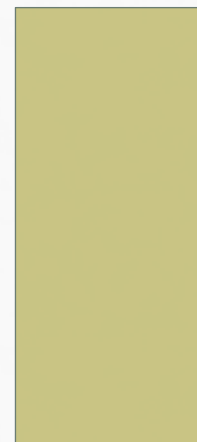


# ECONOMIC ANALYSIS OF THE IMPLICATIONS OF IMPLEMENTING EPA'S TIER 3 RULES

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# BACKGROUND

- Tier 3: Would require oil refiners to reduce the average sulfur content in gasoline from 30 parts per million (ppm) to 10 ppm
  - Slated to occur in 2017 at the earliest
- Two ways to reduce sulfur content of gasoline
  - FCC feed desulfurization: Remove sulfur from the crude oil inputs to a refinery
  - FCC naphtha desulfurization: Remove sulfur directly from the gasoline produced by the refinery
- Estimated average cost impact to refineries
  - B&O Study (sponsored by API): ~1.9 cents per gallon
  - Math Pro Study (sponsored by Intl. Council on Clean Transportation): ~0.8 to 1.4 cents per gallon

# B&O'S PREDICTION RECORD

- 2007 HDD Rule: Reduce the sulfur content of diesel fuel from an average of 500 ppm to 15 ppm.
- B&O predicted that HDD Rule would
  - substantially **reduce** the supply of diesel fuel
  - make the United States a net **importer** of diesel fuel.
- B&O's predictions were wrong
  - 2010 diesel fuel production was one million barrels per day **higher** than B&O projected
  - United States generated net **exports** of 458,000 barrels per day in 2010

# FLAWS IN B&O TIER 3 IMPACT

- Fails to account for averaging and trading, which reduces the marginal compliance cost toward the average compliance cost
- Assumes incorrectly that the refinery with the highest cost of compliance (marginal cost impact) will be the marginal supplier of gasoline
- Lack of individual refinery crude input and refined product output slate data prevents adjustments to reflect actual operating conditions
- Estimated capital cost for a new build FCC naphtha sulfurization unit (and the implied ratio of naphtha-to-feed desulfurization) is not reasonable according to companies that construct or install desulfurization units

# TIER 3 IS UNLIKELY TO RESULT IN HIGHER GAS PRICES

- Tier 2: Required a reduction in the average sulfur content of gasoline from 300 ppm to 30 ppm
- Regression analysis shows that Tier 2 had no significant impact on gas prices after controlling for cost of crude oil, refinery margins, any other factors
- Because Tier 3 would impose half the average cost increase as Tier 2 (one cent per gallon v. two cents), the predicted impact on gas prices would likely be negligible

# TIER 3 WOULD GENERATE SIGNIFICANT HEALTH BENEFITS

- Tier 3 will reduce NOx emissions by 25 percent, thereby generating substantial health benefits
  - NOx has been linked to respiratory illness such as asthma and pulmonary disease
- By 2020, Tier 3 is expected to generate \$5.2 to \$5.9 billion per year in health benefits (valued in 2006 dollars)
  - Ozone-related health benefits for Northeast and Mid-Atlantic only per NESCAUM 2012 study
  - Particulate emissions-related health benefits were derived from data from the National Association of Clean Air Agencies (NACAA) and EPA



# TIER 3 WOULD STIMULATE INVESTMENT

- Tier 3 will require the installation of refinery upgrades that will cost nearly \$4 billion over three years, with recurring annual operating costs of \$0.5 billion.
- Over first three years, input-output model predicts
  - 24,500 jobs for full-time equivalent employees
  - Total associated employee compensation of \$1.2 billion for each of the three years of installation
  - Value added to the national economy is \$2.0 billion each year
- Annual operations of refinery modifications will generate going-forward benefits about one-fifth the size of installation-related benefits

# SENATOR VITTER CRITICISMS

- No original health benefits
  - No need given NESCAUM, EPA, and NACAA estimates
- MathPro's database is inferior to B&O's
  - Although more granular, B&O's data do not disclose info on individual refinery crude input slates or refined product production slates, making inferences about the average refinery more difficult
- Impair refiners' ability to compete in global marketplace
  - Europe, Japan, Hong Kong, Chile are already at 10 ppm
  - Shale oil and natural gas developments lower costs for U.S. refiners, allowing U.S. to become a net exporter of refined petroleum products in 2011 for the first time since the late 1940s