

Summary of Testimony by George R. Schink before the Subcommittee on Energy and Power

March 28, 2012

1. Current high gasoline prices are not related to “Tier 3”
 - Sharply rising refined petroleum product prices are due primarily to sharply rising global crude prices. Solution to the problem involves promoting increased global crude oil supplies and reduced consumption of refined petroleum products.
2. Cost estimates of Tier 3 by API sponsored study are exaggerated
 - According to the revised API study, reducing sulfur to 10 parts per million (ppm) would increase the marginal cost of producing gasoline 6 to 9 cents per gallon. Using API’s data, it can be calculated that the estimated average cost of reducing the sulfur content of gasoline to 10 ppm would be 2.1 cents per gallon.
 - If the latest Baker & O’Brien marginal cost estimates are correct and refiners are able to pass these marginal costs on to the consumer in higher gasoline prices (as implied by the study), the refiners would make a profit from Tier 3 by selling gasoline for 6 to 9 cents per gallon while incurring only a 2.1 cent per gallon average increase in cost.
 - A study by MathPro Inc. sponsored by the International Council for Clean Transportation stated the average cost of reducing sulfur to 10 ppm would be 0.8 to 1.4 cents per gallon.
 - The API study’s average cost of reducing sulfur content to 10 ppm is overstated because capital cost estimates are too high. The API study’s capital costs amount to \$1,666 million or 1.5 cents per gallon versus the MathPro study which amounts to \$1,000 million or 0.9 cents per gallon.
 - The API study does not take into account the option of averaging and trading among refineries. Failing to do so tends to overstate the average cost of attainment somewhat and to grossly overstate the marginal cost of attainment.
3. Potential impact of Tier 3 on future retail gasoline prices is uncertain
 - It is impossible to say with any certainty whether the retail price of gasoline will be affected at all by Tier 3. The retail price of gasoline is determined by many factors with the global price of crude oil being the most significant factor. If there is any impact, it is likely to be small.
4. Benefits of Tier 3
 - Reducing sulfur to 10 ppm would reduce nitrogen oxides (NOx) emissions by 25%. Consequently, the threat to human health and the environment arising from NOx emissions would likely decrease significantly.
 - It is a virtual certainty that the increased cost of refining arising from Tier 3 would be more than offset by the economic benefit of improved human health and the economic value added and jobs created in the emission control and auto industries by the implementation of Tier 3

TESTIMONY
OF
GEORGE R. SCHINK, PH.D.
BEFORE THE
SUBCOMMITTEE ON ENERGY AND POWER
COMMITTEE ON ENERGY AND COMMERCE
UNITED STATES HOUSE OF REPRESENTATIVES

March 28, 2012

Introduction

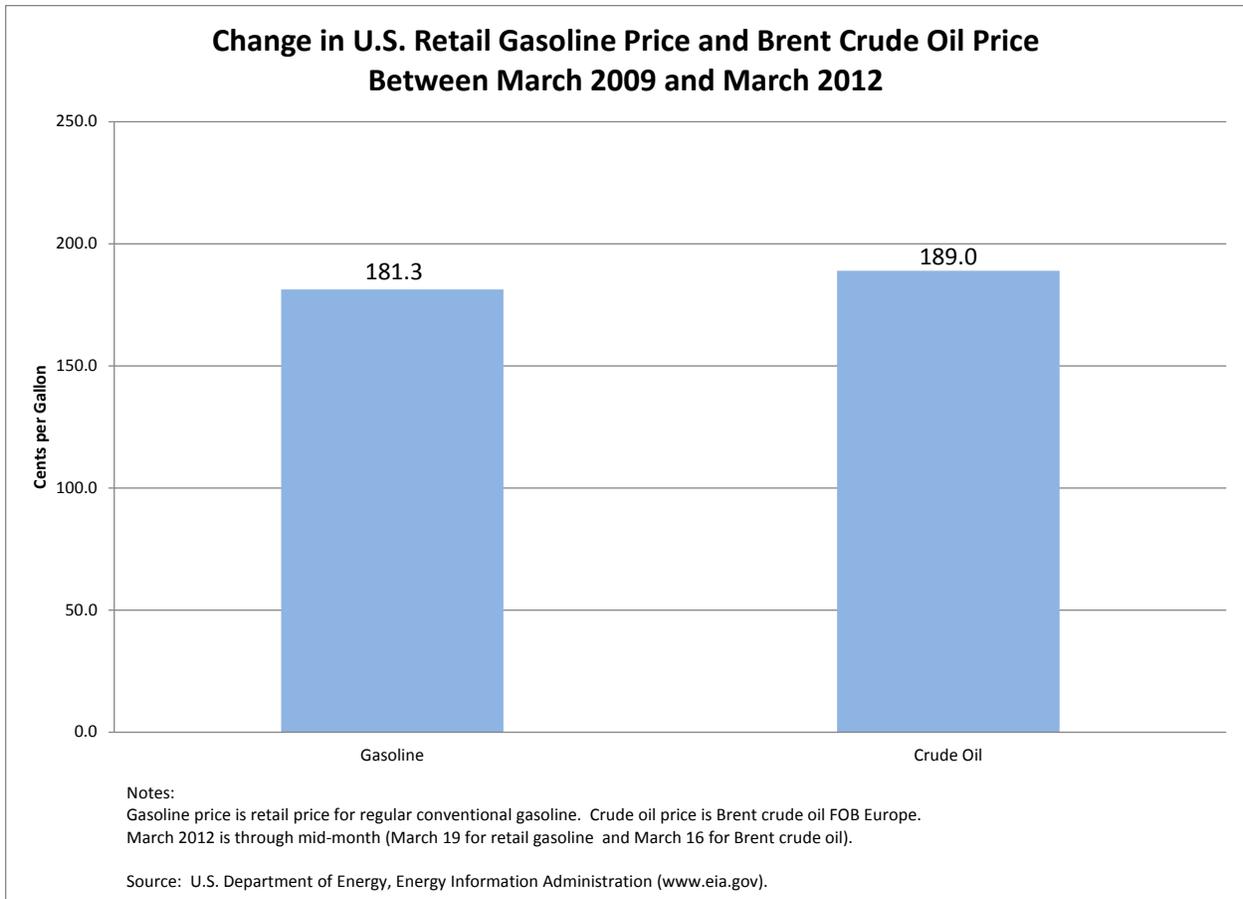
Mr. Chairman and Members of the Subcommittee, thank you for the opportunity to appear before you today to discuss some economic issues related to the implementation of the Environmental Protection Agency's ("EPA's") Tier 3 motor vehicle emission and fuel standards.

I am a Managing Director and Principal at Navigant Economics. I have been engaged by the Emissions Control Technology Association to do a study on the impact of the pending Tier 3 rules on gasoline prices and to assess the cost and benefits of the pending regulation on the economy. I was awarded a B.S. in Economics from the University of Wisconsin in Madison in 1964 and a Ph.D. in Economics at the University of Pennsylvania in 1971. I have been active as an economic consultant in the energy industry for over 30 years and have presented testimony before numerous regulatory bodies, courts and Congress. I have served as a consultant on matters related to the transportation, wholesaling, and retailing of refined products produced by refineries and related to exploration/development, production, gathering, transportation, and refining of crude oil. My consulting work in the oil industry has been done in the context of investigations of industry behavior by the FTC, mergers/acquisitions, FERC regulatory matters, and analyses

prepared for clients' internal planning purposes. My oil industry clients have included major oil companies and oil pipelines.

The Current High Retail Gasoline Prices Are Not Related to Tier 3

Sharply rising prices for refined petroleum product (e.g., motor gasoline, diesel fuel, and jet fuel) are a major near-term economic concern. However, these sharply rising refined petroleum product prices are due primarily to sharply rising global crude oil prices. As shown on the chart below, the increase in the U.S. retail gasoline price between March 2009 and March 2012 can be accounted for entirely by the increase in the Brent crude oil price over the same period. The solution to the problem of sharply increasing crude oil and refined product prices involves promoting increased global crude oil supplies and reduced consumption of refined petroleum products which can be achieved through implementation of new efficient energy using technologies.



The EPA's Tier 3 standards are intended to improve air quality and thereby our health by reducing pollutant emissions by motor vehicles. It certainly is appropriate to assess the cost-effectiveness of implementing the EPA's Tier 3 standard by comparing a valuation of the benefits stemming from reduced pollutant emissions by motor vehicles to the increased cost of producing Tier 3 compliant motor gasoline, and I believe that the EPA will include such analysis in their rulemaking on Tier 3. My testimony focuses on the likely costs and benefits associated with implementing the EPA's Tier 3 standards related to reducing the sulfur content of motor gasoline.

The EPA's Tier 3 standards have absolutely nothing to do with the recent increase in the retail price of gasoline because these standards have not been defined and will not go into effect until 2017. Tier 3 standards could not possibly have any effect on the retail price of gasoline until 2017.

Cost Estimates of Implementing the Tier 3 Standards

The API sponsored a study by Baker & O'Brien, Inc. that estimated the marginal costs to U.S. refiners of reducing the sulfur and vapor pressure ("RVP") in motor gasoline.¹ For its estimate of the marginal cost of implementing the EPA Tier 3 standards, the API uses Baker & O'Brien's highest estimate of the cost of implementing both sulfur and RVP reduction, which is 25 cents per gallon.² Baker & O'Brien's corresponding average cost of implementing both sulfur and RVP reductions is 11.8 cents per gallon.³ The API is incorrect in its claim that the EPA will regulate vapor pressure under its Tier 3 standards. I understand that Administrator Jackson made it clear that vapor pressure will not be regulated under Tier 3 when she appeared before the House Energy and Commerce Committee on February 28, 2012. Therefore, the relevant issue is the cost of sulfur reduction under the Tier 3 standards.

¹ See Baker & O'Brien, Inc. *Potential Supply and Cost Impacts of Lower Sulfur, Lower RVP Gasoline*, prepared for the American Petroleum Institute, July 2011 (hereinafter "Baker & O'Brien 2011 Report"), and The Baker & O'Brien, Inc., *Addendum to Potential Supply and Cost Impacts of Lower Sulfur, Lower RVP Gasoline*, Prepared for the American Petroleum Institute, March 2012 (hereinafter "Baker & O'Brien 2012 Report").

² See API Press Release, "EPA Tier III rulemaking promises higher gasoline manufacturing costs," March 22, 2012. See also Baker & O'Brien 2011 Report, page 48.

³ Baker & O'Brien base their analysis on an assumption that U.S. refiners annually produce 7,296 thousand barrels per day (MBD) of hydrocarbon gasoline. See Baker & O'Brien 2012 Report, p. 6. This volume equals 111,847.68 million gallons per year. Baker & O'Brien's highest total annual cost estimate for reducing the sulfur content and RVP of gasoline produced by U.S. refiners is \$13,220 million. See Baker & O'Brien 2012 Report, page 9. Dividing this total annual cost by 111,847.68 million gallons results in a per gallon cost of \$0.118 per gallon or 11.8 cents per gallon.

There are two recent studies that have been performed that assess the effects of implementing the EPA's Tier 3 standards related to reducing the sulfur content of motor gasoline on U.S. refining costs. First, the American Petroleum Institute ("API") has sponsored a study by Baker & O'Brien, Inc. that estimated the potential supply and cost impacts of producing lower sulfur gasoline.⁴ Baker & O'Brien stated that reducing the sulfur content of gasoline to 10 parts per million ("ppm") would increase the marginal cost of producing gasoline in the U.S. by 6¢ to 9¢ per gallon.⁵ Second, the International Council for Clean Transportation has sponsored a study by MathPro Inc. that estimated the potential costs of reducing the sulfur content of motor gasoline to 10 ppm.⁶ MathPro states that the average cost of reducing the sulfur content of gasoline to 10 ppm would be 0.8¢ to 1.4¢ per gallon.⁷ While Baker & O'Brien do not report their estimate of the average cost of reducing the sulfur content of gasoline to 10 ppm, it can be calculated from the information they report and is 2.1 cents per gallon.⁸ Further, in a letter to Congressman Ed Whitfield dated February 27, 2012, the EPA stated that its estimate of reducing the sulfur content of gasoline to 10 ppm was about 1 cent per gallon, which is consistent with the MathPro Report.

If the latest Baker and O'Brien marginal cost estimates were correct and refiners were able to pass these marginal costs on to consumers in higher gasoline prices (as implied by the study), the

⁴ See Baker & O'Brien 2011 Report and Baker & O'Brien 2012 Report.

⁵ See Baker & O'Brien, 2012 Report, page 12.

⁶ See MathPro, Inc., *Refining Economics of A Natural Low Sulfur, Low RVP Gasoline Standard*, prepared for The International Council for Clean Transportation, October 25, 2011 (hereinafter "MathPro Report").

⁷ See MathPro Report, p. 4.

⁸ Baker & O'Brien base their analysis on an assumption that U.S. refiners annually produce 7,296 thousand barrels per day (MBD) of hydrocarbon gasoline. See Baker & O'Brien 2012 Report, p. 6. This volume equals 111,847.68 million gallons per year. Baker & O'Brien's total annual cost of reducing the sulfur content of gasoline produced by U.S. refiners to 10 ppm is \$2,390 million. See Baker & O'Brien 2012 Report, page 9. Dividing this total annual cost by 111,847.68 million gallons results in a per gallon cost of \$0.021 per gallon or 2.1 cents per gallon.

refiners would make a profit from Tier 3 by selling gasoline for 6 cents to 9 cents per gallon more while incurring only a 2.1 cent per gallon average increase in cost. If this is the case, it seems odd that the refiners are opposing Tier 3.

The primary reason why the Baker & O'Brien average cost of reducing the sulfur content of gasoline to 10 ppm appears to be overstated is that its capital cost estimates are too high.⁹ The Baker & O'Brien capital cost estimate for an FCC gasoline (naphtha) hydroheater is high relative to other estimates, and this estimate is higher than Baker & O'Brien's cost estimate for an FCC feed hydroheater which is a substantially more expensive unit. The capital cost estimates used by MathPro are more in line with other estimates. The annual Baker & O'Brien capital costs amount to \$1,666 million or 1.5 cents per gallon¹⁰ versus the MathPro capital costs which amount to a maximum of \$1,000 million or 0.9 cents per gallon.¹¹ This difference alone accounts for the total difference between the Baker & O'Brien average of 2.1 cents per gallon versus the high end of the MathPro range of 1.4 cents per gallon. The lower end of the cost range for MathPro of 0.8 cents per gallon is obtained by assuming a lower cost to revamp existing units (30% of new grass roots units instead of 50%) and the use of a 7% before-tax return on investment instead of a 10% after-tax return.¹²

⁹ A definitive assessment of the Baker & O'Brien results would require access to their model and detailed calculations which are not available because Baker & O'Brien consider them proprietary.

¹⁰ See Baker & O'Brien 2012 Report, pages 6 and 9.

¹¹ See MathPro Report, page 4. The MathPro annual capital costs are lower than those of Baker & O'Brien primarily because MathPro's investment costs are lower and also because MathPro assumes a 10% after-tax return while Baker & O'Brien assumes a 15% after-tax return.

¹² MathPro Report, page 4.

Further, it appears that the Baker & O'Brien analysis did not take into account the option of averaging and trading among refineries. Such averaging and trading would allow overachievement by efficient refineries to offset underachievement by inefficient refineries. Failure to take averaging and trading into account tends to overstate the average cost of attainment somewhat and to grossly overstate the marginal cost of attainment. Therefore, the Baker & O'Brien marginal cost estimates of reducing the sulfur content of motor gasoline are not realistic.¹³

The Potential Impact of Tier 3 on Retail Gasoline Prices is Small

The implementation of the EPA Tier 3 standards involving a reduction in gasoline sulfur content will not necessarily result in an increase in retail gasoline prices even after the rules go into effect in 2017. Further, the likely average increase in refinery costs is expected to be in the vicinity of 1.0 cent per gallon so any increase that might occur would be small.¹⁴ There is no certainty that even the small increase in U.S. refinery costs associated with reducing the sulfur content of gasoline to 10 ppm would be passed on to consumers. The refiners' margins reflect overall refined petroleum product supply and demand conditions. The retail price of gasoline is determined by many factors with the global price of crude oil being by far the most significant

¹³ The MathPro analysis does not explicitly take averaging and trading into account, but its more aggregate approach implicitly takes it into account.

¹⁴ The effect of an increase in refinery costs due to the reduction in the sulfur content of gasoline will be through the effect of this increase on the costs of the marginal supplier of motor gasoline. The API press release and the Baker & O'Brien reports focus on the marginal cost of attainment. The refinery with the highest cost of attainment may not be the marginal supplier of gasoline. Therefore, even if one had a reliable estimate of the marginal cost of attainment, which Baker & O'Brien do not provide, one could not then assume that this marginal cost of attainment would result in an equal increase in the marginal cost of supply of motor gasoline.

factor. Therefore, it is impossible to say with any certainty whether retail gasoline prices would go up after the Tier 3 standards go into effect in 2017.

Benefits of Tier 3

According to a study by Northeast States for Coordinated Air Use Management (“NESCAUM”), reducing the sulfur content of gasoline to 10 ppm would reduce nitrogen oxides emissions (NOx) by approximately a quarter by allowing pollution control equipment to operate more effectively.¹⁵ Nitrogen oxides cause ozone concentrations and are precursor to fine particulate matter. NOx creates a number of health and environmental problems including respiratory problems such as asthma, ground level ozone, haze, water acidification, acid rain, plant damage, soil damage, and oxygen depletion in water.¹⁶ In the Northeast and Mid-Atlantic area, the largest source of NOx is gasoline vehicles which account for almost 30% of NOx emissions.¹⁷ In the Northeast and Mid-Atlantic area, NOx emissions would be decreased by over 51,000 tons per year. In the Midwest and Southeast areas, NOx emissions would be decreased by almost 130,000 tons per year.¹⁸ For the Northeast and Mid-Atlantic area, it is estimated that the annual health benefits by 2018 from low sulfur gasoline could be almost \$235 million and up to \$1.2 billion.¹⁹ Most of these health benefits are derived from premature deaths avoided by having lower ozone levels. The health benefits from reduced NOx emissions in the Midwest and

¹⁵ Arthur Marin, NESCAUM, Benefits and Costs of Tier 3 Low Sulfur Gasoline Program, CT DEEP SIPRAC Meeting, January 12, 2012 (“Marin Study”), pp. 6-7 and NESCAUM, Assessment of Clean Gasoline in the Northeast and Mid-Atlantic States, November 21, 2011 (“NESCAUM Assessment”).

¹⁶ Marin Study, p. 6-7.

¹⁷ NESCAUM Assessment, p. 4-1.

¹⁸ NESCAUM Assessment, p. xi.

¹⁹ NESCAUM Assessment, pp. 5-4 – 5-5. Benefits are measured in 2006 dollars.

Southeast area also would be large. There also would be environmental benefits which are not included in the health benefit evaluation. I am still working on estimating the value of all these benefits, but given that the health benefits in the Northeast and Mid-Atlantic area alone could be as much as \$1.2 billion, it is in virtual certainty that the value of all these benefits will substantially exceed the MathPro estimate of the increase in U.S. refinery costs of \$1.5 billion per year.

There is an economic benefit of the improved human health that will occur as a result of the reduction in the sulfur content of motor gasoline. Healthier people are more productive and miss less work due to illness resulting in a more productive economy. In addition, the reduction in the sulfur content in motor gasoline will permit the implementation of cost-effective vehicle technologies which will provide substantial environmental benefits at a lower cost than would be possible if the sulfur content of motor gasoline were not reduced. Therefore, reducing the sulfur content of motor gasoline will reduce the costs of the motor vehicles that will satisfy the Tier 3 pollution standards thereby benefitting consumers. Also, there is a further economic benefit due to an increase in value added and jobs created in the emission control and auto industry due to the development and implementation of the Tier 3 technology. I am in the process of quantifying these economic benefits.

Conclusion

It is clear that Tier 3 is not affecting the current price of gasoline, could not possibly affect the price of gasoline until 2017, and the benefits of the rules are expected to far exceed its costs.