Outlook for Transportation Fuel Supplies, 2003 and Beyond

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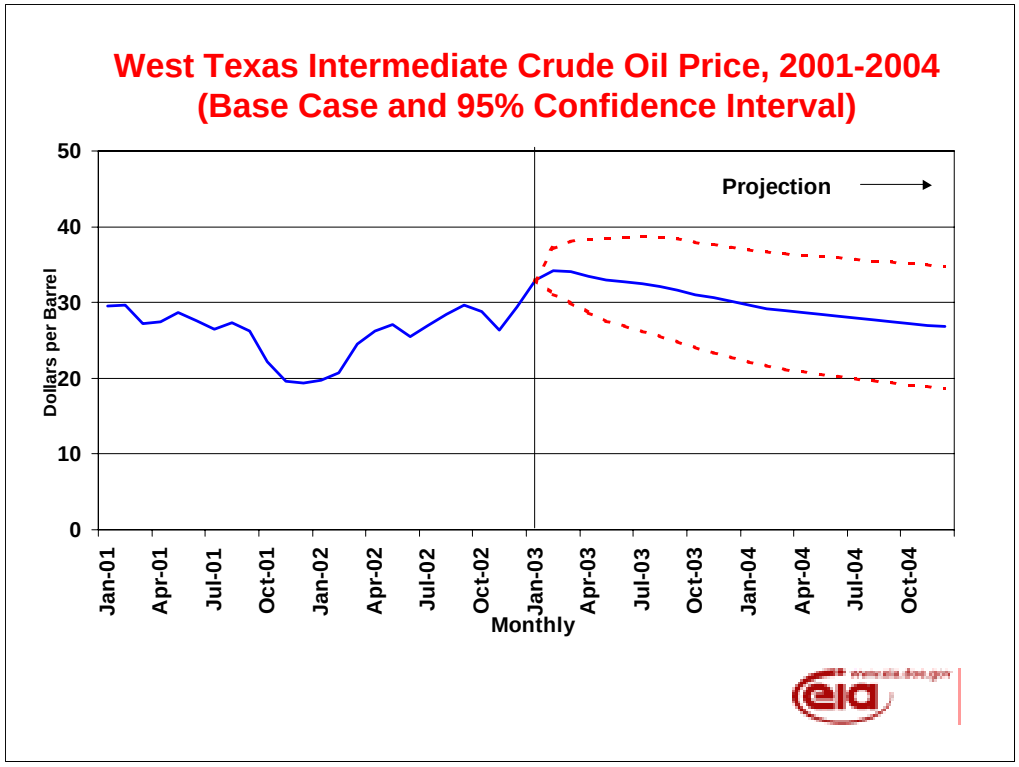
Today I'm going to talk about oil supplies—particularly gasoline supplies—both in the short- and long-term. I'm also going to spend some time looking at gasoline prices and ethanol consumption under a renewable fuels standard.

These projections are from the February *Short-Term Energy Outlook*, the *Annual Energy Outlook 2003* (*AEO2003*), and special studies last year for members of the Senate Energy Committee. The short-term outlook provides monthly projections of domestic energy consumption, supply, and prices through 2004, while the annual outlook provides annual projections through 2025. These projections are a product of the Energy Information Administration, an independent analytical and statistical agency within the U.S. Department of Energy. We do not speak for any particular point of view on energy policy, and our views should not be construed as representing those of the Department or the Administration.

Assumptions are critical to any forecast. The projections are not statements of what *will* happen but of what *might* happen, given certain assumptions. The reference case projections are business-as-usual forecasts, given known technology and technological trends, demographic trends, and current laws and regulations.

EIA does not propose or advocate changes in laws and regulations. So, one of our key assumptions in our reference case is that all current laws and regulations remain as enacted. For the *AEO2003* reference case, that means, for example, that MTBE is eventually banned in only 17 States. Congress has not banned MTBE, so there's no nationwide ban in these projections. Analysis of changes to existing laws and regulations is always done in alternative cases.

I'm going to start with the short-term oil and gasoline outlook.



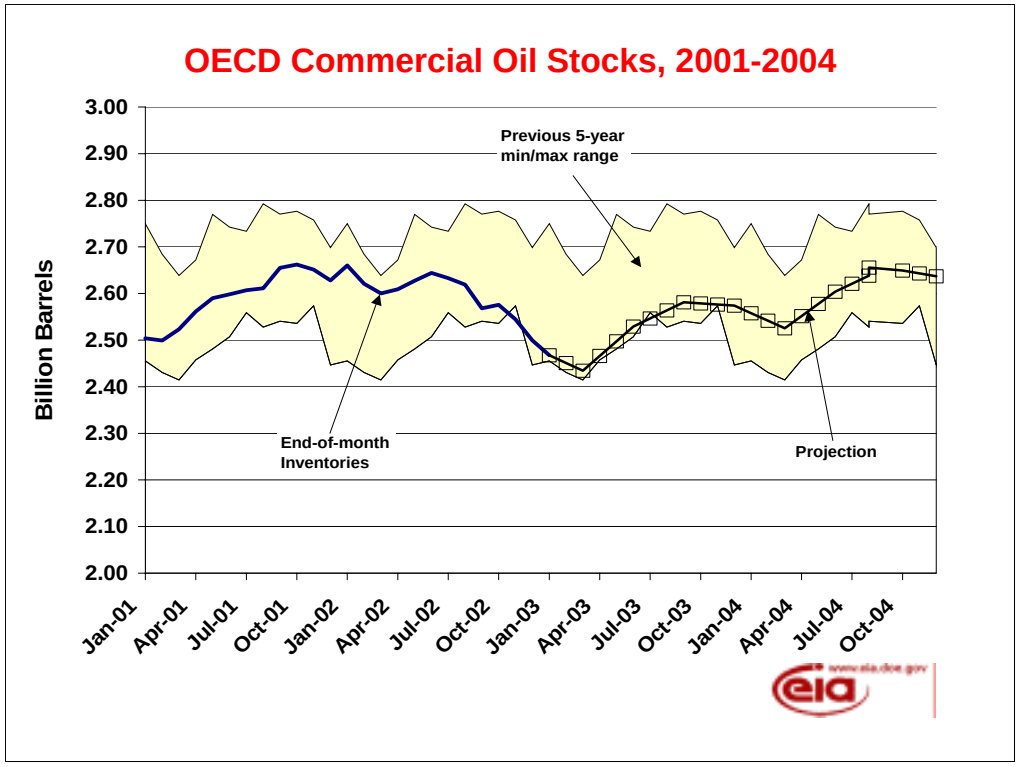
Crude oil is the largest cost component in gasoline--about 40-45 percent of the total. Many of the variations in gasoline prices are the result of changes in crude oil prices, rather than changes in refining costs, taxes, or marketing costs.

According to our February forecast, in 2003 West Texas Intermediate (WTI) crude oil prices--the benchmark U.S. crude-- are expected to average about $32.40 per barrel, declining to around $28.00 per barrel in 2004.

World oil markets will likely remain tight through most of 2003, as petroleum inventories and global spare production capacity continue to dwindle in the face of cold weather and constrained output from Venezuela.

For the year 2003, WTI oil prices are expected to remain over $30 per barrel, even though Venezuelan output appears to be moving toward normal. We now expect Venezuelan crude oil production to be about 1.4 million barrels per day in February, but still below pre-crisis output of 3 million barrels per day. Also, the uncertainty surrounding Iraq will likely make markets abnormally volatile, at least for the near-term.

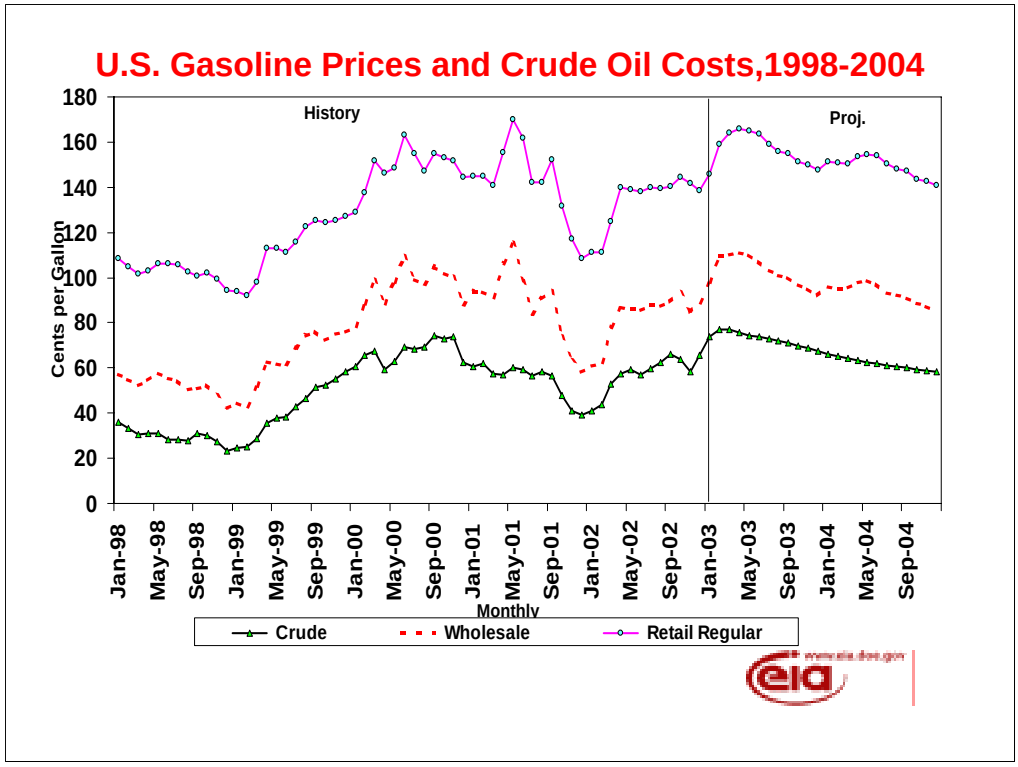
We assume that Venezuela will move toward full capacity utilization in oil production, that Iraq maintains recent export levels and that other producers step up production to keep markets stable. Recovery in Venezuelan output, along with supplementary output from other OPEC countries, should result in a gradual return to declining prices through the forecast horizon.



OECD commercial oil stocks are one indicator of the tightness of the world oil market. The lower the stocks, the more vulnerable world oil prices are to disruptions. So, low stocks are one of the signals to traders to bid up prices.

The OPEC 10 countries are expected to increase their production by 1.5 million barrels per day in February to about 26.7 million barrels per day. OPEC efforts to increase output to make up for lower Venezuela output has reduced global spare production capacity to only 2 million barrels per day, leaving little room to make up for unexpected supply or demand surprises. This assumes that Iraqi production will continue at about 2.3 million barrels per day.

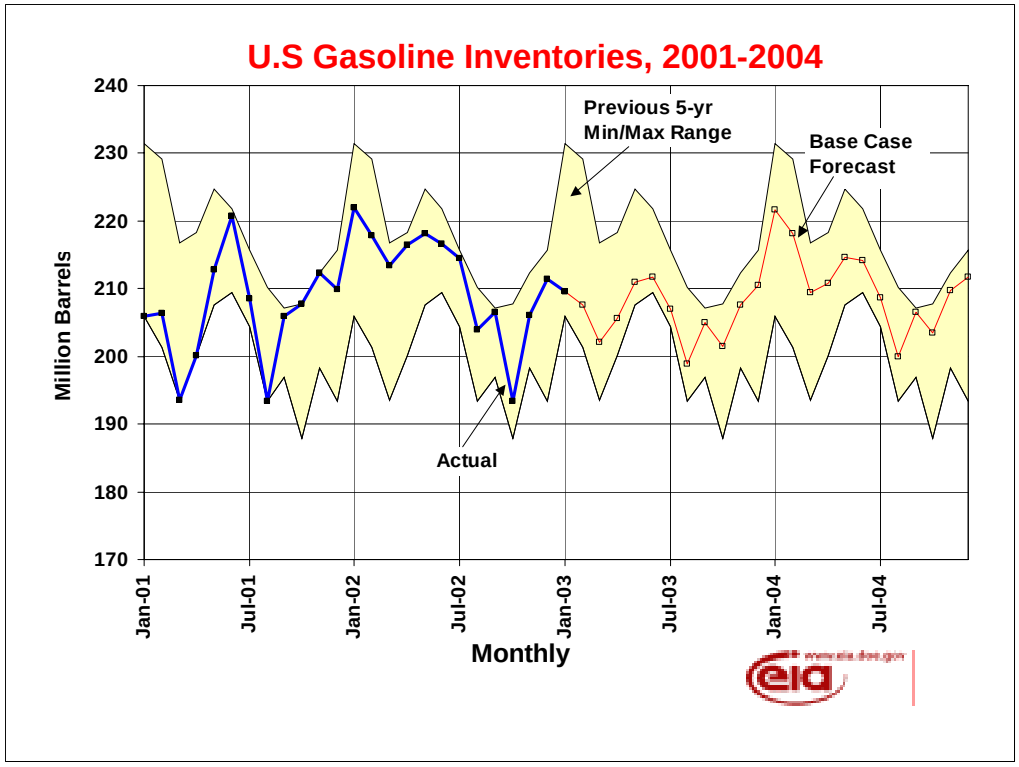
Even if the situations in Venezuela and Iraq are resolved without further oil disruptions, the additional pressure on OECD commercial inventories since early December is likely to keep oil stocks near the lower end of the 5-year min / max range through most of 2003. It could take several months for full Venezuelan production to be restored, and the OECD countries could see new 5-year lows in inventories by spring.



Pump prices have risen recently in response to higher crude oil prices and low inventory. At the wholesale level, spot prices for motor gasoline (N.Y. Harbor) have climbed by about 15 cents per gallon in major U.S. markets since the beginning of the year. The national average regular gasoline price in early February was 41 cents per gallon above the year-ago level.

We expect average monthly prices to post an increase of about 6 cents per gallon between February and late spring. As winter ends, the seasonal increase in gasoline demand is projected to pull retail gasoline prices up, although the rate of increase may be slowed if crude oil prices decline markedly. We can expect to see motor gasoline prices averaging more than $1.60 per gallon--peaking at about $1.66 or more in early spring--through the first half of the year even if the international supply situation improves.

Refiner margins (the difference between the refiner price of gasoline and the refiner acquisition cost of crude oil), which were weak this past summer, are tightening and are expected to continue to rebound over the next 2 years, as demand for gasoline rises and as the cost of producing gasoline increases.



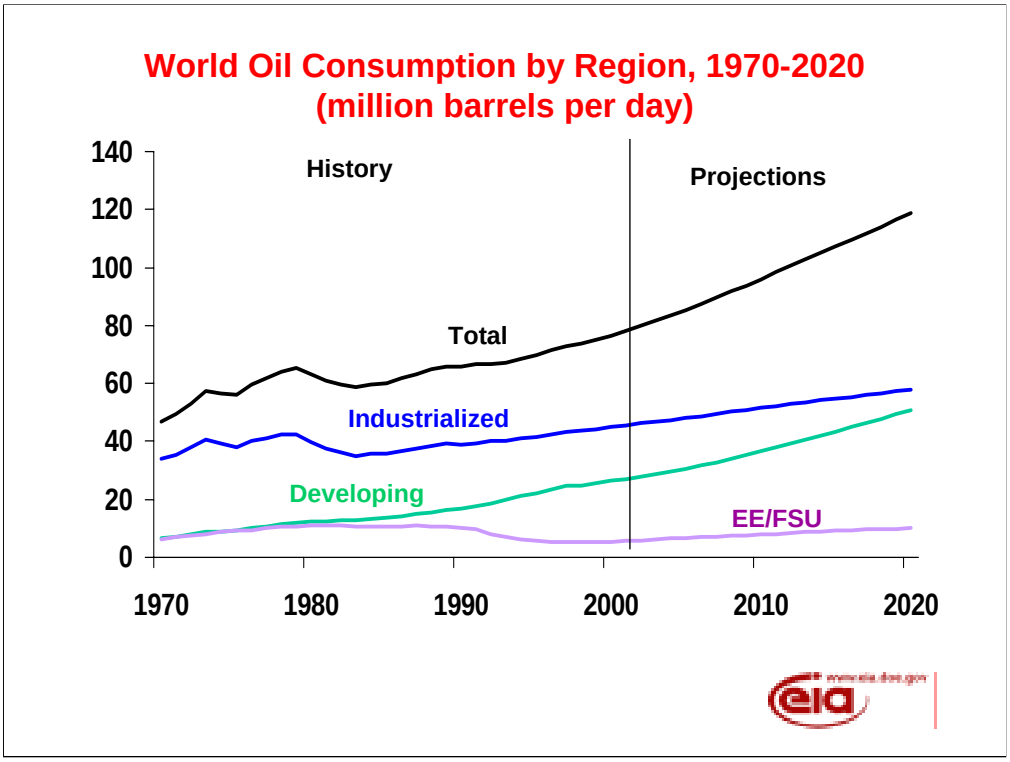
Just as crude oil prices are sensitive to OECD commercial stock levels, gasoline prices are sensitive to inventory levels.

At the end of January, gasoline inventories stood at 210 million barrels, which is toward the lower end of the 5-year min / max range. Gasoline inventories at the end of January were also 8.6 million barrels below the year-ago level.

Demand for motor gasoline is projected to increase at an annual rate of 2.6 percent in 2003, slightly less than last year, as both the economy and real disposable income--boosted by additional tax cuts--continue to expand.

Throughout 2003, gasoline inventories are expected to stay within the min / max range of the last 5 years even if solid demand growth occurs, so long as continued strong growth in imports is feasible. This may not be the case if the expected improvement in Venezuelan exports fails to materialize.

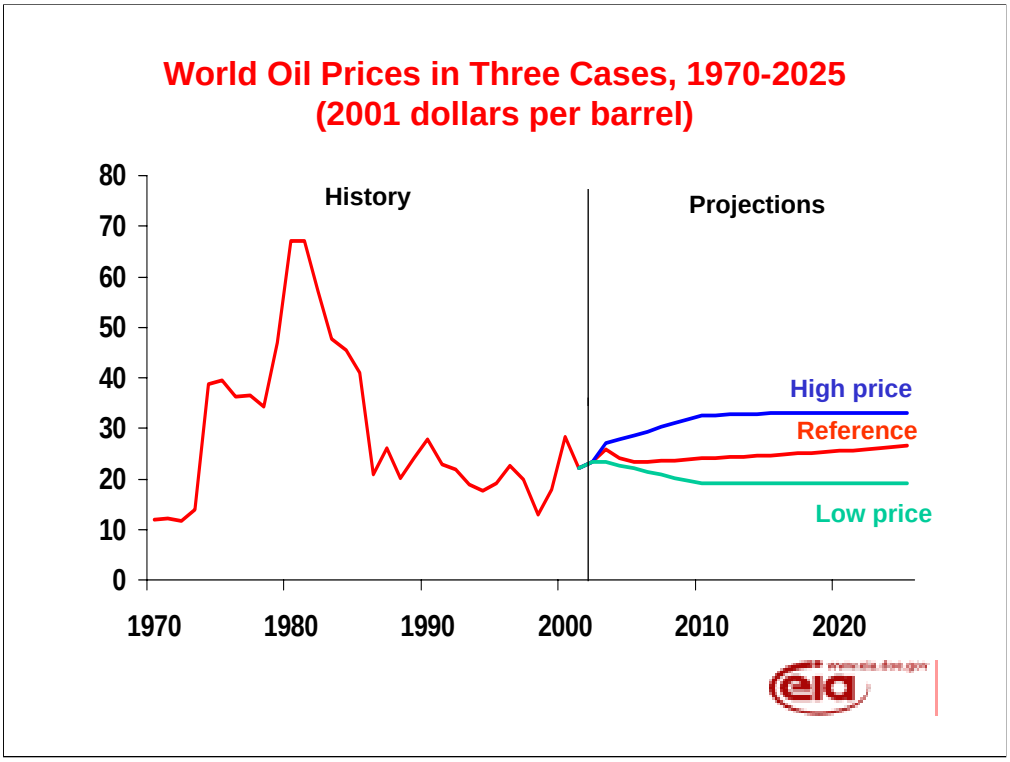
Now let's turn back to the world oil market, in the mid-term forecast through 2025.



The *International Energy Outlook 2002* projects the steady growth of world oil consumption, from a projected 81.8 million barrels per day in 2003 to 118.6 million barrels per day in 2020. Developing countries' consumption grows quickest., driven by growth in Latin America and Asia. Consumption by developing nations is expected to be 21.9 million barrels, or 76 percent, above 2003 levels by 2020.

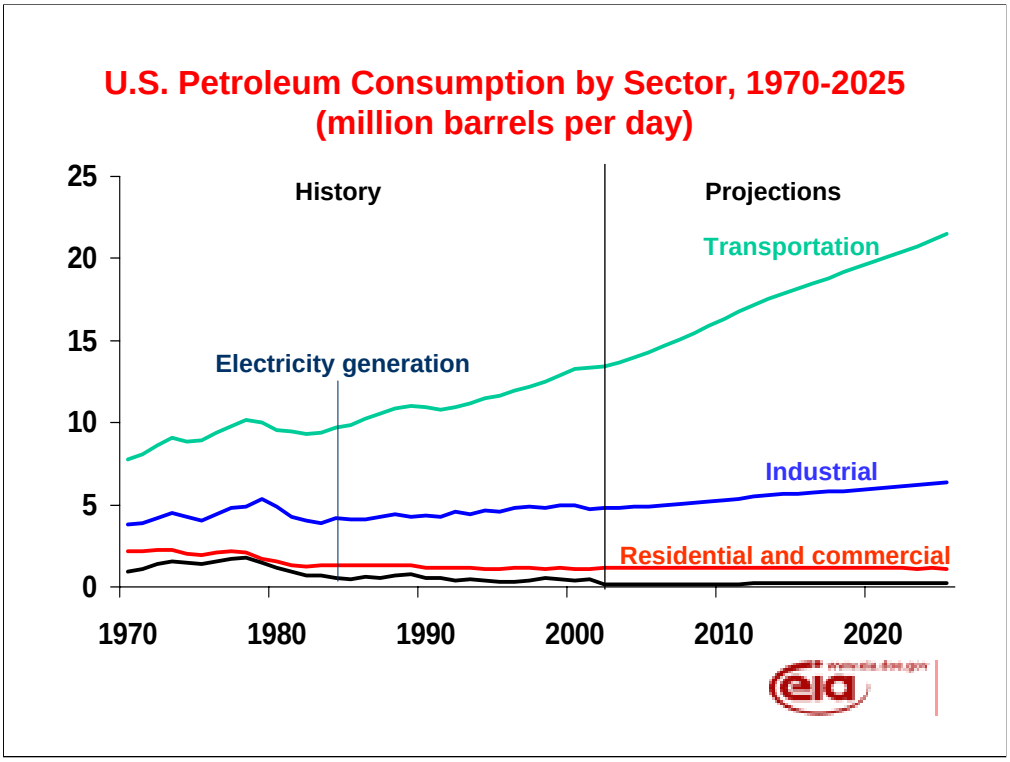
Consumption in industrialized nations is projected to rise by 11 million barrels per day between 2003 and 2020. Western Europe leads in oil consumption growth over the forecast.

Consumption in Eastern Europe and the Former Soviet Union is projected to grow from 6.2 million barrels per day in 2003 to 10.1 million barrels per day in 2020.

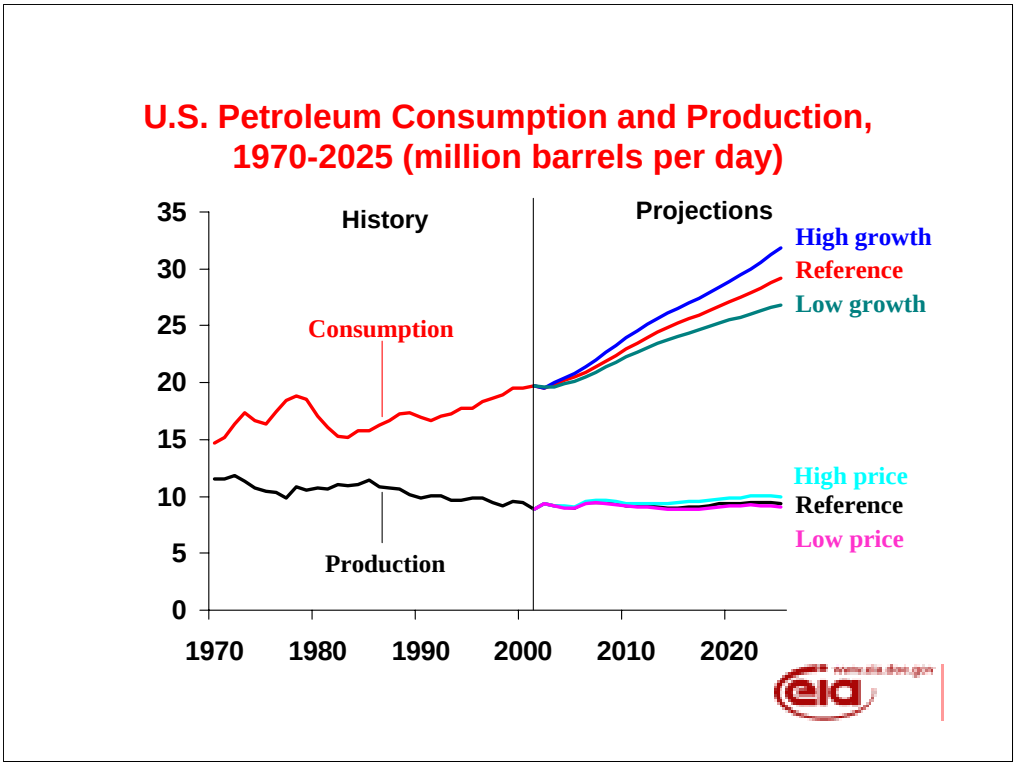


History shows substantial variability in world oil prices, and there is similar uncertainty about future prices. There are three *Annual Energy Outlook 2003* cases based on alternative assumptions about oil production levels in OPEC nations: higher production in the low price case and lower production in the high price case. With its vast store of readily accessible oil reserves, OPEC - primarily the Persian Gulf nations - is expected to be the principal source of marginal supply to meet increases in demand. Yet, the expansion of productive capacity will require major capital investments, which could depend on the availability and acceptability of foreign investments.

Despite the strong growth in demand, oil prices are assumed to remain well below historical highs. Under the *Annual Energy Outlook* reference case, crude oil prices are assumed to rise to $26.57 (in 2001 dollars) per barrel by 2025. The “high” price scenario assumes a price of $33.05 per barrel by 2025. Note that oil prices were above this level from 1974 through 1985, peaking at $67.10 per barrel in 1980.

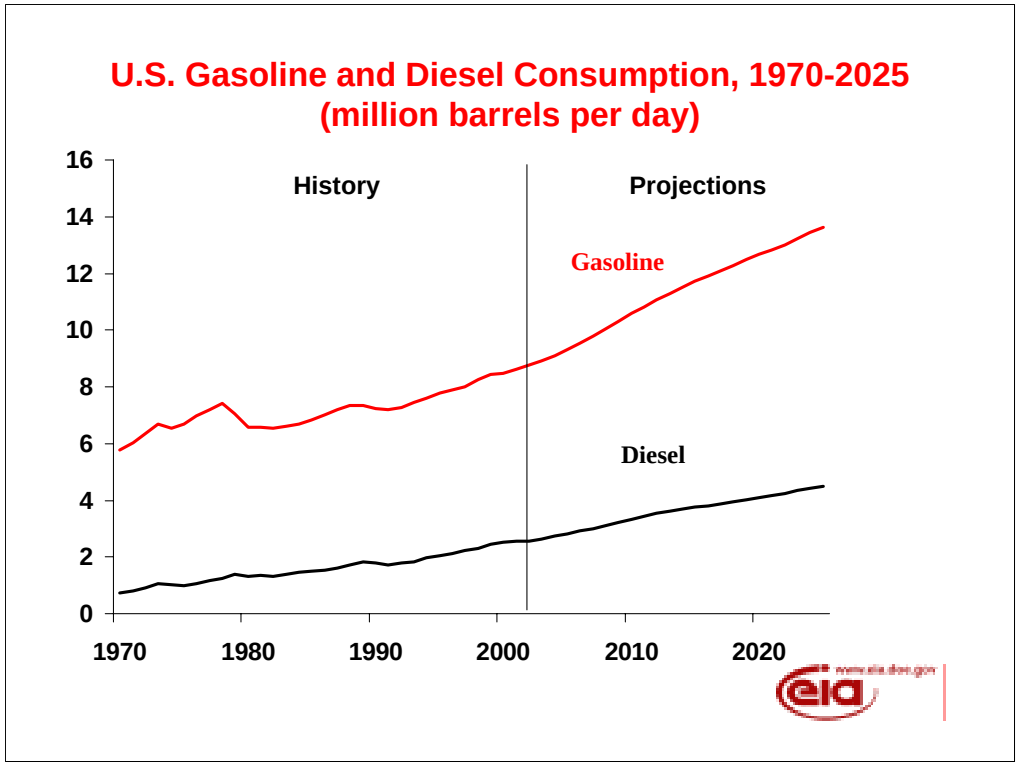


Most of the projected U.S. growth in petroleum use is in the transportation sector. Consumption is projected to grow from 13.69 million barrels per day in 2003 to 21.48 million barrels per day in 2025. Industrial use, primarily for heat and stationary power, is projected to grow more slowly, from 4.8 million barrels per day to 6.3 million barrels per day. Residential and electric utility use remain approximately constant. Petroleum products are uniquely suited for transportation. They have high energy per unit weight and per unit volume and are liquid at normal temperatures and pressures. Ethanol shares these characteristics and can be distributed to end users from the same service stations that sell refined petroleum.



Projected U.S. petroleum production does not match the projected growth in consumption. The United States is projected to consume 10.6 million barrels per day more than it produces in 2003 in the reference case. In 2025, also in the reference case, the United States is projected to consume 19.8 million barrels per day more than it produces. Domestic production includes U.S. production of crude oil, natural gas liquids, methanol for MTBE production, ethanol, and volume gained in processing. U.S. petroleum consumption depends on the level of economic activity. More output stimulates more oil consumption, but doesn't stimulate more domestic oil production. The gap therefore grows larger if the rate of economic growth is higher than the reference case. Higher oil prices don't stimulate domestic oil production very much either.

Our net petroleum import dependence was 55 percent of consumption in 2001. This is projected to increase to 68 percent in 2025 in the reference case, 65 percent in the low growth case, and 70 percent in high growth case.



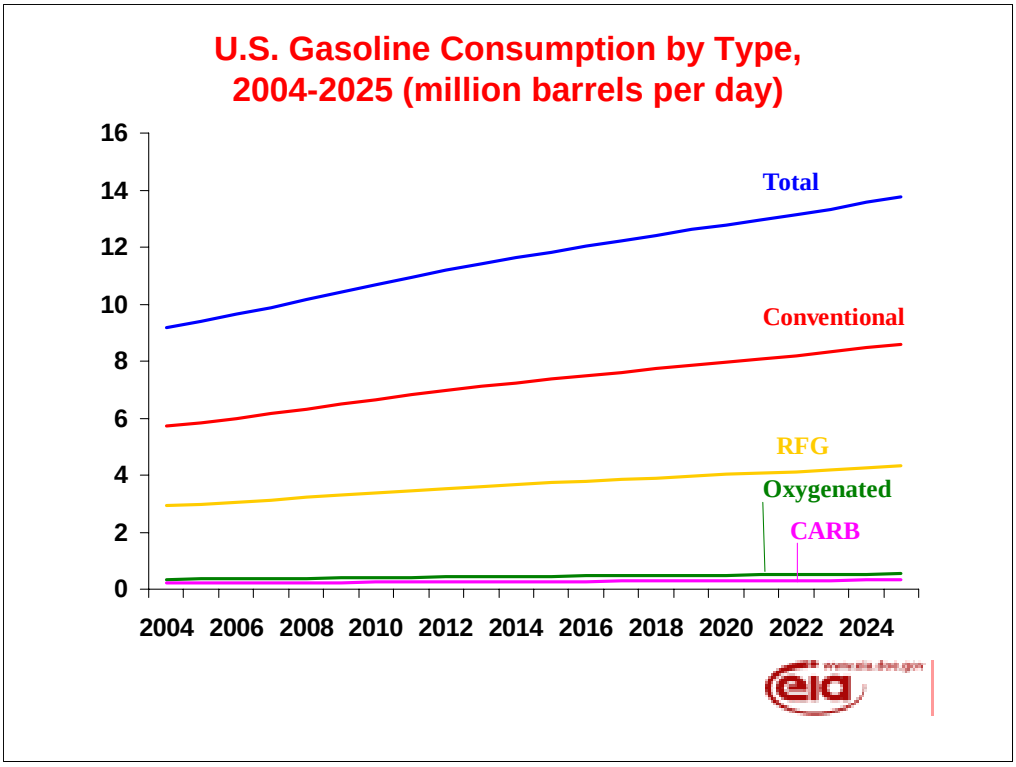
Gasoline will continue to be the fuel of choice for the U.S. transportation sector. Over the forecast, the gap between gasoline and diesel consumption in the U.S. continues to widen, because of limited penetration of diesel in light vehicles. Fortunately for ethanol producers, their product is much easier to blend into gasoline than it is to blend into diesel fuel.

U.S. Gasoline Requirements, 2002

This map shows the various requirements for gasoline in the United States. Ethanol is technically compatible with most of these formulations. Ethanol is already used in Federal RFG (Reformulated Gasoline) in Chicago and Milwaukee. The RFG program was created by the Clean Air Act Amendments of 1990 for metropolitan areas with high levels of carbon monoxide and ground-level ozone. Gasoline used in these areas must meet stringent year-round standards for emissions of unburned hydrocarbons, carbon monoxide, and oxides of nitrogen. California/Federal RFG and some east coast RFG will be blended with ethanol as State restrictions on MTBE use take effect. California Air Resources Board rules effectively limit ethanol in their RFG to 5.7 percent by volume.

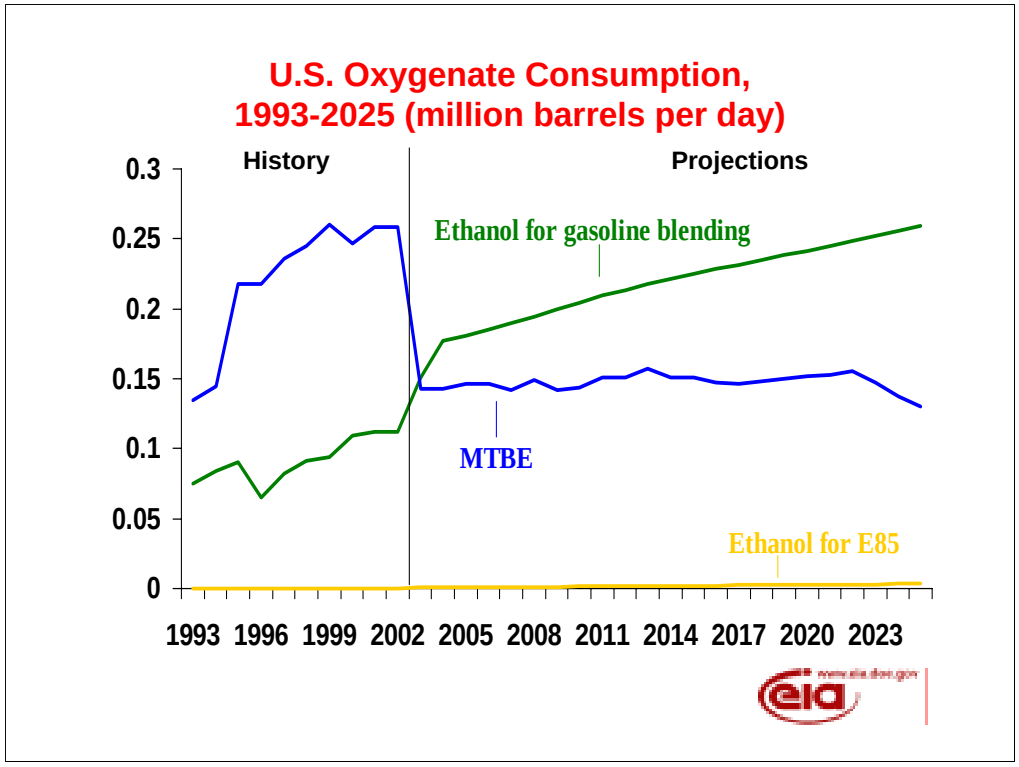
Oxygenated fuels were also created by the Clean Air Act Amendments for places with carbon monoxide problems during the winter. These are used only during the winter in conventional gasoline locations to reduce carbon monoxide emissions. They are themselves convention blended with 7.7 volume percent ethanol; up to 10 volume percent is possible without modifications to existing vehicles. Minnesota, shown on the map as an oxygenated fuel location, requires 10 percent ethanol year-round. White denotes conventional gasoline, which can also be blended with 10 percent ethanol.

California has eliminated its oxygenate requirement for gasoline used in areas not subject to Federal RFG standards. This gasoline is called CBG ("Cleaner Burning Gasoline")



U.S. gasoline consumption is projected to be 9.2 million barrels per day in 2004. California RFG accounts for 800,000 barrels per day, and California CBG (CARB) accounts for another 200,000 barrels per day. The total is projected to increase to 13.8 million barrels per day by 2025. California RFG and CBG consumption are projected to be 1,280,000 barrels per day and 320,000 barrels per day, respectively, by 2025.

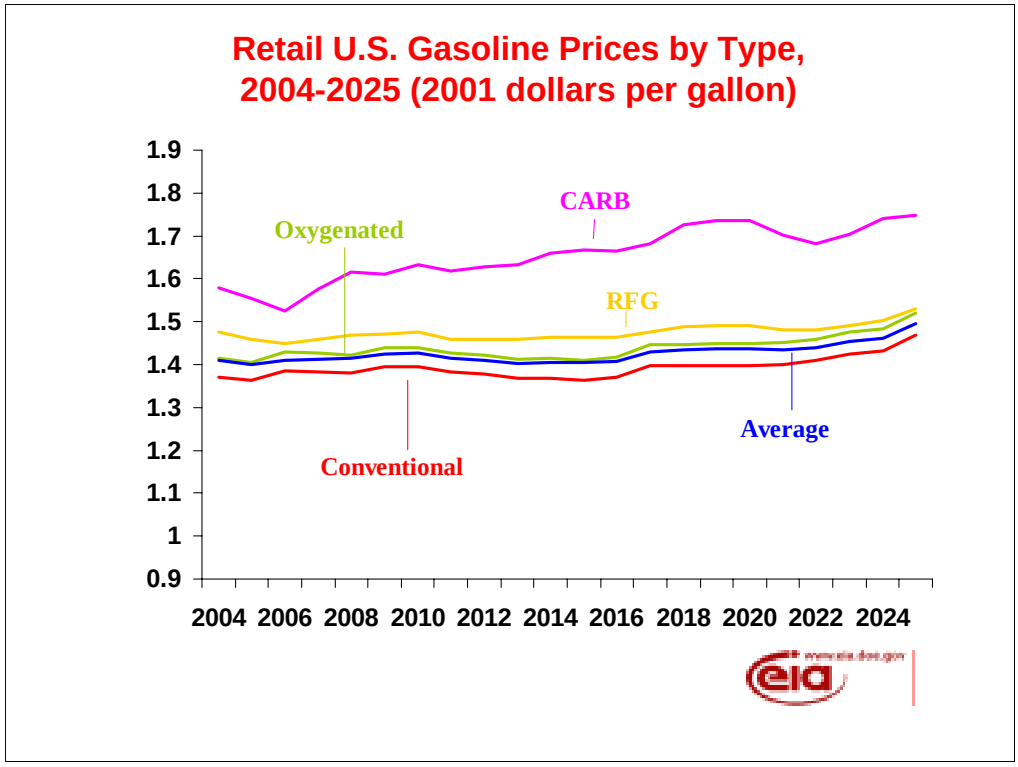
As previously noted, the California Air Resources Board (CARB) limits its RFG to 5.7 percent ethanol by volume. This level just meets the Federal oxygenate requirement for RFG. Chicago and Milwaukee use 10 percent ethanol in RFG, demonstrating that this level in excess of the requirement is technically feasible for RFG outside California. Although CARB no longer requires oxygenate in CBG, we assume that it will contain 5.7 percent ethanol. Despite the volatility concerns, ethanol helps dilute the sulfur and toxic aromatic compounds in gasoline. Oxygenated and conventional gasoline can contain 10 percent ethanol.



U.S. ethanol production, with corn as the primary feedstock, reached 2.1 billion gallons in 2002. Production is projected to increase to 4 billion gallons by 2025, with more than 30 percent of the growth coming from the conversion of cellulosic biomass to ethanol. Ethanol consumption, shown in this graph, closely matches production.

Ethanol is expected to replace MTBE as the oxygenate for reformulated gasoline (RFG) in the 17 States that have passed legislation limiting the use of MTBE because of concerns about groundwater contamination. The Federal requirement for 2-percent oxygen content in RFG is assumed to continue in all States. Most ethanol will continue to blended into gasoline at volume fractions of 10 percent or less.

Ethanol consumption in E85 vehicles is also projected to increase, from the national total of 3.3 million gallons in 2000 to about 52 million gallons in 2025. Lack of refueling infrastructure and increasing demand for ethanol in gasoline limit the penetration of E85. E85 use may also be limited by concerns about evaporative emissions from gasoline commingled with E85 in bifueled vehicles. Mixing E85 and gasoline in a vehicle fuel tank is likely to result in a blend that exceeds applicable evaporative hydrocarbon emission standards. This is especially a concern in RFG areas, which already have serious air pollution problems

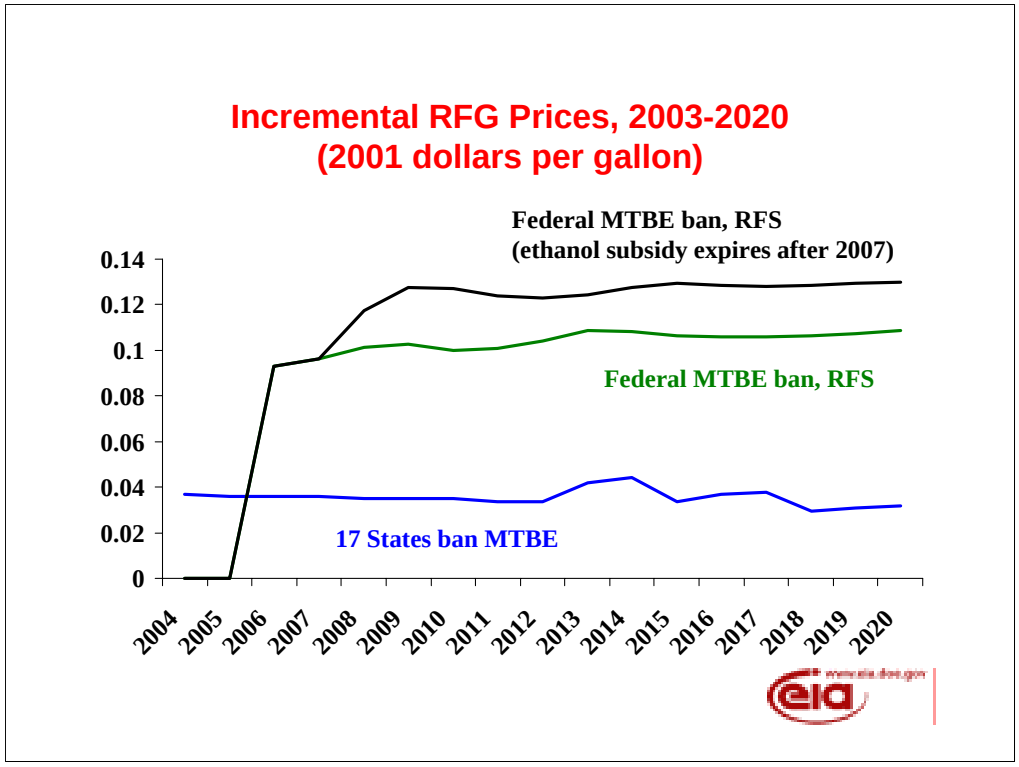


Unlike the short-term prices, which I discussed at the beginning of my talk, over the long run, the *Annual Energy Outlook 2003* projects average gasoline prices to be fairly steady in terms of constant 2001 dollars. Prices rise only from $1.37 a gallon in 2004, where this figure starts, to $1.47 in 2025. The increase results from rising crude oil costs, new gasoline sulfur restrictions in 2004, and growing refinery capacity toward the end of the forecast. If inflation were included in this chart, the average price in 2025 would be $2.66 a gallon, instead of $1.47.

Reformulated gasoline prices range from $1.45 to $1.53 per gallon in 2001 dollars over the forecast. CARB cleaner burning gasoline shows the widest range, from $1.53 to $1.75, as prices rise with rising crude oil costs, tightening CARB standards, and growing refinery capacity in California toward the end of the forecast.

This forecast assumes that the 51-cent excise tax exemption for ethanol continues after it expires in 2007, an exception to our current laws and regulation assumption.

The last six slides show some analyses we did for Senators Murkowski, Daschle, and Bingaman during the debate over an energy bill last year. Instead of a business-as-usual world, where we reach 4 billion gallons of ethanol in 2025, these cases show the effects of a renewable fuels standard, where we reach 5.7 billion gallons by 2020.

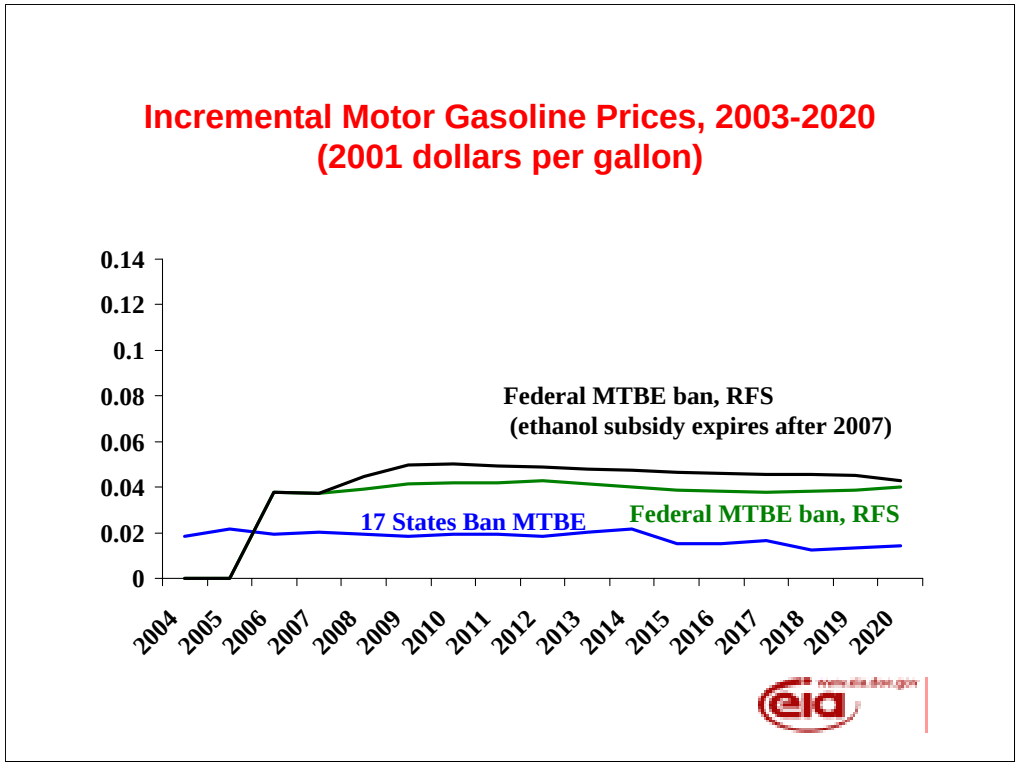


This slide and the next one are from analyses requested by Senator Murkowski and Senator Bingaman.

The 17 pending State MTBE bans are projected to increase reformulated gasoline prices prices by less than 4 cents per gallon (2001 cents) through 2020, relative to a case where MTBE is not banned by State or Federal Governments.

A Renewable Fuels Standard (RFS) of 5 billion gallons by 2012 in conjunction with a Federal MTBE ban and continued oxygenate requirement for RFG adds between 6 and 8 cents to the price of a gallon of RFG. This increment reflects the loss of volume in switching from MTBE to ethanol, requiring more expensive blending components such as alkylate.

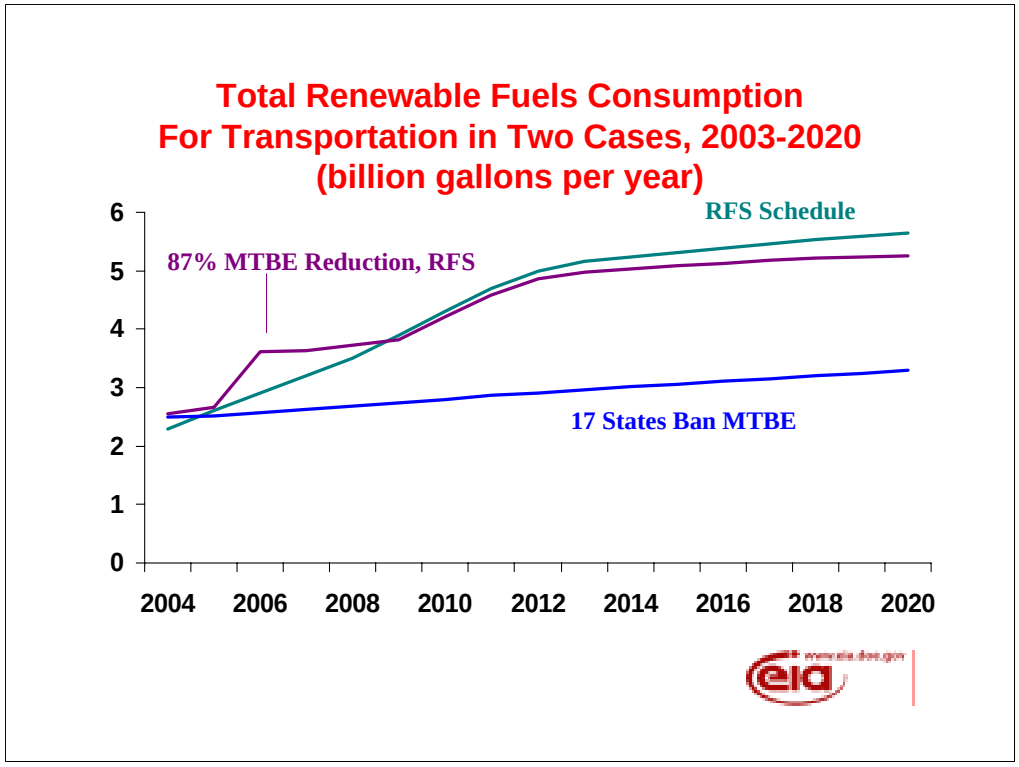
The expiration of the excise tax credit for blending ethanol would increase RFG prices by 2 to 3 cents per gallon, assuming that RFG is blended with 5.7 volume percent ethanol.



The pending State MTBE bans are projected to increase overall motor gasoline prices by at most 2 cents per gallon, relative to a case where MTBE is not banned by States or the Federal government.

The RFS and a Federal MTBE ban add between 2 and 3 cents per gallon to the average price of motor gasoline.

The expiration of the excise tax credit for blending ethanol would increase motor gasoline prices by less than 1 cent per gallon.

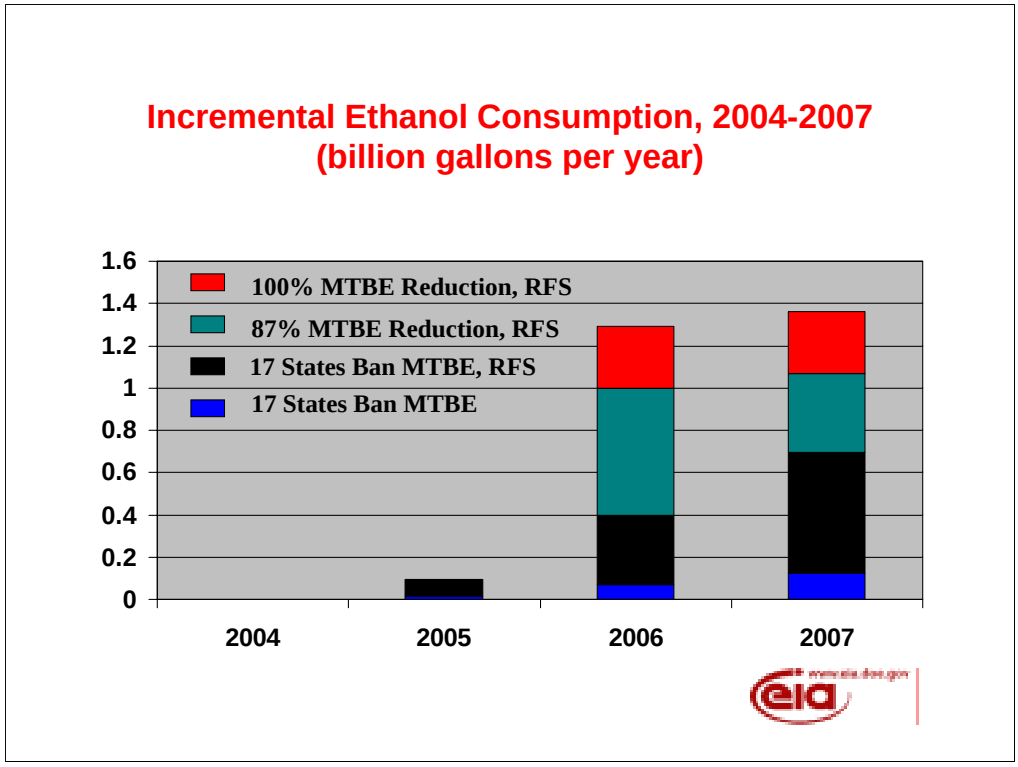


The 87% MTBE Reduction case looked at what would happen if States were allowed to opt out of the MTBE ban. For the purposes of the study, 13 percent of current MTBE consumption continues through 2020.

The Renewable Fuels Standard requires substantially more ethanol blending than is projected under the pending State MTBE bans. Under the 17-State ban ethanol consumption reaches only 3.3 billion gallons in 2020.

An 87-percent MTBE reduction is expected to result in more ethanol use than required by the RFS in the near term, because refiners would have few other options to replace MTBE. Ethanol blending is greater than the RFS through 2008.

Projected ethanol volumes are less than the RFS schedule, because cellulose ethanol gets a 1.5-gallon renewable fuels credit for each gallon of ethanol produced.



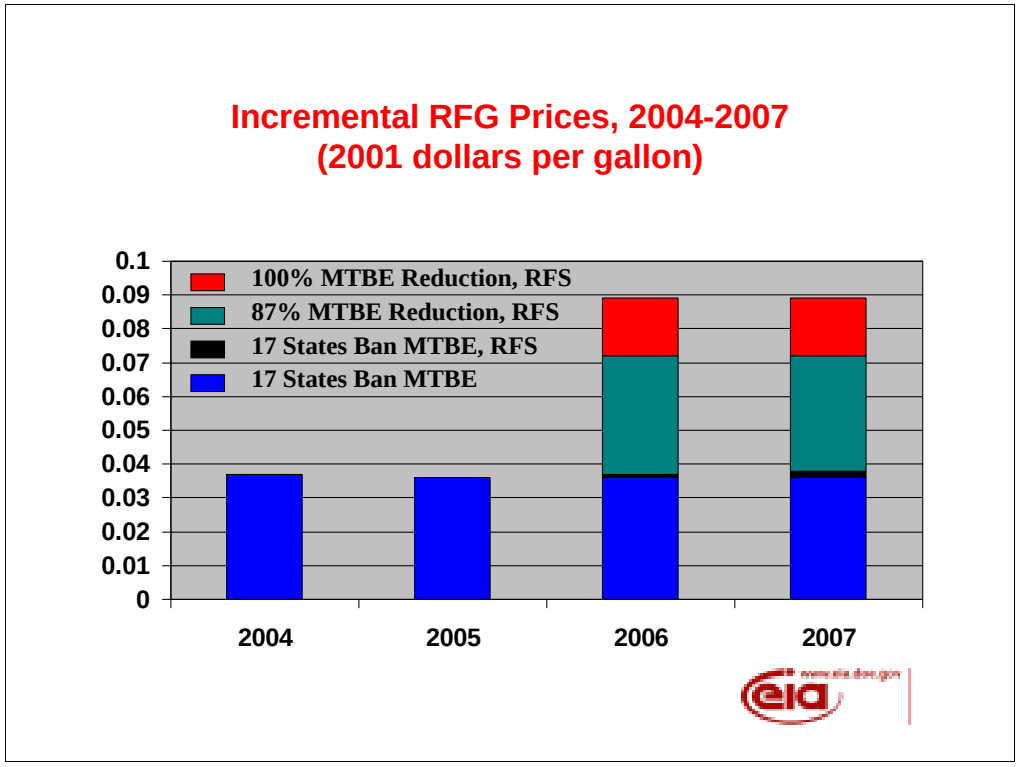
In addition to the four cases I've just discussed, we also did a 17-State MTBE ban case with a 5-billion gallon renewable fuel standard. By looking at the differential between this case and the 17-State ban case, we can get an idea of the impact of a renewable fuel standard by itself.

If enacted, the Renewable Fuels Standard would require more ethanol in gasoline than the MTBE bans pending in 17 States. The RFS schedule in H.R. 4 last year requires 2.3 billion gallons of renewable transportation fuel in 2004 and 2.6 billion gallons in 2005. These volumes can be produced from existing ethanol plants and plants currently under construction. Industry capacity for 2004 is expected to be 2.86 billion gallons per year if all the plants under construction are completed on schedule.

The requirement for 2006 is 2.9 billion gallons. Assuming a plant size of 40 million gallons annually, 1 new plant is needed to meet the requirement in 2006. Another 8 plants must be added to produce the 3.2 billion gallons required for 2007.

In the RFS case 173,000 barrels per day of ethanol are projected to be blended into gasoline and of that, 120,000 barrels per day are blended into RFG in 2006. About 96 percent of ethanol is projected to be produced in the Midwest in that year.

An RFS is technically feasible, since construction of an ethanol plant is only about a 2-year process. However, construction and engineering firms are facing significant demands for labor related to the 2004 reduction of sulfur levels in gasoline and the 2006 reduction of sulfur levels in diesel fuel. As a result, ethanol producers may find new plant construction somewhat more costly than usual in 2006.

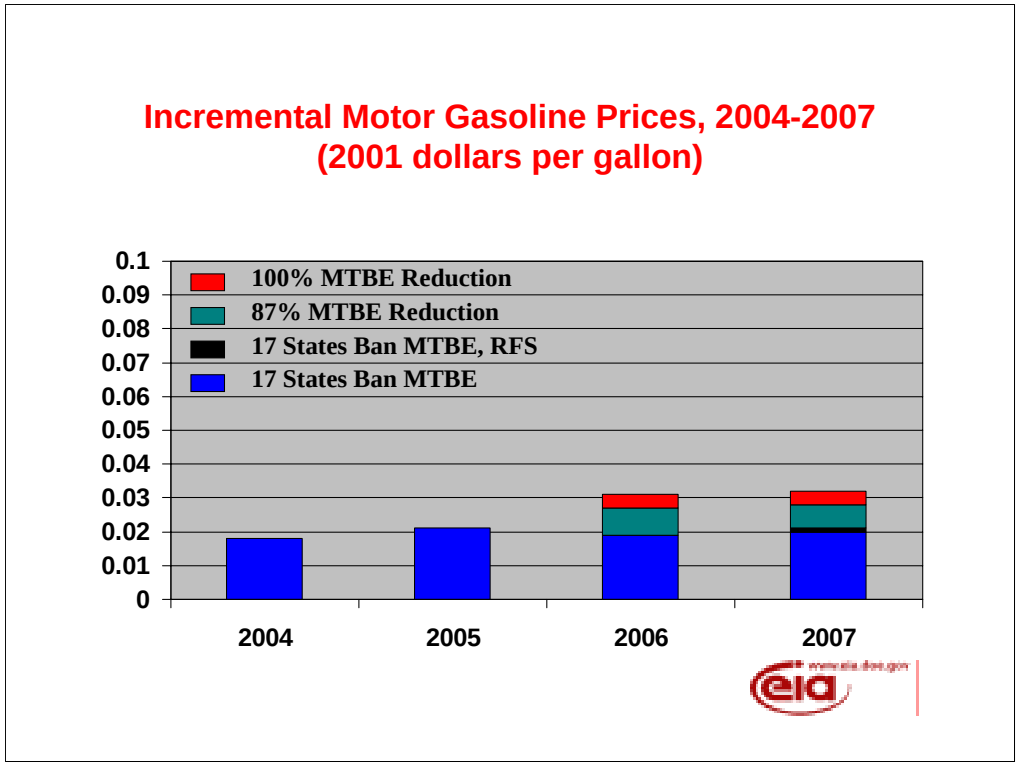


The reduction in MTBE blending primarily affects RFG. The 17-State MTBE bans are projected to increase average RFG prices by about 3.5 cents per gallon. The higher prices reflect the loss of volume, and thus the loss of oxygen and octane.

However, the RFS has little additional effect on prices. The additional ethanol needed to meet the requirements of the RFS can be put into conventional gasoline, rather than being forced into reformulated gasoline, holding down the price impact.

Further reduction in MTBE blending, to 13 percent of current levels, adds about another 3.5 cents per gallon. A full ban adds another 2 cents per gallon.

RFG prices during the transition to phasing out MTBE, such as in California, New York, and Connecticut, could be volatile and higher than average due to short-term supply shortages of RFG.



The 17-State MTBE bans are projected to add about 2 cents per gallon to average national gasoline prices, over a case with no MTBE bans.

Despite requiring substantially more ethanol, the RFS has little additional effect on gasoline prices. A full ban adds about another penny.

In summary, world crude oil and U.S. gasoline markets are very tight, making them vulnerable to disruption. In the mid-term, gasoline consumption is expected to grow, with ethanol making up 2 percent of gasoline volume in a business-as-usual case. A renewable fuels standard would add significantly to ethanol consumption without much effect on price. However, an MTBE ban would have a significant impact on prices.