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Completion Methods

Biofuels producers confront evolving market unknowns
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Study forecasts US fuel demand for next decade
Spark spread trends allow analysis of LNG consumers

Study forecasts US fuel demand for next decade

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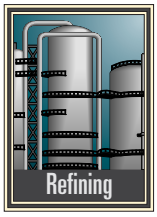


Economic growth, fuel prices, and policy choices will determine the rate of growth of US gasoline and diesel markets during the next decade.

Diesel demand is sensitive mostly to economic growth. The diesel market will therefore remain strong if the economy continues to do well.

Growth of 15-20% in motor fuel demand during the next decade could be slower than the recent past; but continued adjustments to past price increases and a somewhat lower economic growth rate could plausibly push future growth into that range. Biofuels and carbon policies would further constrain diesel demand growth, perhaps to the lower end of the estimate.

The gasoline market also will grow with the economy but is more sensitive to price and is still adjusting to past price increases. Base case growth of 15-20% during the next 10 years is plausible.

Biofuels, corporate average fuel economy (CAFE) policies, and changes in the vehicle mix, however, could reduce gasoline demand by up to 1.2 million b/d. Alternatively, constraints on carbon emissions and biofuels substitution could reduce overall motor fuels demand by as much as 1.3 million b/d. In that case, gasoline demand would grow only about 200,000 b/d during the next 10 years and diesel would grow 400,000 b/d.

This is the context in which US refiners must make investment plans. Given reasonable assumptions about US economic growth during the next several years, the market for motor fuels appears poised to grow, albeit more slowly than in the recent past. Investment in new diesel and gasoline processing capacity is needed and consumers will benefit if additions to refining capacity keep pace with demand.

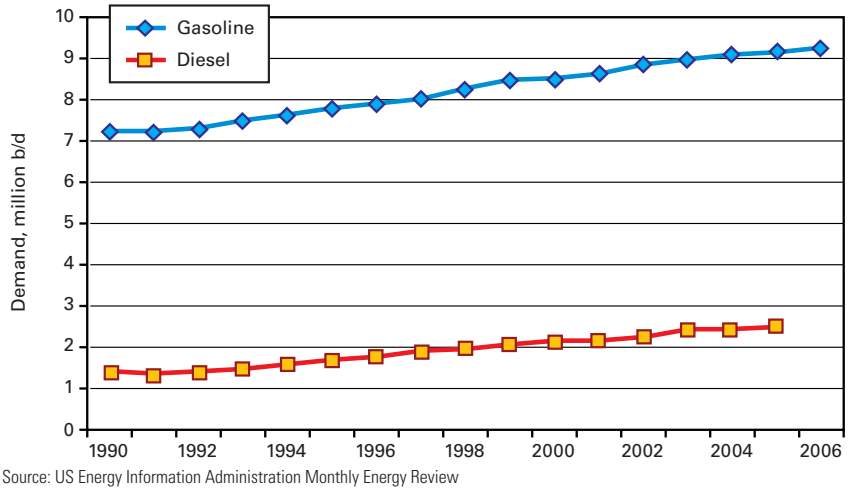
From a refiner perspective, however, policy uncertainties abound. Industry faces immediate prospects of anti-price gouging and punitive tax legislation.

Investors also cannot be certain how CAFE requirements will be implemented nor the extent to which policy will compel use of biofuels beyond the 15 billion gal expected from corn ethanol.

There also are supply risks facing ethanol output—changes in feedstock prices, weather, and distribution costs could curtail output in that market. In addition, cellulosic ethanol may not be available in large quantities in the next 10 years, but mandated biofuels targets could be established on the belief that

US FUEL DEMAND

Fig. 1



Source: US Energy Information Administration Monthly Energy Review

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it will be.

These various uncertainties cloud prospects for investment in US motor fuel production capacity. The outcome could be a situation in which market forces imply a need for expansion of domestic refining capacity while policy discourages it.

This article, the first of two parts, will cover current and future demand for gasoline and diesel, and the economic factors that will influence demand during the next decade. The concluding article in next week's issue will discuss the government policy initiatives that will affect motor fuel demand in the next decade.

Background

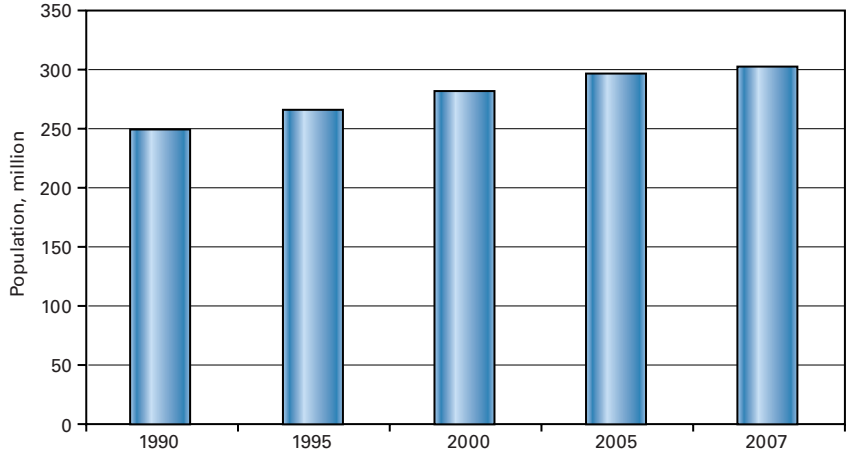
During the past 15 years, motor fuel demand in the US has increased steadily. On average, gasoline demand has increased about 1.5%/year; on-road diesel demand has risen faster—up almost 4%/year.

Although this demand increase has largely been due to rising US prosperity, concerns have been expressed that the country is becoming too dependent on imported crude oil as well as imported refined products, notably gasoline. An additional concern is that the US may be producing too much carbon dioxide.

In his 2006 State of the Union address, for example, Pres. Bush said that the US "is addicted to oil, which is often imported from unstable parts of the world." He has since announced a goal of reducing annual US gasoline demand 20% in 10 years, through a combination of increased use of biofuels and higher light vehicle fuel economy standards.

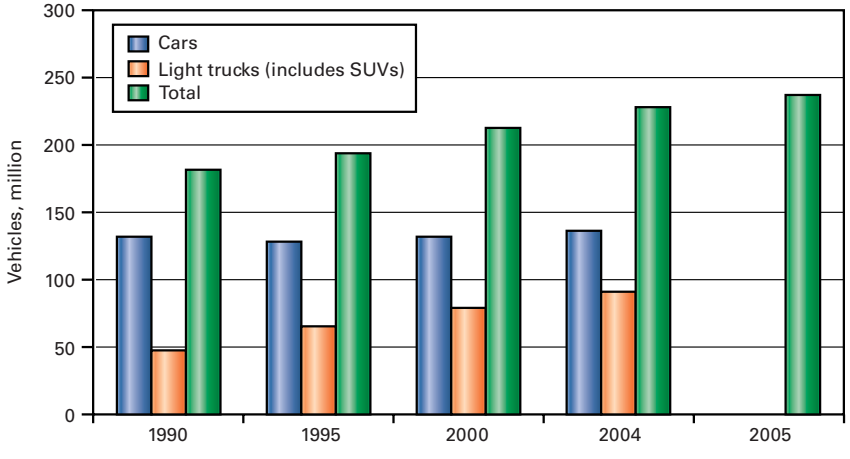
Additionally, although the US has not agreed to greenhouse gas limits under the Kyoto protocol, proposals proliferate in Congress to constrain US carbon emissions beginning in 2010, if not before. For example, Sen. Diane Feinstein (D-Calif.) has introduced a bill that would cap annual US greenhouse gases at 2006 levels beginning in 2010 and ratchet them downwards in subsequent years.

US POPULATION Fig. 2



Source: US Bureau of the Census

US LIGHT VEHICLES Fig. 3



Source: US Department of Transportation, Department of Energy

What effects on motor fuel demand might these various programs have? The US population continues to increase, incomes are rising, and the US light vehicle fleet continues to expand. These forces inexorably push gasoline and diesel demand upwards.

On the other hand, fuel prices have been rising. Technological means are at hand to increase vehicle fuel economy. The biofuels industry is booming. These and other factors could constrain the rise in petroleum motor fuel demand if not reverse it.

Finally, refiner profits in the first half of 2007 were historically high but fell substantially in July 2007. Unscheduled shutdowns and ongoing required maintenance have caused short-run motor fuel prices to rise substantially.

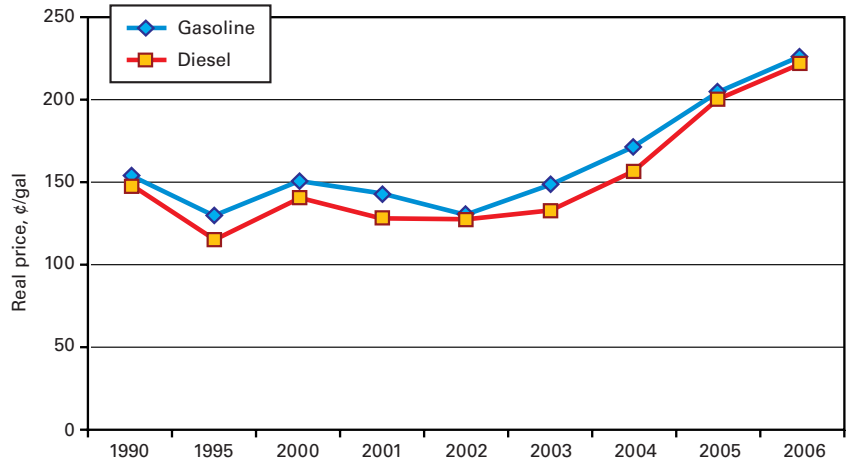
In response, some in Congress and elsewhere have proposed anti "price gouging" legislation as well as special taxes on refiner profits. These policy responses also bear on the willingness of firms to make large and long-term capital investments in new US refining capacity.

Demand

Fig. 1 shows US gasoline demand during 1990-2006 and diesel demand

US PRODUCT PRICES

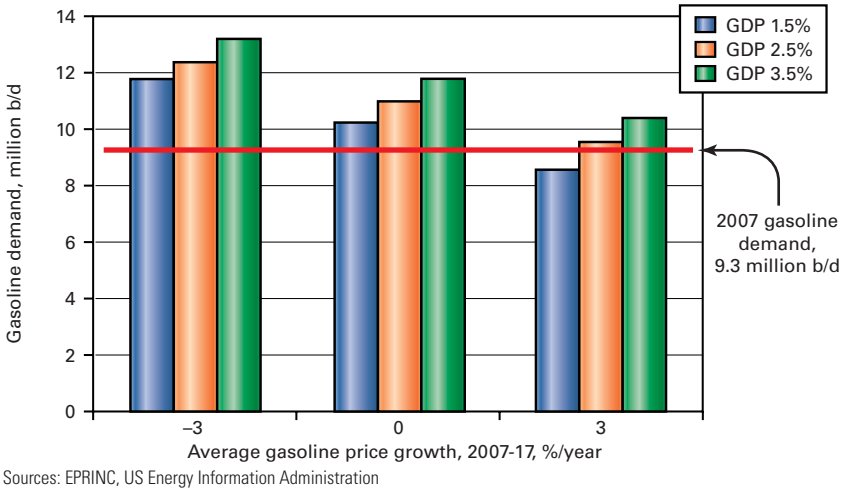
Fig. 4



Sources: US Energy Information Administration Monthly Energy Review, CPI deflator

GASOLINE FORECAST, 2017

Fig. 5



Sources: EPRINC, US Energy Information Administration

through 2005. Gasoline demand grew at 1.5%/year, rising to 9.2 million b/d from 7.2 million b/d. Diesel demand rose virtually without slowing at 3.9%/year, increasing to 2.5 million b/d from 1.4 million b/d.

The principal factors affecting demand for motor fuels are national income—the combination of population and per-capita GDP—and price.

Fig. 2 shows the rising US population during 1990-2007.

Between 1990 and 2005, population increased 19.2%, or 1.2%/year. The Census Bureau projects US population will be 309 million by 2010 and 336 million by 2020. The projected rate of increase, less than 1%/year, is lower than what occurred during 1990-2007; it appears conservative.

Per-capita income also has been rising. In 1990, per-capita US income was $19,500; by 2005 it was $34,600, an increase of more than 77%. The GDP deflator increased 33% during the same period, implying real income rose 44%.

Increasing population and real income lead to more vehicles, as has been the case in the US. Furthermore, the fleet composition has been changing, from mostly passenger cars to a combination of cars, light trucks, and sport utility vehicles (SUVs).

Fig. 3 shows the US light vehicle fleet during 1990-2005.

Between 1990 and 2004 the number of automobiles changed very little, but the numbers of light trucks and SUVs changed a great deal. In 1990, light trucks and SUVs comprised about 1/3 of all light vehicles sold in the US. But since 2000, these categories have comprised 50-55% of all new light vehicles sold. Their numbers have been rising both absolutely and as a proportion of the vehicle fleet.

Fig. 4 shows the real (inflation-adjusted) prices for gasoline and diesel during the same period. During 1990-2002, real prices did not rise; but since then there has been an increase of about 50% in both fuels. Real prices have risen even further in 2007.

These increases will have an effect on demand; in particular they will change the choices consumers make on the types of vehicles they decide to buy.

Gasoline forecast

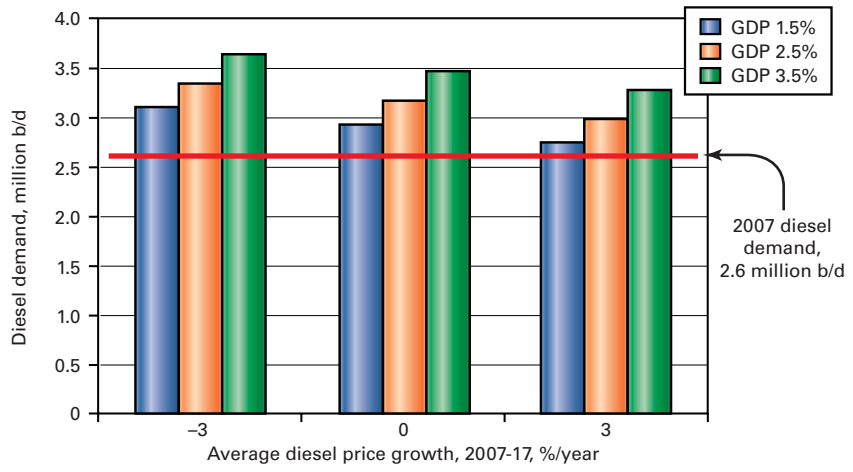
A recent survey of gasoline demand studies performed since 1990 suggests that demand elasticity with respect to price in the US is -0.5 in the intermediate term and -0.75 in the long term. Elasticities of demand with respect to income in the intermediate and long term are 0.65 and 1.0.[1]

If long-term demand is mainly a function of these two variables, the predicted demand increase during 1990 and 2005 would be 28%. Actual demand in that period increased just less than 27%, indicating that these parameter estimates and the assumption that price and income largely explain long-term gasoline demand are close to the mark.

The next 10 years is too short a period for the US light-vehicle fleet to turn over completely. The median age of US passenger cars is 9 years. On average, US cars last almost 17 years. It will take several additional years for a price increase in any given year to substantially alter the vehicle stock.

DIESEL FORECAST, 2017

Fig. 6



Source: EPRINC

With this as a consideration, Fig. 5 reflects use of intermediate term elasticity to project demand growth using different price and GDP growth assumptions.

Growth in gasoline demand ranges from -7% to 42%; the former represents consistently slow economic growth and steadily rising real prices at 3%/year and the latter represents rapid economic growth coupled with steadily declining prices. The true range is probably narrower.

Rapid economic growth coupled with steadily declining prices seems unlikely because the growth would probably push demand up and exert upwards pressure on prices. On the other hand, economic growth is likely to average more than 1.5%/year; i.e., we expect consumers will continue to see sustained real incomes consistent with recent history.

A medium case is moderate (2.5%/year) economic growth with no change in real prices during the next decade. That would imply an 18% overall increase in gasoline demand. This projection, however, is probably high for two reasons. Consumers still are adjusting to the real price increases of the past few years, and real prices have continued to rise so far in 2007.

Accounting for likely consumer adjustments to recent price increases in motor fuels, growth of 10-15% during the next decade given the midcase assumptions is more likely.

We compared these projections with US Energy Information Administration projections of gasoline demand. In its 2007 Annual Energy Outlook, the US Department of Energy projected declining real gasoline prices followed by increases. It also projected 2.9%/year economic growth, which is between our 2.5%/year and 3.5%/year growth cases.

Using our parameter estimates, these assumptions would yield projected growth of about 22% during the next 10 years, although past price increases likely would reduce this to 15-20%. In its Annual Energy Outlook, however, DOE projects growth of only about 1.2%/year or 13% for the decade. This is within the range of our midcase estimate.

Diesel forecast

Estimates of the effect of price and income on diesel demand exist for the entire OECD, not just the US.[2] The estimates suggest a higher long-run income elasticity of demand than for gasoline, about 1.15, and a lower long-run price elasticity, around -0.3.

Using these parameter estimates to predict the growth in diesel demand between 1990 and 2005, we got 71%, not much different from actual growth of 78% during the period.

Fig. 6 shows the results using intermediate-term elasticity.

In all of the cases, diesel demand rises, although the rise might not be as great as shown because diesel consumers are still adjusting to past price increases. For the midcase assumptions, this might reduce growth to about 15-20%. Nevertheless, the clear implication is that so long as US GDP continues to rise, the on-road diesel market is likely to remain strong. ✦

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2. Dahl, Carol, "Oil and Oil Product Demand," Encyclopedia of Hydrocarbons, Instituto Della Enciclopedia Italiana Treccani: Rome, 2005.

The author

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