April 18, 2002

COMMENTS OF THE NATIONAL PETROCHEMICAL & REFINERS ASSOCIATION (NPRA) ON THE FEDERAL TRADE COMMISSION'S SECOND PUBLIC CONFERENCE ON REFINED PETROLEUM PRODUCTS

The FTC listed specific questions on several topics in its request for public comment (66 FR 67528). NPRA has organized this document to address the Commission's set of 14 petroleum refining questions.

The National Petroleum Council (NPC) released a report, U.S. Petroleum Refining, Adequacy and Availability of Cleaner Fuels, dated June 2000. This study was requested by the Secretary of Energy to analyze U.S. refining viability and petroleum product deliverability in the 2005 timeframe. There are several references to this NPC report in NPRA's responses.

Refining

"1. What factors have had the greatest effect on refining production costs and the price of refined petroleum products since 1985? Which such factors have been most responsible for any increase in the level or volatility of refined product prices?"

The factor that has the greatest effect on the prices of refined products is the price of the petroleum refinery's feedstock, crude oil, which, being a commodity with a worldwide market, fluctuates as crude oil supply and demand fluctuate.

Another major factor that influences refining production costs and the prices of refined products is the cost of government regulations. Government regulations affect production costs by:

1. Requiring additional processing steps in the refinery such as hydroprocessing, isomerization, fractionation, hydrogen production, and sulfur removal. These processes increase a refinery's energy, labor, and materials costs.

2. Requiring controls such as scrubbers and low emission burners to reduce emissions from stationary sources in the refinery.

The American Petroleum Institute (API) estimates that the domestic petroleum industry spent about $90 billion between 1990 and 1999 on environmental expenditures with about half in the refining sector, 20 percent in exploration and production, 10 percent in transportation and the balance in marketing, research and development and corporate programs. Environmental capital expenditures of U.S. refiners in that decade were $18 billion and operating and maintenance costs were $29 billion.[1]

More details follow about specific government regulations that have increased refinery production costs and reduced fungibility.

Government Regulations: Motor Fuels

Several federal and state motor fuel regulatory programs were designed over the last ten years in response to air quality concerns (i.e., ozone and carbon monoxide nonattainment). They include:

- Federal Phase II RVP, California Phase 1 RFG and winter oxygenated gasoline in 1992,
- CA highway and off-road diesel and Federal highway diesel in 1993,
- Federal Phase I RFG and conventional gasoline anti-dumping in 1995,
- California Phase 2 RFG in 1996,
- Federal Phase II RFG in 2000, and
- Federal Mobile Source Air Toxics in 2002.

RFG

The federal reformulated gasoline (RFG) program was mandated by Congress in the Clean Air Act Amendments (CAAA) of 1990.[2] Federal RFG Phase I was effective in 1995 and Phase II in 2000.[3] Federal RFG is a year-round program that now represents about one-third of all domestic gasoline volumes sold. RFG restrictions include oxygen and benzene content, summer emissions of volatile organic compounds (VOCs), and year-round emissions of NO_X and toxics. An RFG area can be an entire state (i.e., Connecticut and Massachusetts) or a metropolitan area (e.g., New York City and Chicago). RFG is mandatory in ten metropolitan areas.[4] Governors selected RFG for many other cities in 12 States and D.C. on an optional basis.

RFG standards are significantly more stringent than CG requirements. Individual refineries are not forced by government regulations to produce federal RFG. They have options to produce:

1. only CG without any RFG,
2. some CG and some RFG,
3. RFG without any CG, or
4. no gasoline for domestic use at all.

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[1] "U.S. Petroleum Industry's Environmental Expenditures 1990-1999," January 19, 2001.

[2] Gasoline that does not qualify as federal RFG is called conventional gasoline (CG). See 40 CFR Part 80, Subpart D.

[3] Phase II includes more stringent toxics and summer VOC and NO_X emissions standards.

[4] Baltimore, Chicago, Hartford, Houston, Los Angeles, Milwaukee, New York City, Philadelphia, Sacramento (beginning in June 1996), and San Diego.

However, compliance is mandatory for retail stations in the federal RFG covered areas.

California has its own RFG program which is more stringent than the federal RFG program. The CA Phase 1 requirements were effective in January 1992 with Phase 2 beginning in the summer of 1996. The Phase 3 program is scheduled to start next January.

Winter oxygenated gasoline

A second significant program created by Congress with the CAAA of 1990 is winter oxygenated gasoline for carbon monoxide (CO) nonattainment areas. Although required by federal legislation, these are really state programs. They began in November 1992 on a widespread basis in about 36 metropolitan areas.[5] Many cities dropped the program after reaching attainment with the federal CO National Ambient Air Quality Standards (NAAQS). Again, individual refinery participation is voluntary and market driven, but retail station compliance is mandatory.

Conventional gasoline anti-dumping

CG anti-dumping is a third major program created by Congress with the CAAA of 1990 (40 CFR Part 80, Subpart E). This program limits some effects of gasoline blending (i.e., increased aromatics content) and, therefore, limits refining flexibility. This is a mandatory program for all domestic refineries producing gasoline and for all imported gasoline.

State gasoline programs

The 1990 CAAA also imposed requirements that result in new state motor fuel strategy programs. Arizona has a year-round Cleaner Burning Gasoline program for Phoenix that is similar to federal and California RFG. Nevada has a different winter Cleaner Burning Gasoline for Las Vegas. Minnesota requires oxygenated gasoline throughout the year. Federal summer low RVP gasoline programs began in the late 1980s and early 1990s in response to local ozone NAAQS nonattainment problems (40 CFR 80.27). Sometimes, in lieu of federal RFG, State strategies include summer low RVP gasoline programs for specific areas.[6] For all of these programs, individual refinery participation is voluntary and market driven (a refinery has the freedom to make an economic choice on what types of gasoline to produce), but retail station compliance is mandatory.

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[5] Winter oxygenated gasoline standards began earlier for a few CO nonattainment areas.

[6] The CAA preempts States from adopting fuel controls that are different than federal standards. However, EPA may waive preemption and approve summer low RVP gasoline programs if they are necessary to achieve a NAAQS and if no other measure that would bring about timely attainment exists. The summer CG RVP regulations are max. 9.0, 7.8, 7.2 or 7.0 psi.

Highway diesel

In 1990, EPA promulgated highway diesel fuel standards which were effective in October 1993 (40 CFR 80.29). The CAAA of 1990 included most of these requirements.[7] These standards, which include sulfur and either cetane index or aromatics, are mandatory for highway diesel fuel. However, Alaska and certain U.S. territories are exempt. California's more stringent standards were effective in October 1993 for highway and off-road diesel fuel. Refiners are not forced to produce diesel fuel for the U.S. market; an individual refinery could instead use these blendstocks to produce other distillate products (i.e., home heating oil).

Mobile Source Air Toxics

In 2001, EPA promulgated Mobile Source Air Toxics regulations that are effective in 2002 (66 FR 17230). These standards are annual average "anti-backsliding" regulations and are refinery-specific (not a national, one-size-fits-all standard). This is a mandatory program for all domestic refineries producing gasoline and for all imported gasoline.[8]

Product slate

One important feature, common to many of these regulations, is that a refinery has the choice to produce a fuel to meet a new specification (i.e., federal or CA RFG, Arizona's or Nevada's Cleaner Burning Gasoline, federal highway diesel, winter oxygenated gasoline, low RVP summer CG) or to redirect its product slate.

> In these previous product quality regulations, refiners could assess their expected competitiveness both with the added investment to produce the new fuel quality and without. If the investments did not make economic sense in the expected future market, the refiner could choose not to invest and still operate, selling products into markets where the specifications had not changed.
> NPC report (p. 27)

In future, remaining in operation and not producing motor fuels to comply with new, stringent standards for the domestic market may not be practical for some U.S. refineries.

[7] The CAAA of 1990 also provided the opportunity for small refineries that desulfurize both highway and off-road diesel (from Oct. 1993 through the end of 1999) to offset this investment expense by selling acid rain allotments to electric utilities. See 40 CFR Part 73, Subpart G.
[8] California gasoline produced for use in California is excluded.

Government Regulations: Stationary Sources

NPRA has spent considerable time discussing the Clean Air Act requirements regarding fuel specifications, but today's refiners must also meet rigorous stationary source controls at the plant. Refineries, because of their size, are obvious targets for environmental regulations that control the potential for impacts on air, water, and land. These requirements can include specific end-of-pipe controls (e.g., permitted wastewater discharges), general industry requirements (e.g., control of fugitive emissions, land disposal restrictions on certain wastes), and overlap from other industries (e.g., chemical controls for MTBE additives). A refinery must also be concerned about applicable state and local regulations and the potential overlap with or increased stringency from federal regulations. Many of these facilities face multiple federal regulations for the handling of wastes, effluents, and air emissions. We have listed below many federal regulations applicable to stationary source controls. While not every refinery will have to meet all these regulations, the need to address most of these issues can be staggering to any refinery manager and the investment implications of these federal requirements are considerable.

Specific Federal New Source Performance Standards (NSPS) applicable to some or all refinery facilities or terminals including:

- Sulfuric Acid Production Units,
- Boilers,
- Nitric Acid Plants,
- Hot Mix Asphalt Facilities,
- Refineries,
- Storage Vessels of Petroleum or Volatile Organic Liquids,
- Stationary Gas Turbines,
- Asphalt Processing,
- Bulk Gasoline Terminals,
- Equipment Leaks of Volatile Organic Compounds in Petroleum Refineries, and
- Volatile Organic Compound Emissions from Petroleum Refinery Wastewater Systems.

Permits

- State Operating,
- Prevention of Significant Deterioration,
- New Source Review,
- Lowest Achievable Emission Rate.

Applicable Federal National Standards for Hazardous Air Pollutants (NESHAPs) include:

- Equipment Leaks (Fugitive Emission Sources) of Benzene,
- Equipment Leaks (Fugitive Emission Sources),
- Benzene Emissions from Benzene Storage Vessels,
- Benzene Transfer Operations,
- Benzene Waste Operations, and
- Offsite Waste.

Furthermore, EPA is developing additional NESHAPs, including,

- Refinery Residual Risk,
- Combustion Turbines,
- Industrial Boilers,
- Process Heaters,
- Reciprocating Internal Combustion Engines, and
- Organic Liquid Distribution.

Specific Federal Maximum Achievable Control Technology (MACT) standards include:

- Process Vents, Storage Vessels, Transfer Operations, and Wastewater,
- Equipment Leaks,
- Industrial Process Cooling Towers,
- Gasoline Distribution Facilities (Bulk Gasoline Terminals and Pipeline Breakout Stations; Stage 1),
- Marine Vessel Tank Loading Operations, and
- Petroleum Refineries.

States regulate emissions at petroleum refineries with the following programs:

- State Implementation Plans (SIPs) for meeting the federal National Ambient Air Quality Standards (NAAQS),
- Operating Permits,
- Petroleum Liquid Storage, and
- Tank Truck Gasoline Loading Terminals.

There are also federal water and effluent programs, including,

- Oil Pollution Prevention,
- The National Pollutant Discharge Elimination System, and
- Water Quality Standards.

Solid wastes are regulated with the following federal standards:

- Standards Applicable to Generators of Hazardous Waste,
- Standards Applicable to Transporters of Hazardous Waste,
- Hazardous Waste Permits, and
- Technical Standards and Corrective Action Requirements for Owners and Operators of Underground Storage Tanks (USTs).

"2. How has the structure of the refining industry changed since 1985? Why did these changes occur? How have these changes affected capacity, utilization, production costs, prices for refined petroleum products, and overall competition in the industry? How has the role and quantity of imported refined petroleum products changed during this time? What has contributed to any such change?"

The supply/demand balance in the gasoline market has tightened over the years due to steadily increasing gasoline demand (growing population, larger cars, more miles traveled) with relatively little growth in U.S. refining capacity (no new refinery built since 1976, limited opportunities for expansion at existing refineries, low returns on investment). The supply/demand balance will probably tighten in the diesel market in the near future due to EPA's ultra low sulfur highway diesel standards (effective in 2006). An extensive and pervasive overlay of intricate and often conflicting regulations, especially those for New Source Review, adds further significant complications.

Current high capacity utilization rates at U.S. refineries (currently 93.6%), growing petroleum product demand for transportation fuels, and the need to comply with overlapping fuel regulatory specifications stretch supply capabilities dangerously close to the breaking point. Maintaining adequate petroleum supplies will largely depend on maintaining sufficient growth in refining capacity and operating near maximum utilization. Historically, the refining industry has kept pace with increasing demand and quality requirements if given adequate time and realistic expectations. With refining utilization projected to remain high and as refined petroleum product requirements approach actual technological, economic, and practical limits, supply capability becomes less certain. Thus, there is increasing risk that we will experience periods of tight fuel supplies and periodic market disruption in the future.

Restrictive new petroleum product standards must be addressed by individual companies. Some may choose not to invest. Others may invest in capacity additions as part of a coordinated and optimized improvement program. These independent decisions and individual circumstances may result in short-term supply disruptions and accompanying price volatility, particularly during the initial implementation of new petroleum product standards.

The U.S. refining industry is faced with recent and prolonged very low rates of return on capital, significant upcoming clean motor fuels investment requirements, and the need to increase production to meet rising domestic demand - all while providing dependable petroleum product supplies at accustomed prices. Recent high average utilization rates may not be sustainable without the chance for short-term petroleum product supply disruptions.

Furthermore, domestic refining capacity expansions may not materialize if stringent new motor fuel composition standards and/or New Source Review compliance costs draw unreasonable amounts of capital and/or discourage investment.

> Since 1985, annual capital expenditures have ranged from a low of about $2 billion to in excess of $6 billion. The peak expenditures correspond to the significant environmental expenditures that occurred in the early 1990s as a result of implementation of the CAAA. *During this period, the . . . typical investment amounts spent on items such as capacity and efficiency were reduced.* (italics added).
> NPC report (p. 33).

The petroleum refining industry is very competitive and refiners have made several changes in response to the competitive environment.

1. Refiners have shut down uneconomic plants. At present, there are many fewer refineries in the U.S. than there were in 1985; the number of operating refineries has dropped from 223 in 1985 to 155 in 2001. Some closed because they did not have funds to invest further or the expected low returns did not justify additional investment.

2. Refiners have merged to form larger companies that can reduce operating costs by achieving economies of scale. At least 12 of NPRA's 59 refining members, accounting for nearly 40% of U.S. refining capacity, have merged into other companies since 1998.

3. Refiners have increased refinery utilization to the point where there is no longer any slack capacity in the refining system. Since 1985 the annual average domestic refinery capacity utilization rate increased from 78% to 92% in 2001.[9] At times, average domestic refinery capacity utilization rates reached 99%.

4. Refiners have increased capacity at existing refineries so that total U.S. capacity has increased by approximately 1 MMBPD from 1985 to 2001. However, petroleum refining capacity decreased by about 0.5 MMBPD from 1985 until 1994 as refineries were shut down. (The low point coincides with implementation of the 500 ppm sulfur limit for on-highway diesel fuel.) Since 1994, refining capacity has recovered as refiners added capacity to existing facilities. It should be noted that the rate of capacity addition has slowed in the last few years. From 1994 to 1999, the domestic refining capacity increase averaged 1.6% per year and then decreased to 1.1% per year from 1999 to 2001. Future capacity additions could be affected and slowed down by New Source Review. Through EPA's reinterpretation of its New Source Review guidance, the rules have changed long after refinery modifications have been completed. In 1999 and 2000, EPA called into question the validity of permit decisions issued by states in the early to mid 1980s. Such retroactive reinterpretation has had a chilling effect on refinery modifications and even routine maintenance. Unless reconsidered, these policies could limit future capacity expansions and modifications.

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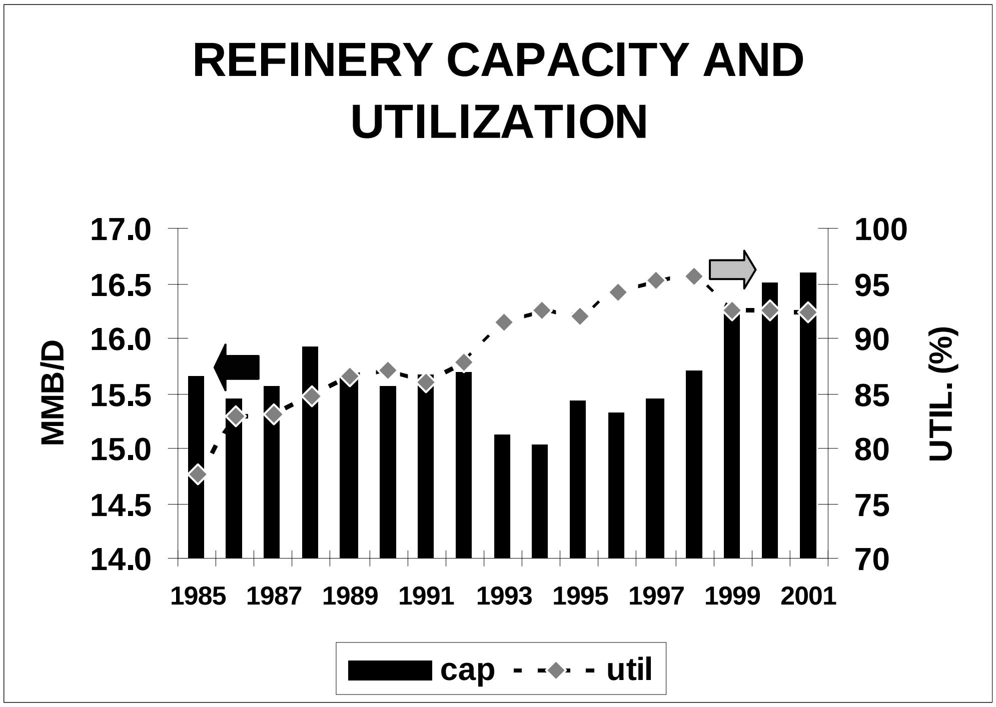
9 National averages were 95-97% in the summer of 2000.

Capacity and Utilization

As the number of refineries dropped (from 223 in 1985 to 155 in 2001), the average size of a U.S. refinery increased from under 80,000 b/d in 1985 to 109,000 b/d in 2001.[10] At the same time, EIA reports that the aggregate domestic crude oil distillation capacity in operable refineries increased from 15.7 million barrels per calendar day in 1985 to 16.6 in Jan. 2001[11] and annual average U.S. refinery capacity utilization increased from 78% in 1985 to 92% in 2001.[12]



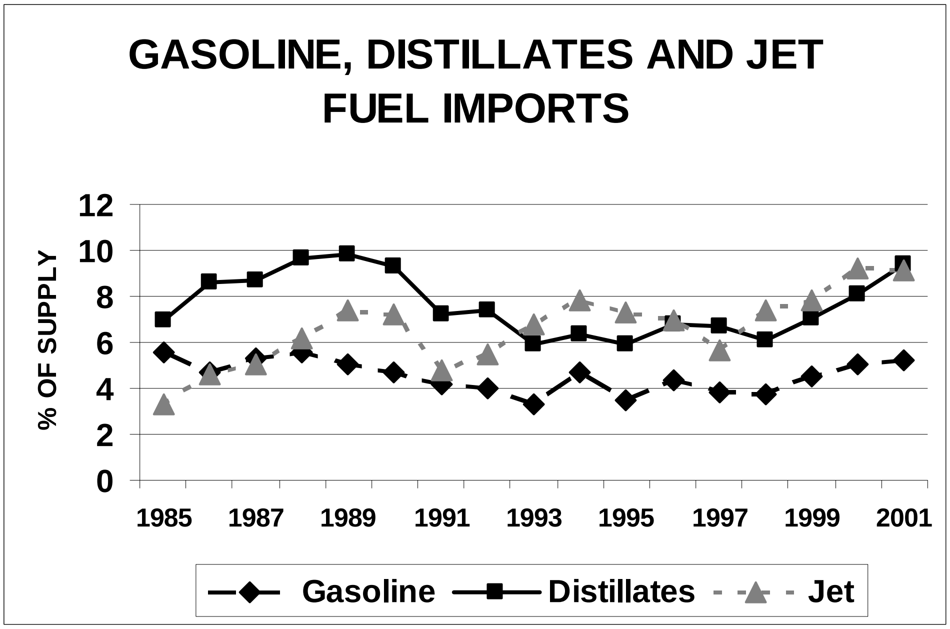
Some refineries have increased their capacity.

> The refining industry is a capital intensive, commodity business and many factors contribute to capacity increases within the industry. A large portion of capacity growth results from expansion of existing equipment at significantly less cost than building a completely new unit. These kinds of capacity increases occur as technology and process control improve and as physical bottlenecks are removed during the course of maintenance and turnarounds. This process is commonly referred to as "stretch" capacity.
> NPC report (p. 27).

10 Also see the refinery closures section of NPRA's replies to questions 6 and 11.
11 16.3 million b/d in operating refineries and 0.3 million b/d in idle (but not permanently shutdown as of Jan. 1, 2001) facilities.
12 National averages were 95-97% in the summer of 2000.

Imports

The following chart, using EIA data, shows the significance of imported gasoline, distillates (diesel and home heating oil) and jet fuel:



Imports contribute about 5 percent to total U.S. gasoline supplies and 5-10 percent of the total domestic supply of distillates and jet fuel. With current very high capacity utilization rates, these imports are <u>vital</u> in order to maintain adequate petroleum product supplies.

“3. What is the empirical evidence on the trends of the inflation-adjusted levels and volatility of refined product prices (for example, spot prices) at the bulk supply level? Are these trends similar or dissimilar in various parts of the nation? Are the trends similar for different refined products (e.g., diesel, gasoline, heating oil, jet fuel)?”

NPRA does not have any information related to this set of questions.

“4. Have infrastructure investments kept pace with growth in demand? If not, why not? Are there policies that can be implemented that will create or reinforce incentives for refiners to make efficient investments in infrastructure to maintain adequate capacity, including reserve capacity in the event of a supply disruption? Would such incentives vary as a function of size, capitalization, or debt level? How has the age of the industry infrastructure contributed to the need for and cost of the capital improvements?”

Investment in refining assets has not kept up with demand as evidenced by the level of refined product imports. Petroleum refineries and their support facilities are capital intensive endeavors and the barriers to entry are high, especially since the return that refiners realize on existing assets is low (about 5% per year over the past decade). Additionally, investment in U.S. refineries is at a disadvantage relative to foreign refineries which do not have to meet the same environmental standards required of U.S. refineries. Reform of the New Source Review (NSR) program and termination of the ongoing enforcement campaign based on NSR reinterpretation must occur to give the industry the certainty necessary to invest. Unless these policy changes occur, refining investments made will be subject to retroactive decisions by EPA bureaucrats decades in the future, as happened in 1999 and 2000.

"5. In light of EPA's report and white paper, how have changes in environmental regulations affected refinery production in ways that have potential impacts on the prices of refined products? What has been the actual and historical effect of such regulations? Have changes in fuel specifications, both past and prospective, affected the competitiveness, fungibility, cost, and price stability of the gasoline and distillate fuel pools?"

Refinery configurations differ and there are many different petroleum products. Refinery utilization and product slate are not a simple function of clean fuels regulations. The multitude of environmental regulations are challenging to refineries and they significantly impact the fungibility of products produced. Many factors must be evaluated when new specifications are assessed. New Source Review, Mobile Source Air Toxics and highway diesel sulfur control illustrate the significant regulatory changes refiners must address.

Refinery Configurations

EIA's insight is instructive:

> Not all refineries are alike. The complexity of a refinery depends upon the physical properties of the crude oil to be processed there and the characteristics of the desired product that will be produced there. Because refinery process requirements differ with the quality of crude oil inputs, a refinery's geographic proximity to the sources of its crude oil inputs can influence its configuration.
>
> Modern refineries process various blends of many different crude oils, and different configurations of refining units are used to produce a given slate of products from available crude oils. A change in the availability of a certain type of crude oil can affect a refinery's ability to produce a particular product. . . . The product slate at a given refinery is determined by a combination of demand, inputs and process units available, and the fact that some products are the result (co-products) of producing other products.[13]

Furthermore, the NPC emphasizes the significance of this variability (p. 28):

> Refinery Configuration - Most U.S. refineries have evolved at existing locations over a long period of time as opposed to having been designed and constructed as an integrated system. Therefore, each refinery is a unique combination of facilities producing a wide range of products. Refineries have intrinsic differences in the way they are configured. This results in a range of energy costs, maintenance requirements, technology utilization, product compositions, and many other factors that are refinery specific but are extremely important in considering a decision to make significant product quality investments.

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[13] Energy Information Administration, Petroleum: An Energy Profile 1999, DOE/EIA-0545(99), July 1999, p. 27.

Petroleum Products

The refining industry responds to changes in demand and economics by adjusting processes and blending procedures to vary the yield of finished products. Again, there are many different petroleum products. Fuels, nonfuel products and petrochemical feedstocks are petroleum product categories.

1. Fuels

- Gasoline
  - Motor gasoline
    Types: reformulated gasoline (RFG), gasohol, conventional gasoline
    Grades: regular, middle and premium octane
  - Aviation gasoline

- Distillate Fuel Oil
  - Diesel: low sulfur highway and high sulfur off-highway
    Off-highway examples: locomotives, ships, farm tractors, bulldozers, forklifts, underground mining equipment, backhoes, cranes
  - Home heating oil: space heating, electricity generation, crop drying, fuel for irrigation pumps on farms

- Jet Fuel
  - Kerosene-type: commercial and Military Grades JP-5 and JP-8
  - Naphtha-type: Military Grade JP-4

- Kerosene
  - Uses: space heating, cooking stoves, water heaters, lamp oil

- Residual Fuel Oil
  - Use: fire boilers to provide steam for heating or electricity generation

- Liquefied Refinery Gases (LRG)
  - Ethane/ethylene, propane/propylene, normal butane/butylene, isobutane/isobutylene
  - Uses: space heating, cooking

- Still Gas or Refinery Gas
  - Use: a refinery fuel

2. Nonfuel Products

- Asphalt

- Lubricants
  - Uses: engine oil, gear oil, automatic transmission fluid

- Petroleum Coke
  - Uses: carbon electrodes, electric switches

- Road Oil
  - Uses: dust suppressor, surface treatment on roads, roofing, waterproofing

- Solvents

- Wax
  - Uses: chewing gum, candles, crayons, sealing wax, canning wax, polishes

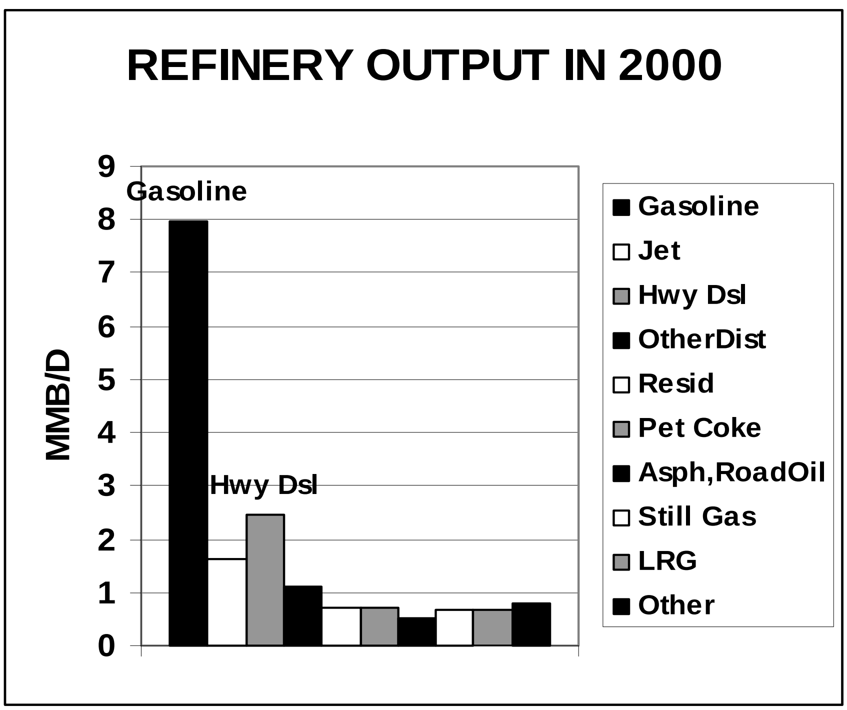
- Miscellaneous
  - Uses: cutting oil, petroleum jelly, fertilizers

3. Petrochemical Feedstocks

- Examples: benzene, toluene, xylene, ethane, ethylene, propane, propylene, naphtha, gas oil

- Uses: solvents, detergents, synthetic fibers, synthetic rubber, plastics, medicine, cosmetics

This chart shows aggregate U.S. production volumes in 2000. With 46 percent of domestic refining output, the largest volume product is gasoline. Highway diesel fuel is the second largest volume product.



New Source Review

EPA and the Bush Administration must quickly conclude the review of EPA's New Source Review (NSR) Program and release its findings. Future delays in announcing program changes will only exacerbate an already confused situation in which necessary and important business decisions are affected. Congress enacted the NSR program in the 1970s to ensure that sources that significantly increase their emissions install technology to control that increase. While the refining industry has a record of dramatic emissions reductions, it continues to be tangled up in a program intended to control emissions increases because of how the program is administered.

Under the Clean Air Act, NSR is triggered by any physical change or change in the method of operation of an industrial or electric utility source that increases its emissions by a significant amount. If a physical/operation change does not itself significantly increase source emissions, then, under the law, NSR does not apply.

If a facility change does cause a significant emissions increase, NSR requires the source to get a permit to begin construction of the change, install emissions control technology on the change, and perhaps meet other requirements as well. EPA officials have made public statements that some changes at refineries over the past twenty years required NSR permits but that none were obtained. Since NSR is only triggered by an emissions increase, and given that the refining industry since 1980 has experienced dramatic emissions reductions, any EPA claim of widespread NSR non-compliance would appear inconsistent with the basic intent of the program. In addition, no refinery can function efficiently if every change to a facility requires a permit before construction can begin.

EPA's current reinterpretation of NSR threatens refiners' ability to make the plant changes necessary to comply with important environmental requirements for stationary sources and fuel reformulation. We believe that NSR saddles American industry with enormous costs with little or no corresponding environmental benefit. EPA now applies NSR to many changes that will never cause emissions increases, to routine maintenance and repair, and even to changes that reduce emissions. In many instances, companies could make equipment changes that would improve environmental, energy and/or economic performance, but today they are putting them off or canceling them entirely to avoid the time and expense of NSR requirements. This means that NSR in its current form inhibits technological advancement. While it may appear that NSR is strictly an environmental program, there are enormous costs associated with the business decisions driven by the program.

For years, NPRA, as well as others, has urged federal regulators to reform EPA's NSR program. The Bush Administration, in its National Energy Policy announced in May 2001, directed the EPA to review its NSR program and, if warranted, to develop reforms to the program. Real reform must develop credible applicability tests so that plant changes that do not increase emissions do not trigger NSR. Real reform must also change EPA's current reinterpretation of routine maintenance, repair and replacement. NPRA urges the Bush Administration to release its modifications to EPA's New Source Review program as soon as possible.

Mobile Source Air Toxics (MSAT)

The MSAT final rule (66 FR 17230) could limit overall gasoline production and restrict refiners' ability to produce specific types of gasoline.[14] Locking refiners into their 1998-2000 baseline toxics performance effectively constrains their ability to adjust summer/winter gasoline production, or to modify production between RFG, CG, CARB, or among grades of gasoline. Furthermore, it will limit refinery operational flexibility.

The constraints in the MSAT final rule, combined with its timing, may leave some refiners unable to respond to changes in demand among gasoline grades or different types of gasoline (i.e., CG versus RFG). For example, if another gasoline supply disruption occurred such as the one affecting Midwest RFG in 2000, refiners might not be able to increase their RFG production in response. This is because increased RFG production could divert blendstocks with lower toxics emissions from conventional gasoline into RFG, potentially endangering compliance with the MSAT rule for the CG pool. A refiner in this situation faces a choice of responding to a real market need for RFG at the expense of CG production or of not responding to the need for additional RFG production – in either case, gasoline supplies to consumers are adversely affected.

Since the MSAT final rule could limit overall gasoline production and restrict refiners' ability to produce specific types of gasoline, it should be included in the Commission's analysis of key factors. Its adverse impacts on refinery flexibility mean that the rule will reduce gasoline producibility, especially if or when MTBE use as a blendstock is resticted.

[14] Promulgated by EPA last year and effective this year.

Highway Diesel Sulfur Control

Last year, EPA promulgated an ultra low sulfur highway diesel regulation that will be effective in 2006 (66 FR 5002). EPA did not heed warnings from the NPC: "There is a significant risk of inadequate diesel supplies if the EPA's proposal for 15 ppm maximum sulfur highway diesel beginning April 1, 2006 is implemented." NPC report (p. 5). NPRA is also concerned that this federal action could lead to shortages of diesel fuel beginning in 2006 and, along with other stakeholders, has sued the Agency.[15]

EIA released a report that evaluated the diesel supply implications of this rulemaking, The Transition to Ultra-Low-Sulfur Diesel Fuel: Effects on Prices and Supply, May 2001. EIA's analysis of the effects of the federal highway ultra low sulfur diesel (ULSD) rule in 2006 is presented in Chapter 5 and includes the following conclusion:

> Supply scenarios that assume more cautious investment ***indicate inadequate supply*** compared with the demand levels projected in the *Annual Energy Outlook 2001*. Only more aggressive investment scenarios or lower demand scenarios show adequate supply to meet estimated demand. The two sets of supply sensitivities [1) higher capital costs for hydrotreaters than EPA cost or 2) 10% return on investment vs. 5.2% in all other scenarios] show even lower production estimates than the initial set. This indicates the possibility of a tight market supply situation when the ULSD Rule takes effect in 2006. While considerable uncertainty exists in both the supply and demand estimates, this analysis indicates that even though the market could see supply meet demand at a cost increase for production between 5.4 and 7.6 cents per gallon, there are a ***number of scenarios in which inadequate supply of ULSD could result***. (p. 50) (emphasis added)

The U.S. refining industry has alternatives to this very large investment in highway diesel. Instead of installing new, multi-million dollar equipment to desulfurize highway diesel blendstocks with uncertain returns, refiners can produce other distillate products, such as more off-road diesel, home heating oil or medium sulfur highway diesel for the export market. Given this situation, there is no guarantee of adequate supply of highway diesel fuel in the U.S. in 2006. Therefore, the Commission and other government agencies should be aware of this potential volatility.

Also, Texas requires its own diesel standards (similar to California's) effective in 2005 in 110 east/central counties and extends the ULSD requirement to the off-road market in east/central TX in 2006. The Texas diesel program is noteworthy because of inconsistencies with the federal highway diesel ultra low sulfur regulations.

[15] No. 01-1052 and Consolidated Cases in the U.S. Court of Appeals for the D.C. Circuit.

For example, the effective date for the federal highway ULSD program at retail is September 1, 2006 (40 CFR 80.500(c)). The ultra low sulfur requirements in the Texas Low Emission Diesel (LED) program will be effective on June 1, 2006 (three months earlier). In addition, the federal regulations include transitional provisions (such as a temporary compliance option and small refiner options) that permit the production and domestic sale of some 500 ppm sulfur cap highway diesel until the end of May 2010 (66 FR 5002). The Texas LED rules do not include these federal temporary compliance and small refiner features.

The federal temporary compliance option includes a credit trading program with a relevant restriction: if a refinery produces highway diesel for a state 15 ppm sulfur cap program that requires a higher volume, then that fuel is excluded from the federal credit program. (40 CFR 80.531(a)(5)(iv)). This restriction applies to both motor vehicle diesel fuel produced in that state or imported directly into that state. Therefore, the Texas LED rule has the consequence of creating a conflict with EPA's highway ULSD regulations in 2006.

In spite of NPRA's objections explaining these inconsistencies, EPA Region 6 approved the Texas LED program as necessary for ozone attainment in Houston-Galveston (66 FR 57196). Furthermore, EPA Region 6 proposed to approve the Texas LED program for Dallas-Fort Worth (66 FR 46754).

The requirement for ULSD for the off-road diesel market in 2006 in 110 east/central counties in Texas exacerbates supply concerns. This should be included in the Commission's review of the potential for future volatility.

Similarly, Georgia requires an average sulfur content no higher than 30 ppm for gasoline in the Atlanta area beginning on April 1, 2003. This is an earlier effective date than the federal requirement which begins on January 1, 2005.

“6. What capital investments have been needed to produce refined petroleum products (e.g., reformulated gasoline) in compliance with federal and state environmental and other regulations implemented since 1985? Have any refineries shut down because they found the needed capital improvements would be uneconomical? What capital investments will be needed to comply with federal and state regulations scheduled to take effect in the future?”

New Capital Investments

Additional capital investments at U.S. refineries will be needed to assure adequate supplies of petroleum fuels. EIA has characterized the situation:[16]

> Refinery configuration is constantly changing to meet current requirements. Changing quality of crude oil inputs and changing product requirements will continue to stimulate technological advances and modifications in refinery configuration. Environmental requirements for cleaner burning fuels and cleaner refinery processes have been foremost among factors that have influenced refinery configuration during the last decade. Innovations in catalyst design and refinery process units will continue to allow greater flexibility in processing heavy residual oils. Newly developed catalysts will also help refiners meet environmental standards for sulfur in final products and in refinery emissions. Requirements for specialized hydrocrackers, hydrotreaters, and other downstream units are likely to increase as refinery configurations adapt to increasingly stringent product specifications.

Future refining capital requirements from recent EPA clean fuels rulemakings are remarkably high. The NPC estimated that $8 billion (see p. 51) will be needed to meet EPA’s low sulfur gasoline rule.[17] Charles River Associates/Baker & O’Brien estimated that an additional $8 billion will be needed to comply with the Agency’s ultra low sulfur highway diesel rulemaking.[18] Furthermore, additional capital investments may be required to comply with possible future EPA rulemakings, such as desulfurizing off-road diesel or Mobile Source Air Toxics (MSAT) Phase 2.[19]

Moreover, there will be a number of new ozone nonattainment areas. Recently, EPA released a list of 329 counties with an average annual fourth maximum 8-hour daily maximum

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[16] Energy Information Administration, Petroleum: An Energy Profile 1999, DOE/EIA-0545(99), July 1999, p. 32.

[17] See the Agency’s final rule at 65 FR 6698.

[18] An Assessment of the Potential Impacts of Proposed Environmental Regulations on U.S. Refinery Supply of Diesel Fuel, prepared for the American Petroleum Institute, August 2000, p. 12. EPA’s final rule is at 66 FR 5002.

[19] See 40 CFR 80.1045 and 66 FR 17259.

ozone concentration in 1998-2000 greater than 84 ppb. These counties are in 33 states[20] and D.C. As a result, many states may impose changes in gasoline specifications (i.e., low RVP in the summer) in the next few years.

In addition, EPA is developing additional NESHAPs, including,

- Refinery Residual Risk,
- Combustion Turbines,
- Industrial Boilers,
- Process Heaters,
- Reciprocating Internal Combustion Engines, and
- Organic Liquid Distribution.

The petroleum industry is confronted with many technical and environmental challenges. However, resources are limited and the aggregate capital costs of upcoming motor fuels and stationary source environmental regulatory initiatives are high. Fuel specification changes and resulting required refinery capital investments must be appropriately sequenced with minimum overlap to mitigate the potential for major disruptions in petroleum product supply and resulting significant price variations.

New restrictive petroleum product standards will be addressed by individual companies. Some may choose not to invest. Others may invest in capacity additions as part of a coordinated, optimized improvement program. These independent decisions and local circumstances may result in the potential for short-term supply disruptions and accompanying price volatility, particularly during the initial implementation of new petroleum product standards.

The U.S. refining industry is faced with recent and prolonged very low rates of return on capital, significant upcoming clean motor fuels investment requirements, and the need to increase production to meet rising domestic demand, all while providing dependable petroleum product supplies at accustomed prices. High capacity utilization rates at U.S. refineries, increasing petroleum product demand for transportation uses, and the need to address multiple motor fuel specification changes simultaneously raise serious supply concerns. The long-term high utilization rate may not be sustainable without the chance for occasional short-term petroleum product supply disruptions. Furthermore, domestic refining capacity expansions may not materialize if stringent new motor fuel composition standards draw unreasonable amounts of capital and/or discourage investment.

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[20] Alabama, Arizona, Arkansas, California, Colorado, Connecticut, Delaware, Florida, Georgia, Illinois, Indiana, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Mississippi, Missouri, Nevada, New Jersey, New York, North Carolina, Ohio, Oklahoma, Pennsylvania, Rhode Island, South Carolina, Tennessee, Texas, Virginia, West Virginia, and Wisconsin.

Refinery Closures

There is no single reason why refineries have shut down. An assessment that required capital improvements would not be economical is certainly a partial explanation. Environmental capital requirements usually do not pay for themselves by generating a return on those investments.

In a press release dated January 17, 2001 announcing the closure of its Blue Island refinery in Illinois, Premcor made the following statement:

> “At Premcor refineries throughout the country, we are focusing our operations to meet the requirements of the next wave of low-sulfur, cleaner-burning fuels. Despite the investment by Premcor of approximately $70 million over the past five years at Blue Island, the refinery, as currently configured and operated within our refining network, does not generate a return sufficient for us to justify the additional investment,” said William C. Rusnack, president and CEO of Premcor. “In the end, we have determined the right choice for Premcor is to focus our planning on higher return projects at our other three refineries.”

On February 28, 2002, Premcor made the following statement when it announced that it would close its Hartford, Illinois refinery later this year:

> “We have evaluated the feasibility of upgrading our Hartford refinery to meet future low-sulfur gasoline and diesel specifications and have been unable to justify the significant investment that would be necessary to remain operational.”

Refinery closures were discussed in the NPC report:

> Since 1990, the reference point for refinery capacity data used in the last NPC refining study, the number of operable refineries in the United States has declined from 205 to 159, as shown in Table 1-1. Fifty refineries out of 205 closed, with four new refineries added. In addition, many refineries changed ownership because of sales, mergers, joint ventures, and other strategies as companies strove to improve their competitiveness.

TABLE 1-1
NUMBER AND CAPACITY OF
U.S. PETROLEUM REFINERIES

	1/1/1990	1/1/1999
Operating Refineries	194	155
Non-operating Refineries	11	4
Total Refineries	205	159
Operating, MB/D	15,063	16,061
Operable Shutdown, MB/D	509	200
Operating Capacity, MB/D	15,572	16,261
Average Size, MB/D	76	102

> About half of the observed closures since 1990 have been refineries without the facilities normally associated with producing finished gasoline. The remaining closures have varied in size, complexity, and geography, with no apparent single physical factor responsible for their owner's decision to cease operation. . . . The refinery shutdown trend is likely to continue into the future, regardless of new fuels regulations, as the competitive landscape continues to evolve. . . . While history has shown a steady trend, the new fuels regulations may advance the shutdown of some refineries whose long-term competitiveness is in doubt.
> NPC report (pp. 23-25, 27)

EIA agrees that U.S. refineries are expected to continue to close in future years. EIA's "estimate is that this will occur between now and 2007 at the rate of about 50-70 MB/CD per year. All refineries face investments to update or replace old equipment, to meet environmental operating requirements and fuel specification changes. But smaller refiners may find their lack of economies of scale and the size of the investments required puts them at a competitive disadvantage and would keep them from earning the returns needed to stay in business."[21]

[21] Shore, J., et al, Energy Information Administration, Availability of Gasoline Imports in the Short to Mid Term: U.S. Perspective, AM-02-61, 2002 NPRA Annual Meeting, San Antonio, TX, March 2002, p. 9.

"7. How have environmental regulations affected refinery capacity for motor gasoline and other refined products? What effect have these regulations had on refinery utilization and the product slate, including the types and quantities of motor gasoline produced? How have these regulations affected production schedules, lead time, and the ability to respond to supply disruptions (e.g., alter product slates)?"

Government policy is a major determinant of whether adequate petroleum product supplies will be available at reasonable cost. Domestic refining capacity is stretched to its limit and prospects for expansion are constrained by regulatory policy.

EIA has characterized the U.S. refining environment:[22]

> Environmental requirements for cleaner burning fuels and cleaner refinery processes have been foremost among factors that have influenced refinery configuration during the last decade. . . . Requirements for specialized hydrocrackers, hydrotreaters, and other downstream units are likely to increase as refinery configurations adapt to increasingly stringent product specifications.

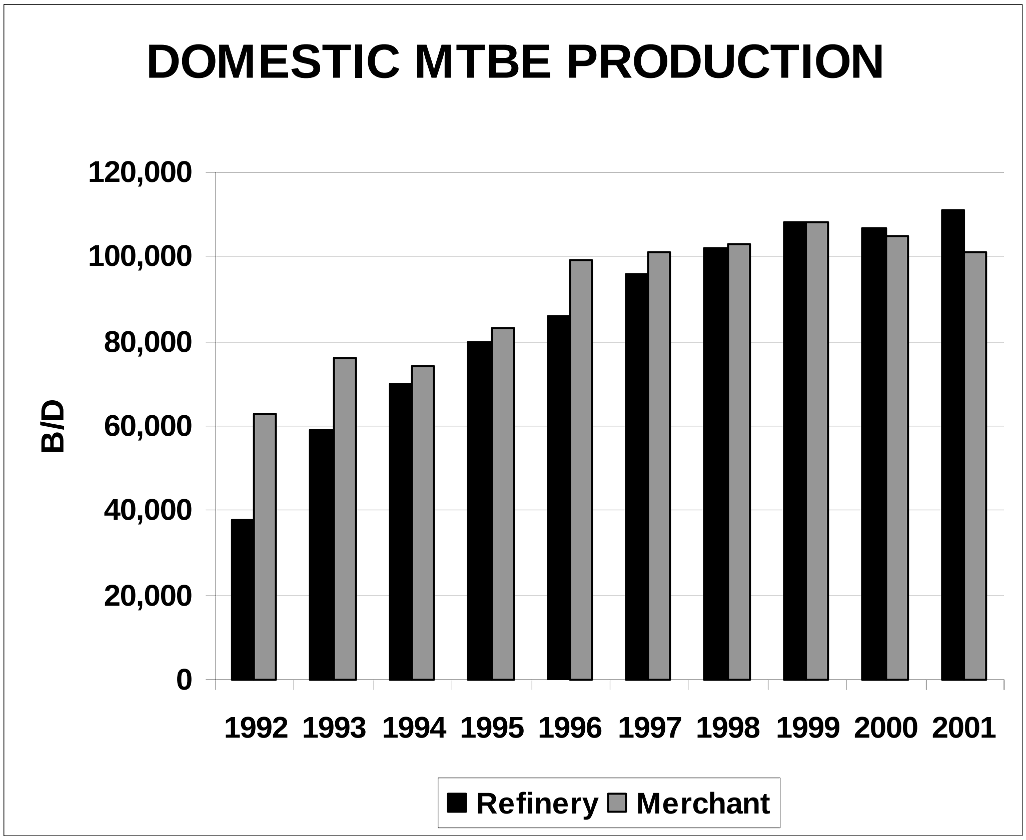
RFG and Oxygenates

RFG accounts for about one-third of total U.S. gasoline demand. In the Northeast (Delaware, Philadelphia and New Jersey) and on the West Coast, about two thirds of the gasoline produced is RFG. By comparison, RFG is less than 20 percent of gasoline production in the Gulf Coast and Midwest, and is usually not produced in Rocky Mountain area refineries.

Due, at least in part, to the oxygenate requirements in the winter oxygenated gasoline and RFG programs and the need for a low aromatics source of octane, oxygenates have been a growing gasoline blendstock. Current ethanol use is about 115,000 b/d, compared to MTBE at about 260,000 b/d. With current gasoline demand at about 8.5 million b/d, ethanol represents about 1% and MTBE about 3% of total U.S. gasoline supply. Oxygenates contribute about 10 percent of total gasoline supplies in winter oxygenated gasoline, gasohol and federal RFG areas; this is a significant volumetric source of supply. Almost all of the MTBE is used in RFG areas (Northeast, California, Houston and Dallas). About half of the ethanol is used in RFG and half in CG (gasohol), largely in the Midwest.

Domestically produced MTBE supplies about 80 percent of domestic demand; the balance is imported. Most of the domestic MTBE production capacity is in Texas. MTBE is produced at refineries and at merchant petrochemical plants.

[22] Energy Information Administration, Petroleum: An Energy Profile 1999, DOE/EIA-0545(99), July 1999, p. 32.


DOMESTIC MTBE PRODUCTION
B/D
120,000
100,000
80,000
60,000
40,000
20,000
0
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
Refinery
Merchant

Regulatory Challenges Ahead for Refiners

The refining industry now faces extensive new Clean Air Act regulations that will take effect over the next several years. These include requirements both for control of refinery emissions and for the reduction of sulfur levels in gasoline and on-road diesel fuel. Refining capacity is stretched to its limit and the prospects for expansion are limited by regulatory policies. The nation's energy delivery infrastructure is increasingly overwhelmed by demand, with new construction and/or expansion made more difficult by regulatory impediments.

The refining industry's return on invested capital over the past ten years averaged 4-5%, roughly the passbook savings rate at local banks. During much of the same period refiners were called upon to invest about $20 billion in environmentally-related capital expenditures. An earlier NPC study determined that those expenditures were likely to exceed the book value of the entire refining industry.

The chart entitled "Cumulative Regulatory Impacts on Refineries, 2000-2008" (attached at the end of these comments) presents many new regulatory requirements. Implementing these upcoming programs is crucial to refiners and it is their goal to continue the industry's environmental progress. Between 1980 and 1996, according to EPA's own figures, the refining industry decreased its criteria pollutant air emissions by 74%, while refining capacity decreased by only 1 %; these figures underestimate our current emissions reductions, since they do not include the impact of many regulations issued under the 1990 Clean Air Act Amendments. And these figures do not reflect the significant emissions reductions that have been obtained through the use of reformulated gasoline produced by refiners.

And while our industry's environmental progress has been strong, we must begin to balance the need for environmental improvement with the need for reliable domestic energy supplies. As our chart illustrates, the refining industry faces an avalanche of new environmental requirements – most of which fall within the same narrow time period for implementation. The investment requirements that refiners face will be substantial and may raise questions about the continued viability of some in the industry. NPRA estimates that over $20 billion must be spent over the next decade to comply with newly issued or anticipated gasoline and diesel fuel requirements.

"8. What new motor gasoline transportation and storage issues have arisen due to new environmental regulations since 1985?"

Several gasoline and diesel standards required in the last ten years are described in NPRA's response to question 1. These new regulations require product identification and segregation in the motor fuels transportation and distribution system. In addition, periodic downstream product testing is necessary to document proper segregation and maintenance of product integrity.

An excellent discussion of these issues is presented in Chapter 6 ("Impact of Product Specification Changes on Distribution and Testing") of the June 2000 NPC report. Concerns have also been raised about the distribution of ultra low sulfur highway diesel. An analysis of the challenges of EPA's ultra low sulfur highway diesel rule on pipelines is summarized in Chapter 4 in EIA's The Transition to Ultra-Low-Sulfur Diesel Fuel: Effects on Prices and Supply, May 2001.

"9. What effect has the increase in the number of different grades of motor gasoline (with varying emissions specifications and oxygenates) had on product markets and geographic markets for refined petroleum products? Are there specific grades of gasoline that are produced by just a few refiners? How has this affected the industry's ability to respond to supply disruptions? How rapidly do refined product prices typically react to changes in supply? Are there implications that one can draw from the response speed regarding the nature of competition in the market? What are the consequences and associated costs of producing an off-specification motor gasoline?"

Boutique Fuels

Federal policymakers are today concerned about boutique fuels required by states. The U.S. downstream industry will continue to do its job to optimize the manufacture and distribution of gasoline and other products to comply with regulatory requirements to the best of its ability. Various analyses of the boutique fuels issue agree that the current situation results in market disruption only when unforeseen problems arise, such as refinery or pipeline outages, or acts of God. The industry is already required to comply with a multitude of new fuel and stationary source regulatory requirements in this decade. The combined cost of these regulations is estimated to approach $20 billion. Requiring the domestic refining industry to make additional significant investments in a quixotic attempt to reduce the number of boutique fuels will reduce domestic gasoline production and should be summarily dismissed as a policy option. Refiners should not face new fuel specifications as an "antidote" to the current boutique fuel situation. The following summary outlines NPRA policy concerns regarding boutique fuels.

First, a great deal of attention has been directed to national maps showing the varied gasoline specifications required across the nation. Those maps were prepared to explain to federal and state policymakers why logistical considerations are important in today's gasoline market. Unless policymakers understand that gasoline specifications differ, sometimes even within a relatively restricted geographical area, they will not understand the difficult requirements or the relative sophistication of today's gasoline production and delivery system. As in most cases, there is no substitute for visual representation of these facts.

Second, the downstream segment of the U.S. petroleum industry has performed, is performing and will continue to perform its job of optimizing the manufacture, distribution and marketing of gasoline to comply with these varying requirements to the best of its abilities. A large number of different gasoline specifications is more challenging than a small number. But it is our job to manufacture and deliver the fuels as the specifications require, and we make every effort to do so.

The relative efficiency and simplicity of fuel manufacture and distribution should be carefully considered in establishing fuel specifications. Economic, environmental and other factors also play a role in the policymaking process. Various analyses of the boutique fuels issue agree that the current situation results in market disruption only when unforeseen problems arise, such as refinery or pipeline outages, or acts of God.

Third, and relatedly, the boutique fuels phenomenon is in many cases an attempt by local and regional policymakers to devise a fuel strategy for their area that balances environmental and economic considerations. In some instances, areas that could have opted into RFG have decided instead to rely on a special fuel for their area.

Apparently, the policymakers in those areas have decided that their local air quality requirements may be met more economically by a fuel other than RFG. Logistical considerations typically also play a part in such a decision process. It is difficult to argue that legal and well-considered decisions of this kind should be completely ignored or swept aside.

Fourth, EPA has to date approved state requests for differing gasoline specifications with some liberality. We have been led to believe that the Agency's policy in the future will be to continue to entertain such requests, and, in many or most cases, to grant them. We are told that this is in keeping with the respect for state, regional and local decision making that is part of our federal system.

Without arguing that point, such a deferential policy strongly suggests that a diversity of gasoline specifications will continue to be the norm, rather than the exception. Thus, an attempt to simplify and/or reduce the number of gasoline specifications could soon be overcome by a new crop of subsequently approved boutique fuels.

Fifth, the basic laws of economics will continue to encourage the development of boutique fuels so long as federal fuel requirements are economically, and sometimes environmentally, inefficient. For example, NPRA has joined others in recommending that the RFG 2% by weight oxygenation requirement be removed. Numerous studies indicate that the oxygen content requirement is not needed to achieve the actual required environmental performance of RFG. As long as the oxygenation requirement remains, areas that can do so may opt for a boutique fuel to meet their environmental requirements in another way than with RFG.

Substitution of an ethanol ("renewables") requirement for the RFG oxygenate requirement will exacerbate the boutique fuels situation. The minimal costs of using mandated ethanol create many new market distortions. The number of "boutique" fuel areas will increase geometrically as refiners or marketers in the same or adjacent areas struggle with the decision to use ethanol as a blendstock or to buy credits from others.

Sixth, the conclusion we at NPRA reach is that the best policy going forward is for EPA and other federal and state policymakers to be very sensitive to fuel supply and distributional concerns when deciding on any new fuel requirements. All other things being equal, it would be preferable not to add any more boutique fuels to the mix, or at least not to do so without due consideration of all the pluses and minuses involved.

“10. Are current environmental regulations, or those that are scheduled to take effect in the future, affecting refinery ownership? That is, are companies that own refineries making decisions to divest because of the regulations and the cost to comply? Is there a pattern of such sales and are the purchasers comparable to the sellers in terms of ability to raise capital to comply with environmental requirements and to expand capacity?”

Often, it is not clear why a refinery is sold. An assessment that needed capital improvements would not be economical is certainly one significant explanation. There may be other reasons, such as FTC conditions for approval of a merger, corporate strategic planning decisions, or better investment opportunities elsewhere.

“11. What factors explain the closure of several smaller refineries in the United States over the past decade? Why have some major oil firms sold refining capacity? Has the closure of smaller refineries changed the regional composition of refining capacity? If so, has this created infrastructure bottlenecks and affected price volatility?”

Refinery Closures

There is no single reason why refineries have shut down. An assessment that needed capital improvements would not be economical is certainly one explanation. Environmental capital requirements usually do not pay for themselves by generating a return on those investments. Three small refineries in California closed rather than make the investment for CARB Phase 2 Cleaner Burning Gasoline effective in 1996. In addition, the two Premcor refineries (80,000 and 64,000 b/d capacity), mentioned in response to question 6, are smaller in size than the average domestic refinery.

Refinery closures were discussed in the NPC report:

> Since 1990, the reference point for refinery capacity data used in the last NPC refining study, the number of operable refineries in the United States has declined from 205 to 159, as shown in Table 1-1. Fifty refineries out of 205 closed, with four new refineries added. In addition, many refineries changed ownership because of sales, mergers, joint ventures, and other strategies as companies strove to improve their competitiveness.

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EIA agrees that U.S. refineries are expected to continue to close in future years. EIA's "estimate is that this will occur between now and 2007 at the rate of about 50-70 MB/CD per year. All refineries face investments to update or replace old equipment, to meet environmental operating requirements and fuel specification changes. But smaller refiners may find their lack of economies of scale and the size of the investments required puts them at a competitive disadvantage and would keep them from earning the returns needed to stay in business."[23]

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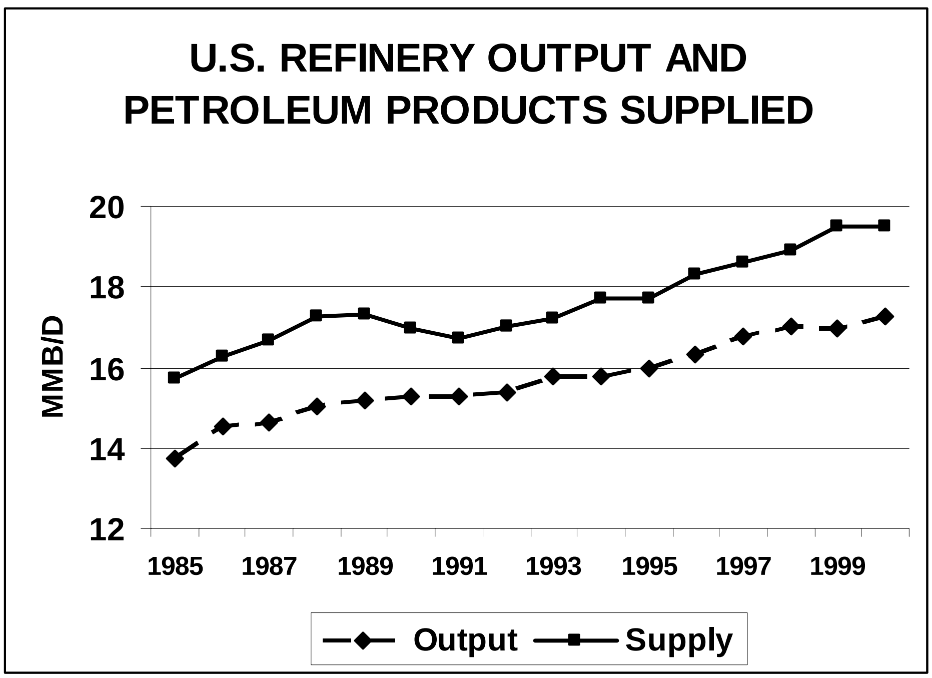
[23] Shore, J., et al, Energy Information Administration, Availability of Gasoline Imports in the Short to Mid Term: U.S. Perspective, AM-02-61, 2002 NPRA Annual Meeting, San Antonio, TX, March 2002, p. 9.

"12. Is there any exercise of significant market power currently being observed in particular aspects or geographic areas of the domestic refining industry? If so, to what extent has such exercise of significant market power affected prices of refined products?"

NPRA does not have any information related to this set of questions.

"13. Why is refinery capacity utilization at such high rates and are these rates likely to continue for a number of years into the future? What are the primary causes?"

Demand for petroleum products in the U.S. has exceeded domestic refinery output by about 2 million barrels/day for many years:



The annual average capacity utilization rate of domestic refineries has exceeded 90 percent for the last 10 years. No refinery has been built in the U.S. since 1976. No new refinery is expected to be built in the U.S. Therefore, future annual average capacity utilization rates will be a function of the continued growth in domestic petroleum product demand and capacity expansion at domestic refineries.

Thus, maintaining adequate petroleum supplies will largely depend on both continuing growth in domestic refining capacity and maintaining near maximum utilization. Historically, the refining industry has barely kept pace with increasing demand and quality requirements, if given adequate time and realistic expectations. With utilization projected to remain high and as refined product requirements approach actual technological, economic, and practical limits, supply capability becomes less certain. Thus, there is increasing risk that we will experience periods of tight petroleum product supplies and market disruption.

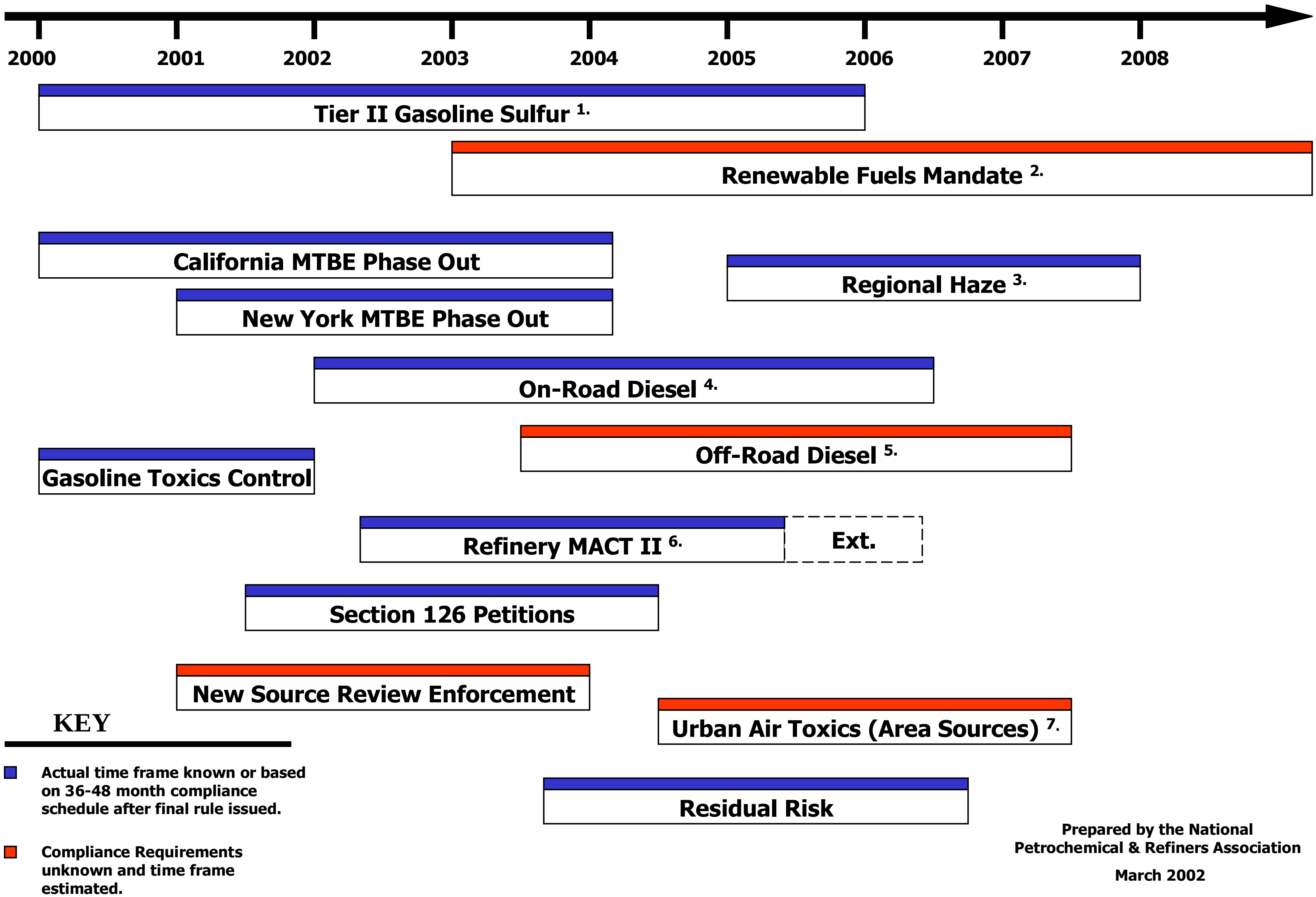
In summary, high capacity utilization rates at U.S. refineries, increasing petroleum product demand for transportation, and addressing multiple motor fuel specification issues simultaneously raise serious supply concerns. It is not evident that this long-term high refinery utilization rate can be sustained without short-term petroleum product supply disruptions. Furthermore, domestic refining capacity expansions may not materialize if stringent new motor fuel composition standards draw capital and/or discourage investment.

"14. To what extent have refiners instituted just-in-time inventory of crude oil and/or refined products? What are the likely price effects of any changes in inventory behavior?"

This topic is addressed in the 1998 National Petroleum Council report titled U.S. Petroleum Product Supply Inventory Dynamics.

The chart on the following page is referenced in the response to question 7.

Cumulative Regulatory Impacts on Refineries, 2000 - 2008



Prepared by the National Petrochemical & Refiners Association

March 2002

FOOTNOTES:

1. Longer compliance time for refineries in Alaska and Rocky Mountain states and small refineries covered by Small Business Regulatory Enforcement and Flexibility Act (SBREFA). Additional compliance time is available for these refineries if they produce ultra low sulfur highway diesel beginning in 2006.
2. Senate Energy bill (S. 517) proposes an ethanol mandate of 2.3 billion gallons in 2004 which increases to 5 billion gallons in 2012.
3. Regional Haze State Implementation Plans (SIPs) due 2005-2007. Earliest compliance date. Schedule may be impacted by National Ambient Air Quality Standard (NAAQS) litigation.
4. Longer compliance time for small refiners covered by SBREFA.
5. Estimated effective date based on proposed heavy duty vehicle standards.
6. Compliance date may be harmonized with Tier II schedule.
7. Urban Air Toxics Strategy includes potential controls of gasoline loading facilities at refineries. Estimated compliance schedule.