements	1155	952

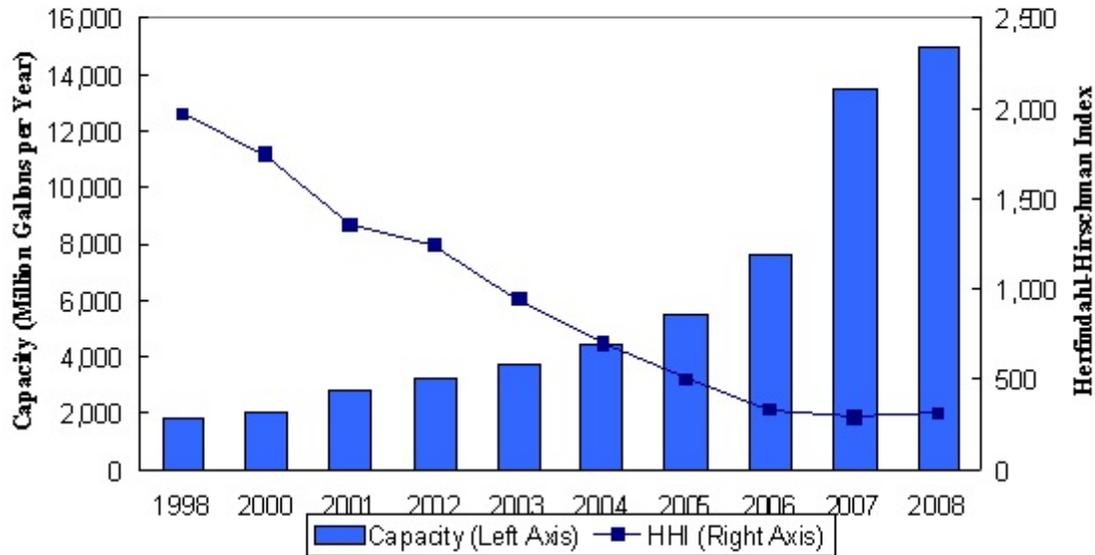
Source: RFA, EIA

Note: Capacity for 2007 includes the capacity as of September of 2007 and the capacity additions under construction and expected to be completed within 12-18 months of September 2007. Capacity for 2008 includes the current capacity as of September 2008 and the capacity additions under construction and expected to be completed within 12-18 months of September 2008. Production data for 2007 are from July 2006 through June 2007, and production data for 2008 are from July 2007 to June 2008.

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<sup>34</sup>As discussed in footnote 4 above, the Commission and the Department of Justice characterize markets having HHIs below 1000 as unconcentrated. HHIs between 1000 and 1800 indicate moderately concentrated markets, and HHIs over 1800 indicate highly concentrated markets that are more likely to pose competitive concerns. Horizontal Merger Guidelines § 1.51.

**Figure 2: Historical Fuel Ethanol Capacity and HHIs**



Source: RFA

Note: Annual figures are for operating capacity and capacity under construction at year-end for 1998 to 2004, and as of October for 2005 to 2008. This is a departure from the similar figure found in reports from previous years. In previous years, the capacity and HHI figures were plotted only for operating capacity and excluded capacity under construction. Capacity under construction was included in the last year of the figure with a (P) to denote anticipated operating capacity in the forthcoming year.