

**2006 Report on Ethanol Market Concentration**

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Federal Trade Commission

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Under Section 1501(a)(2) of the Energy Policy Act of 2005, as codified at 42 U.S.C. § 7545(o), the Federal Trade Commission (“Commission” or “FTC”) must annually “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.” The statute further directs the Commission to consider marketing arrangements among industry participants in rendering its analysis. The Commission must report its findings to Congress and to the Administrator of the Environmental Protection Agency. This Report presents the Commission’s concentration analysis of ethanol production for 2006.

Based on publicly available data and on interviews with ethanol producers and marketers, FTC staff concluded that current U.S. ethanol production is not highly concentrated. Assuming that U.S. fuel ethanol production is a relevant market for competition analysis, our best measurement of concentration (based on production capacity) yields Herfindahl-Hirschman Indices (“HHIs”) between 326 and 995, depending on the degree to which we attribute individual ethanol producers’ shares to the firms that market their ethanol. These levels represent a drop of 21 to 35 percent from comparable figures presented in last year’s report. Under the Horizontal Merger Guidelines that the Commission and the U.S. Department of Justice use to assess the competitive effects of mergers, these HHIs indicate an unconcentrated market. Indeed, our results may overstate these concentration levels, for reasons outlined below. In any event, the level of concentration in ethanol production would not justify a presumption that a single firm, or

a small group of firms, could wield sufficient market power to set prices or coordinate on prices or output.

## **I. Background**

This analysis builds upon the factual background contained in the Commission's 2005 Report on Ethanol Market Concentration, which detailed important characteristics of domestic fuel ethanol production and marketing.<sup>1</sup>

The growth in domestic ethanol production over recent years has been well-documented. In 2005, U.S. ethanol plants produced 3.9 billion gallons of ethanol, up 15 percent from 3.4 billion gallons in 2004.<sup>2</sup> It is estimated that in 2006 U.S. ethanol production will exceed 4.6 billion gallons, at least 18 percent greater than 2005 production, and at least 188 percent greater than the 1.6 billion gallons produced in 2000.<sup>3</sup>

Increases in ethanol production reflected comparable growth in U.S. ethanol production capacity. By the end of 2005, there were 95 facilities with a total of over 4.3 billion gallons per year of ethanol production capacity.<sup>4</sup> This represents a capacity increase of over 779 million gallons per year during 2005 alone, as producers built and began producing from 14 new

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<sup>1</sup> See FTC, REPORT ON ETHANOL MARKET CONCENTRATION (2005), available at <http://www.ftc.gov/reports/ethanol05/20051202ethanolmarket.pdf>.

<sup>2</sup> 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\\_mbb1\\_m.htm](http://tonto.eia.doe.gov/dnav/pet/pet_pnp_oxy_dc_nus_mbb1_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](http://www.eia.doe.gov/pub/oil_gas/petroleum/data_publications/monthly_oxygenate_report/historical/2005/2005_02/pdf/819mhilt.pdf).

<sup>3</sup> See EIA, *Petroleum Navigator – U.S. Oxygenate Production*, available at [http://tonto.eia.doe.gov/dnav/pet/pet\\_pnp\\_oxy\\_dc\\_nus\\_mbb1\\_m.htm](http://tonto.eia.doe.gov/dnav/pet/pet_pnp_oxy_dc_nus_mbb1_m.htm); 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](http://www.eia.doe.gov/pub/oil_gas/petroleum/data_publications/monthly_oxygenate_report/historical/2001/2001_01/pdf/oxydata.pdf). Our estimate of 2006 ethanol production is a full-year projection based on actual production from the first seven months of 2006.

<sup>4</sup> See RENEWABLE FUELS ASS'N, FROM NICHE TO NATION: ETHANOL INDUSTRY OUTLOOK 2006, at 2 [hereinafter FROM NICHE TO NATION], available at [http://www.ethanolrfa.org/objects/pdf/outlook/outlook\\_2006.pdf](http://www.ethanolrfa.org/objects/pdf/outlook/outlook_2006.pdf).

facilities during the year.<sup>5</sup> Production capacity continued to expand in 2006 as well. As of mid-October 2006, the Renewable Fuels Association (“RFA”) estimated that current domestic ethanol production capacity exceeded 5 billion gallons per year, a 16 percent increase compared to the end of 2005.<sup>6</sup> Industry expansion likely will continue into the foreseeable future, as the RFA estimated that producers are currently adding 3.5 billion gallons per year of production capacity at 45 new plants and expansions at 7 existing facilities.<sup>7</sup>

The number of participants in ethanol production increased as well. By mid-October 2006, 90 different firms operated ethanol plants, a one-year increase of roughly 15 firms. New firms are entering ethanol production, and we estimate that 110 firms will operate ethanol plants by the end of 2007. As new entrants emerge, the largest producer’s share of capacity continues to fall. Currently, the largest producer accounts for 21 percent of domestic ethanol production capacity, down from 25 percent in 2005 and over 40 percent in 2000.

## **II. Analysis**

Section 1501(a)(2) instructs the Commission to measure concentration in ethanol production by using HHIs. The Commission and the U.S. Department of Justice use HHIs to help assess the likely effects of a merger or acquisition on competition in a relevant antitrust market.<sup>8</sup> The HHI is calculated by summing the squares of the individual market shares of all

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<sup>5</sup> *See id.* at 2.

<sup>6</sup> *See* Renewable Fuels Ass’n, *Industry Statistics – Ethanol Biorefinery Locations* (estimate as of Oct. 16, 2006), available at <http://www.ethanolrfa.org/industry/locations/>.

<sup>7</sup> *See id.* As described below, our analysis uses a narrower slice of the expected capacity growth identified by RFA. Our approach considers as competitively significant only those capacity additions that are likely to result in marketable volumes within the next year. Our estimate (conducted as of mid-June 2006) identified 2.5 billion gallons per year of additional capacity likely to come on-line by the end of 2007.

<sup>8</sup> *See* U.S. DEP’T OF JUSTICE & FTC, HORIZONTAL MERGER GUIDELINES (1992, revised 1997) [hereinafter HORIZONTAL MERGER GUIDELINES], available at <http://www.ftc.gov/bc/docs/horizmer.htm>.

market participants.<sup>9</sup> The Horizontal Merger Guidelines categorize three levels of market concentration: markets may be “unconcentrated” (HHI below 1000), “moderately concentrated” (HHI between 1000 and 1800), or “highly concentrated” (HHI over 1800).<sup>10</sup> The HHI provides a snapshot of market concentration and, in the context of merger review, the post-merger change in the HHI suggests the merger’s likely effect on market concentration. It must be emphasized, however, that the HHI is only the starting point for competitive analysis, and the Commission does not make enforcement decisions based solely on market shares or HHIs. The analytical significance of the HHI depends on other market factors (such as ease of entry and likely competitive effects) that require further investigation and market analysis.

For purposes of calculating the HHIs required by Section 1501(a)(2), we must assume that U.S. fuel ethanol production is a relevant antitrust market.<sup>11</sup> This assumption precludes consideration of potentially relevant product and geographic characteristics that would bear on a complete competitive analysis of the ethanol industry. Indeed, provided that fuel ethanol production remains above minimum production levels mandated by the Energy Policy Act of 2005, ethanol itself may not be a proper antitrust product market. At levels above the mandatory minimum, ethanol likely competes with other blending components (alkylate, iso-octane, or other clean, high-octane blending components) that can be used in gasoline, and refiners and

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<sup>9</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]. The HHI ranges from 10,000 (pure monopoly) to a number approaching 0.

<sup>10</sup> See HORIZONTAL MERGER GUIDELINES § 1.5.

<sup>11</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 *id.* §§ 1.1-1.2.

blenders may choose to use other blending components in their gasoline as ethanol prices increase. In regions or states that sell E-85 (a blend of gasoline that is 85 percent ethanol), owners of flexible-fuel vehicles will choose regularly between purchasing E-85 or purchasing gasoline with no more than 10 percent ethanol. If ethanol is part of an overall gasoline market, or even a smaller market consisting of other clean-burning blendstocks, the HHIs in this analysis could overstate concentration in the product market and suggest an exaggerated likelihood of the potential for ethanol producers to engage profitably in anticompetitive behavior.

Although this analysis is limited to U.S. ethanol production, imported ethanol also may be analytically significant. The RFA reports that over 136 million gallons of ethanol were imported into the U.S. in 2005, down from 149 million gallons in 2004.<sup>12</sup> Yet imports increased significantly from January through July 2006, totaling 309 million gallons in that period alone and increasing domestic ethanol supplies by 12 percent.<sup>13</sup> Of course, the annual variation in ethanol imports is related to changes in the relative prices of ethanol in the U.S. and other countries. As relative U.S. ethanol prices increase (as they did in 2006), selling ethanol into the U.S. becomes more attractive to foreign producers, despite federal tariffs. Although imports remain a small share of U.S. consumption, their presence suggests that HHIs for domestic ethanol production tend to overstate concentration in the ethanol industry.

Staff used three different methods of calculating HHIs in ethanol production and marketing. As described below, staff first calculated HHIs based on the ethanol production capacity of each individual producer. Staff then calculated HHIs that attributed each producer's

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<sup>12</sup> See FROM NICHE TO NATION at 17.

<sup>13</sup> See EIA, *Petroleum Navigator – Imports by Area of Entry*, available at [http://tonto.eia.doe.gov/dnav/pet/pet\\_move\\_imp\\_a\\_EPOOXE\\_IM0\\_mbb1\\_m.htm](http://tonto.eia.doe.gov/dnav/pet/pet_move_imp_a_EPOOXE_IM0_mbb1_m.htm). To calculate this figure, we divided the volume of fuel ethanol imports during the first seven months of 2006 by domestic fuel ethanol production during the same time. See EIA, *Petroleum Navigator – Oxygenate Production*, available at [http://tonto.eia.doe.gov/dnav/pet/pet\\_pnp\\_oxy\\_dc\\_nus\\_mbb1\\_m.htm](http://tonto.eia.doe.gov/dnav/pet/pet_pnp_oxy_dc_nus_mbb1_m.htm).

capacity to the firm responsible for marketing the producer's ethanol. Finally, by way of confirming these calculations, staff determined the HHIs on the basis of actual production, rather than capacity.

*A. Producer-Based Allocation, Using Capacity*

Staff first calculated market shares of producers based on their fuel ethanol production capacity. Although market shares may be measured in other ways, such as by total dollar sales, production capacity provides a useful and easily confirmable indicator of a producer's competitive significance.<sup>14</sup>

To determine the production capacity of each ethanol plant, staff relied on publicly available information supplemented by interviews with industry participants. RFA publishes and frequently updates data regarding ethanol capacity and announced capacity additions. Many producers publicly disclose existing plant capacity or future construction plans. Marketers also may announce new agreements with producers. Staff interviewed producers, marketers, and other industry participants to confirm public data.

In attributing capacities to individual producers, staff included additional capacity from new plant construction or expansion, provided that the construction or expansion had sufficiently progressed such that the extra capacity could yield marketable volumes within one year. This is consistent with the approach adopted in the Horizontal Merger Guidelines.<sup>15</sup> Staff attributed additional capacity to the firm only if the firm had finished its expansion plans, received necessary financing for the construction, and begun physical construction or expansion. Although a producer may plan on expanding capacity substantially over the next few years, staff

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<sup>14</sup> See HORIZONTAL MERGER GUIDELINES § 1.41. A firm's capacity likely is the best measure of its competitiveness, because ethanol is an undifferentiated product (*i.e.*, producers manufacture chemically identical ethanol).

<sup>15</sup> See *id.* § 1.32.

deemed these plans to be too speculative for this analysis until the producer has secured financing and begun actual construction.<sup>16</sup>

Using this approach, if each U.S. ethanol-producing firm is allocated market share based on its capacity, staff determined that the HHI would be 326, which is deemed an unconcentrated market under the Horizontal Merger Guidelines.<sup>17</sup> Staff's similar calculation of this figure in last year's report yielded an HHI of 499. Thus, there has been a reduction in concentration in ethanol production since 2005.<sup>18</sup>

*B. Marketer-Based Allocation, Using Capacity*

Marketing agreements add complexity to a competitive analysis of the ethanol industry. Producers must reach oil companies and others that ultimately blend ethanol with gasoline for sale to consumers. Some producers market their own ethanol by entering into sale agreements with oil companies, blenders, or brokers, and by arranging for truck or rail transportation to storage facilities. Other producers, however, rely on third-party ethanol marketers to make these arrangements. Because marketers often represent more than one producer, a marketer can amalgamate volumes from multiple ethanol production facilities to provide purchasers with a single source for volumes of ethanol that would exceed what any individual producer can provide. Marketers also may negotiate more favorable transportation or storage rates that can broaden the geographic area to which a plant's output can be supplied economically.

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<sup>16</sup> The increased amount of ethanol plant construction and expansion seems to have lengthened the time needed for builders to complete these projects. For example, according to industry participants, a new ethanol plant ordinarily requires 15 to 18 months of construction time before volumes can be produced at the plant, a slight increase from last year's findings. These considerations justify caution in estimating how much of announced capacity additions will actually come to pass within one year.

<sup>17</sup> This number suggests an analytic precision that does not reflect the rate of change in this industry, particularly as producers announce capacity additions seemingly on a weekly or even daily basis. Staff's HHI calculations represent staff's best estimate as of June 30, 2006, the cut-off date for our analysis unless otherwise indicated. In this regard, staff's approach excludes some capacity expansions identified in RFA data.

<sup>18</sup> See FTC, REPORT ON ETHANOL MARKET CONCENTRATION 9 (2005).

There is no standard marketing agreement in the industry, and marketing agreements vary in length. Some marketers maintain an equity ownership interest in their producers' facilities. In virtually all instances, however, the ethanol producer determines its own output level.

To analyze market concentration in light of these marketing relationships, staff evaluated whether the capacities used to produce the ethanol marketed by one company should be attributed to that single ethanol marketer rather than to the individual ethanol producers represented by the marketer. A producer's ability to adjust its own output in response to changing prices suggests that staff should treat each producer individually. Marketing "pools," however, may warrant a different approach. In a pooling arrangement, the marketer treats all of its producers' volumes in common, makes sales to accounts, and decides which plant is best situated to service the account. Each producer is allocated a prorated share from the common revenue pool, based on the volume it contributes.<sup>19</sup> As a result, each producer within the marketing pool receives an identical netback (*e.g.*, the sale price less the cost of transportation from the ethanol plant), regardless of where its production was actually delivered. Because a customer receives a single offer from a marketer representing a pool of numerous producers, pooling arrangements effectively reduce the number of bidders that compete to supply a given customer. This characteristic might suggest that volumes from all producers sharing a common marketer should be attributed to the single marketer.<sup>20</sup>

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<sup>19</sup> Under a non-pool marketing arrangement, a marketer sells its producers' volumes on a plant-specific basis. The marketer typically presents sales opportunities to each plant, leaving it to the plant's management to decide whether to accept the offer. Some ethanol also is sold to gasoline suppliers by firms acting essentially as brokers or resellers that take ownership of the ethanol and sell for their own benefit.

<sup>20</sup> On the other hand, because marketers have no control over a producer's output decisions, a producer may have an incentive to boost production in the event of an ethanol price increase. Increased production could undercut the pool price and force the marketer to find additional buyers at potentially lower prices. Thus, even in the pooling context, producers might be treated more appropriately as independent firms.

Given the fact-specific nature of market analysis, staff cannot determine with certainty the effect of each marketing agreement on the industry. Staff therefore calculated HHIs by attributing all producers' shares to their marketers, regardless of whether the marketing agreement involves pooling volumes. This approach yields an HHI of 995. This figure falls within the range for unconcentrated markets under the Horizontal Merger Guidelines and is down from last year's HHI of 1259 using the same allocation method.<sup>21</sup>

Staff alternatively calculated an HHI that attributed shares to marketers only when they had pooling arrangements with their producers. For producers that did not market through a pooling arrangement, staff attributed the market shares to the producers themselves. This approach yields an HHI of 635 – also an unconcentrated market, and down from last year's HHI of 813 using the same methodology.<sup>22</sup>

### *C. EIA Production Data*

Although capacity-based data provide a good indication of ethanol industry concentration, calculation of HHIs on this basis is limited by difficulties in measuring ethanol production capacity with precision. Most industry participants report capacity based on “guaranteed” or “name-plate” capacity. Typically, builders and designers guarantee that a newly constructed plant (or expansion) will produce a certain volume of ethanol. In this industry, the plant often can produce more than the guaranteed capacity. Moreover, a plant will tend to exceed its rated capacity as the producer improves the production process and gains expertise in the plant's operation. It is not uncommon for ethanol plants to run 10 to 15 percent higher than their stated capacities.<sup>23</sup>

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<sup>21</sup> See FTC, REPORT ON ETHANOL MARKET CONCENTRATION 11 (2005).

<sup>22</sup> See *id.*

<sup>23</sup> In addition, some industries demonstrate significant differences among competitors' capacity utilization rates.

To address the measurement issues in the capacity-based HHI calculations, staff performed a parallel analysis using ethanol production data. Every month, EIA collects confidential information on the production of oxygenates such as ethanol and methyl tertiary-butyl ether. Firms that produce over 8 million gallons of oxygenates per year must report to EIA their monthly production volumes by product. EIA agreed to calculate the HHI data based on annual production from July 2005 through June 2006, following the same attribution methods outlined in the previous sections. To maintain its confidentiality obligations, EIA reported only the final HHI numbers and did not disclose to us the volumes of ethanol attributed to each producer or marketer.

The two right-hand columns of Figure 1 show HHIs using EIA production data. If all shares are attributed to the individual producers, the HHI is 683, which is unconcentrated under the Horizontal Merger Guidelines and shows deconcentration in the market when compared to the HHI of 929 from the 2005 report.<sup>24</sup> If we allocate producers' shares to their marketers, the HHI is 1345. This would be moderately concentrated under the definitions in the Horizontal Merger Guidelines, although it represents deconcentration when compared to the HHI of 1613 from 2005. If we allocate producers' shares to their marketers for pooling agreements only, the production-based HHI is 981, down from the HHI of 1221 from the 2005 report.<sup>25</sup>

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Calculating HHIs by using actual production data controls for these differences.

<sup>24</sup> See FTC, REPORT ON ETHANOL MARKET CONCENTRATION 13 (2005).

<sup>25</sup> See *id.*

**Figure 1: Domestic Fuel Ethanol Concentration**

Treatment of Marketing Agreements	HHI Based on Capacity		HHI Based on Production	
	2006(P)	2007(P)	2005	2006
Attribute shares to each producer	499	326	929	683
Attribute shares to marketer only for pool marketing agreements	813	635	1221	982
Attribute shares to marketer for all marketing agreements	1259	995	1613	1345

Source: RFA, EIA

Note: Capacity for 2006(P) includes capacity additions that, as of the FTC’s 2005 report, were anticipated to be completed by the end of 2006. Capacity for 2007(P) includes new capacity additions that, as of July 2006, are expected to be completed by the end of 2007. Production data for 2005 are from July 2004 to June 2005, and production data for 2006 are from July 2005 to June 2006.

Because they are based on historical data, the production-based HHIs likely overstate the concentration levels that will prevail in the near future in a deconcentrating industry. Production data do not fully account for entrants that began producing ethanol during the period measured by EIA, and should now be considered as full market participants. Production data also do not account for capacity expansions or additions that will produce marketable volumes within the next year.

Also, year to year comparisons show a substantial amount of entry into ethanol production. Such entry can deter anticompetitive conduct by reducing the likelihood that one firm (or a group acting together) profitably could raise prices above competitive levels.<sup>26</sup>

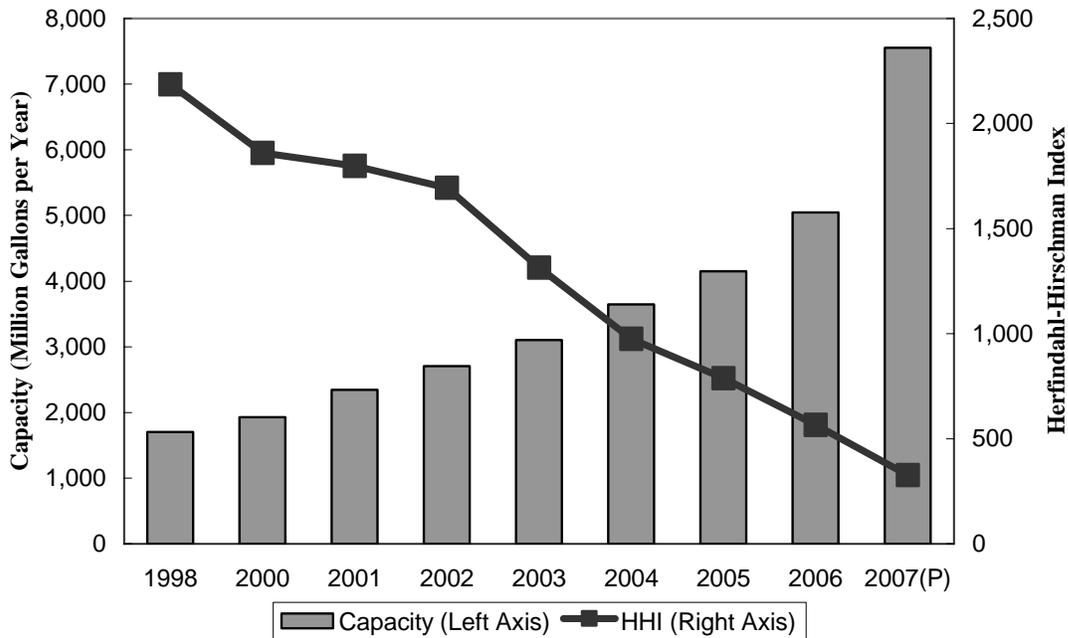
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<sup>26</sup> See HORIZONTAL MERGER GUIDELINES § 3.0 (“A merger is not likely to create or enhance market power or to facilitate its exercise, if entry into the market is so easy that market participants, after the merger, either collectively or unilaterally could not profitably maintain a price increase above premerger levels.”). For a more complete discussion of entry and ethanol production, see FTC, REPORT ON ETHANOL MARKET CONCENTRATION 14-16 (2005).

### III. Conclusion

Our HHI analysis of market concentration shows that U.S. ethanol production is unconcentrated or, at most (using actual production data), only moderately concentrated under the Horizontal Merger Guidelines, revealing little incentive or ability for one or more firms to act anticompetitively. New entry and other market factors reduce the significance of these figures, and, as shown in Figure 2, concentration has fallen as production capacity has increased. Nevertheless, given the highly fact-intensive nature of antitrust analysis, staff cannot exclude the abstract possibility that future mergers may potentially create anticompetitive effects in a given segment of the industry, or that industry participants may engage in anticompetitive conduct.

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



Source: RFA

Note: Annual figures are for year-end for 1998 to 2004, and October for 2005 to 2006. 2007(P) is projected capacity for late 2007, which adds construction of new plants and expansions as of July 2006.