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## More Attention Needs to Be Focused on the CEC's Fuel Price Forecasts to Ensure They Have a Credible Foundation

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Initially Prepared for the CEC/ARB 10/16/06 Joint  
Workshop on the Development of  
the Alternative Transportation Fuels Plan  
(Updated Presentation With Explanatory Notes Accessible  
Through the "View" and "Notes Page" PowerPoint Tabs)  
11/3/06

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## Summary and Conclusions:

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- California's Strong Policy Emphasis on Reducing Petroleum Dependence is Sound and the Case for it Has Been Strengthened by Petroleum Fuel Price Developments Since the AB 2076 Reports Were Developed.
- We Believe the Seriousness of the Petroleum Dependence Problem Was Underestimated in the AB 2076 Analysis and This Should Be Corrected in the AB 1007 Effort
- The AB 2076 Reports Relied on Faulty Assumptions and Forecasts Which Have Biased the Case in Favor of Petroleum, and Against the Case for CNG and LNG
- As a Result of a Seriously Flawed CNG Price Forecast, the AB 2076 Analysis Wrongly Concluded That There Were Negative Net Benefits Associated with NGVs
- The CEC Staff Assumed a Fixed "Linkage" Between Gasoline and CNG Prices Over the Entire Forecast Period For Which There is No Credible Justification, An Assumption Which is Clearly Wrong and Biased Against CNG/LNG Vehicles
- Every Indication is That The Staff Plans on Relying on the AB 2076 Fuel Price Forecasting Approach for the AB 1007 Project. Their Method is Seriously Flawed and Cannot Provide a Credible Foundation for Alternative Transportation Technology Policy Making in California



## Summary and Conclusions (Cont.):

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- The Staff has relied on the DOE/EIA's Forecasts of World Oil Prices But, Apparently, Has Ignored the DOE's Internally Consistent Forecasts of Transportation Fuel Prices
- The DOE/EIA's Oil Prices Forecasts Over the Past Several Years Have Consistently and Significantly Under Forecast the Actual Level of Oil Prices, Even in Its High Oil Price Cases
- The DOE/EIA's World Oil Price Forecasts Assume Away for the Future the Primary Reason Why Oil Prices Have Been Extremely High in Recent Years; Geopolitical Instability in the Middle East
- We Believe There is a Significant Likelihood That the DOE/EIA's Oil Price Forecasts Even In the High Oil Price Cases Will Understate Future World Oil Price Levels
- In Contrast to the CEC Staff's Approach, The DOE/EIA's National Energy Modeling System (NEMS) Which is Used to Develop the Annual Energy Outlook (AEO) Forecasts is a Highly Sophisticated Forecasting Tool Supported by a Large Number of Experienced Energy Professionals. In Contrast to the Staff's "Black Box" Approach:
  - It Is Peer Reviewed;
  - The DOE Includes in its AEO Comparisons of Its Forecasts With Those of Other Forecasters;
  - The DOE Periodically Performs Back Cast Analyses to Evaluate the Accuracy of Its Previous Forecasts.



## Recommendations:

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- The CEC should use the DOE/EIA's High Oil Price Case From the 2006 Annual Energy Outlook as the "Most Likely" Case for any Cost/benefit Analyses of Alternate Transportation Fuels for the AB 1007 Initiative
- The CEC Should Recognize There is a Significant Likelihood That Actual Future Petroleum Prices Will Be Higher Than Forecast Even in the High Oil Price Cases
- In the Absence of a More Credible Methodology, the CEC Should Rely on DOE/EIA's 2006 Annual Energy Outlook Forecasts of Transportation Sector Retail Fuel Prices For Its Market Assessment and Any Cost/benefit Analyses of Alternative Transportation Fuel Technologies
- The CEC's Estimate of the "External Costs" of Petroleum Dependence is Seriously Outdated and Needs to Be Revised Based on More Recent Studies



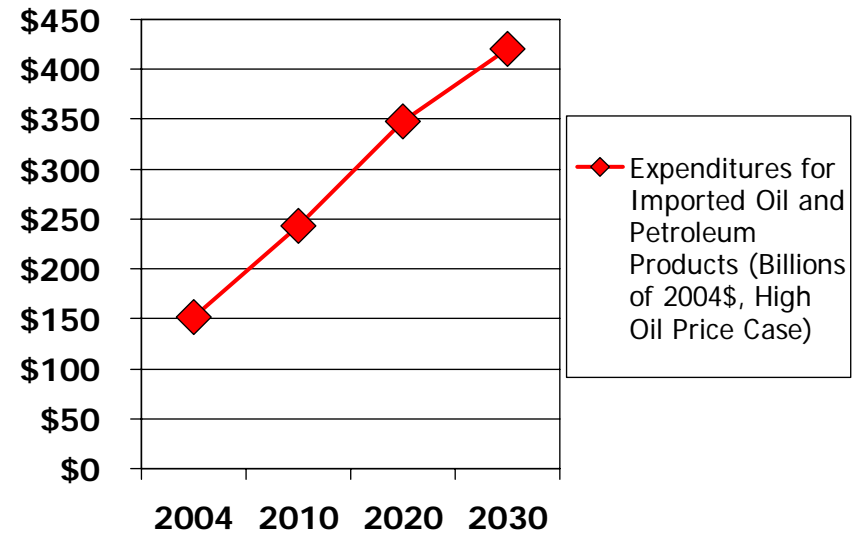
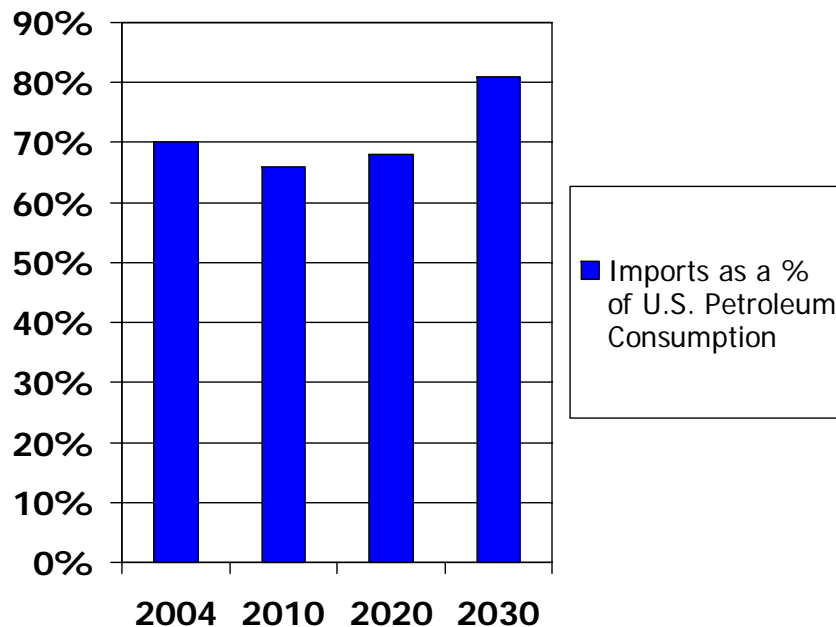
## Consequences of the Fuel Price Forecasting Problem

- A High Profile Initiative Intended to Promote the Development of Alternate Fuel Vehicles in California Has Underestimated the Costs of Petroleum-based Fuels While Also Significantly Underestimating the Fuel Cost Savings and Overall Economic Benefits\* Available to Owners of CNG/LNG Vehicles
- We Can Only Hope That Consumers Interested in Alternative Fuel Vehicles Don't Rely on the Accuracy of the CEC Staff's Fuel Price Forecast and Cost-benefit Analyses Concerning NGVs
- We Can Also Hope That the Auto Manufacturers Don't Rely on the CEC's Staff's Previous Analyses in Reaching Decisions About Whether or Not to Build New Dedicated NGVs

\*Source: CEC's "Reducing California's Petroleum Dependence" Report, August 2003, Page 9, Among Others.

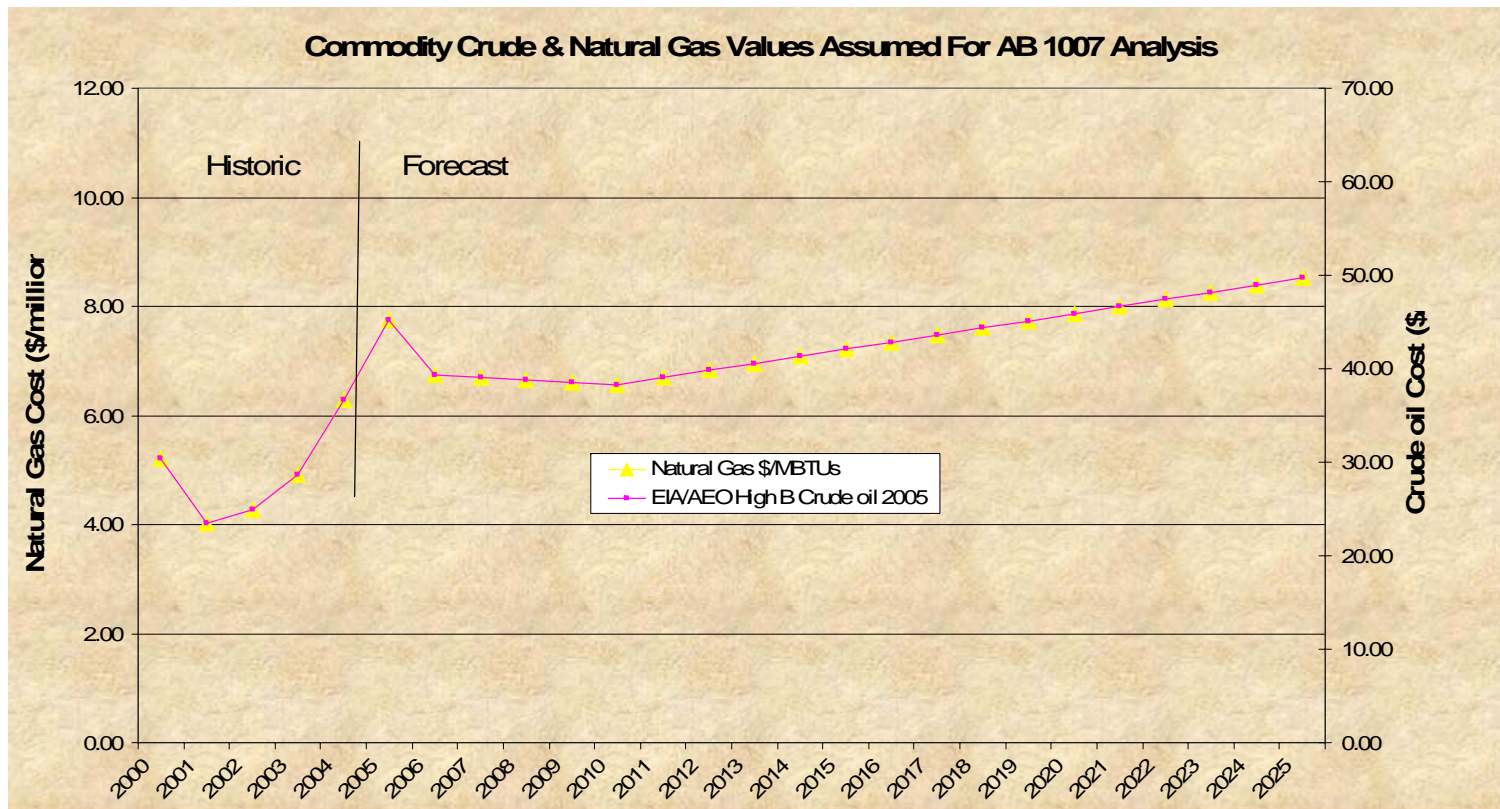
# The Problem of U.S. (and by extension, California) Dependence on Petroleum Imports is Serious and Is Projected to Get Even Worse

## U.S. Dependence on Petroleum Imports and Their Costs Are Expected to Increase



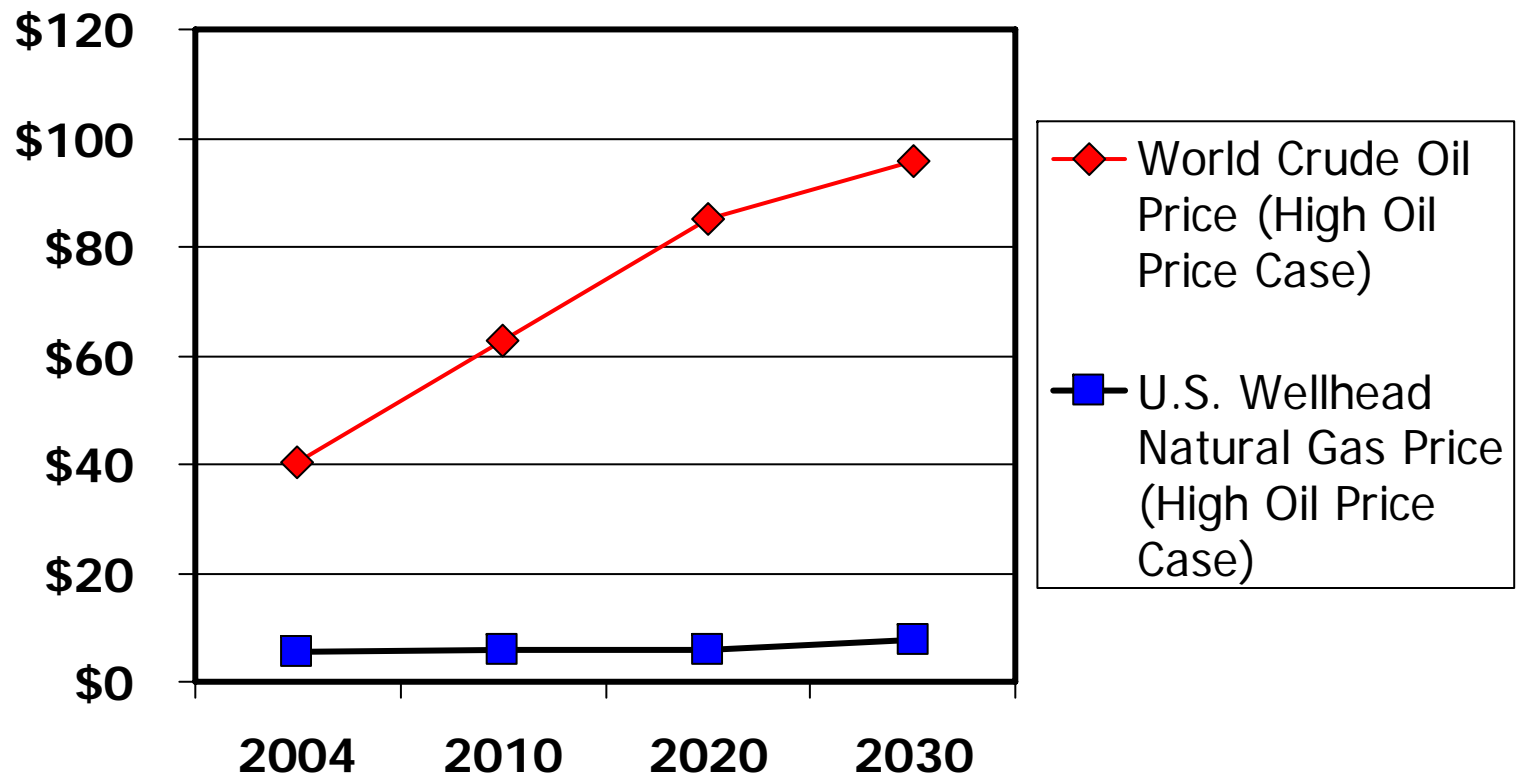
Source: DOE/EIA 2006 Annual Energy Outlook

# The Staff Has Presented Very Misleading Information About the Relationship of Oil and Natural Gas Prices Which Implies At First Glance that Future Oil and Natural Gas Prices Will Be The Same



Source: CEC Staff Work Paper  
 Mark P. Sweeney Consulting,  
 October 16, 2006 San Diego, CA.

# DOE/EIA's Forecasts Suggest A Completely Different Relationship Between World Oil and US Domestic Wellhead Natural Gas Prices (2004\$/Barrel for Oil and /Mcf for Natural Gas)



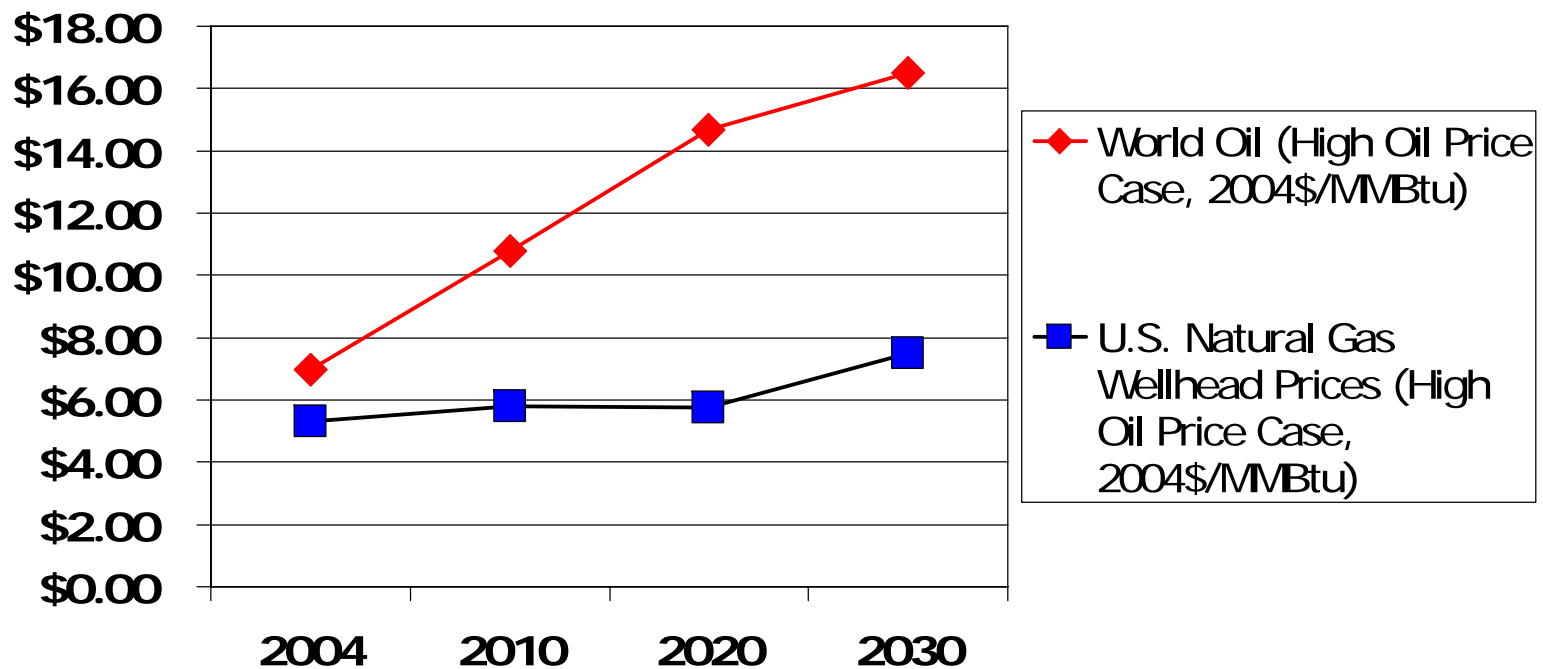
Source: DOE/EIA 2006 Annual Energy Outlook

Mark P. Sweeney Consulting,  
San Diego, CA.

October 16, 2006

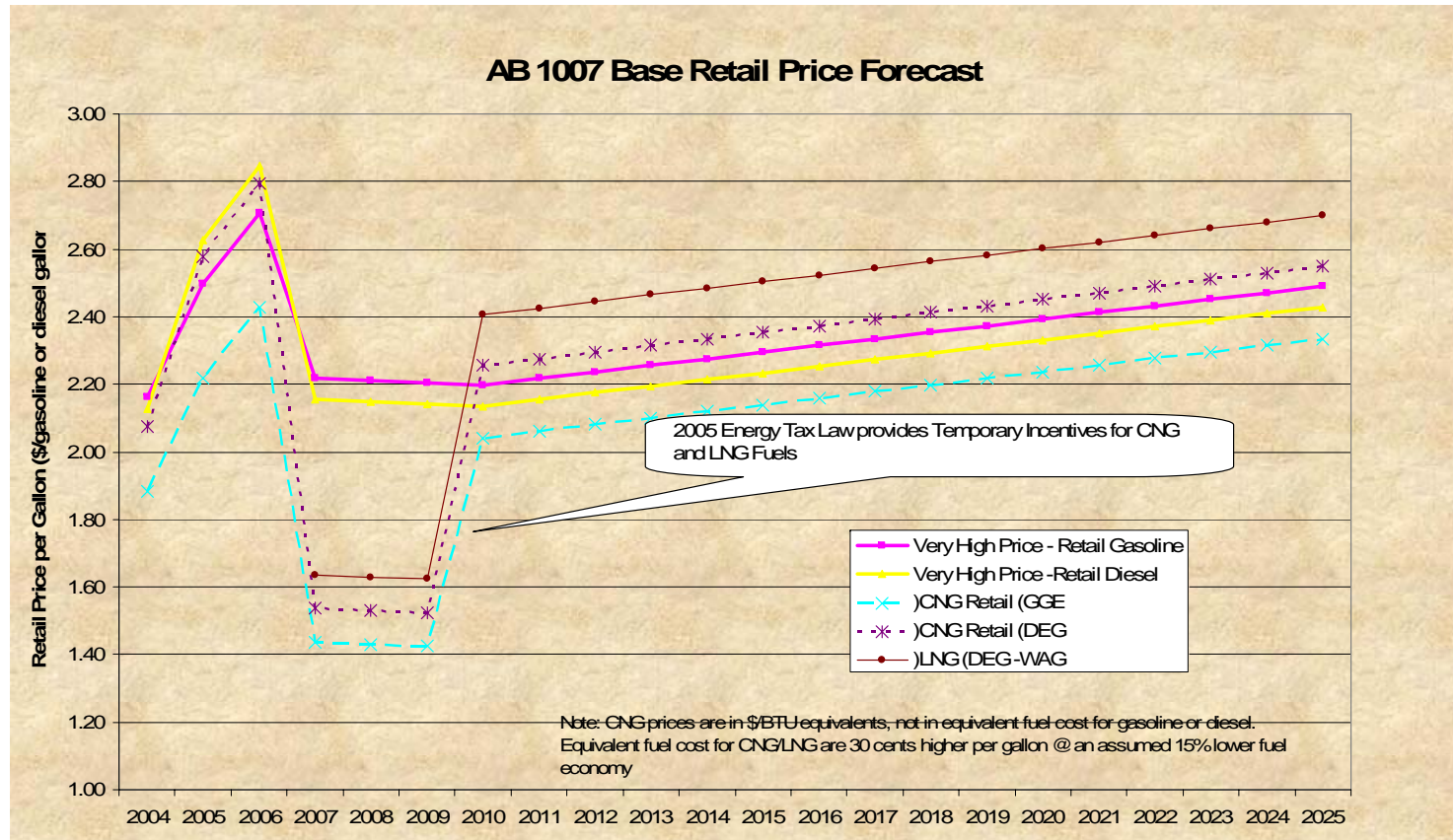


# On A Consistent Energy Content Basis, DOE/EIA's Forecast Tells The Same Story About a Growing Price Advantage for Natural Gas Relative to Petroleum (2004\$/MMBtu)



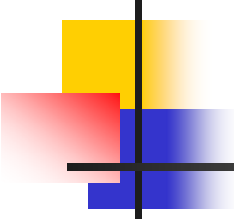
Source: DOE/EIA 2006 Annual Energy Outlook

# The Staff's Draft AB 1007 Price Forecast of Transportation Fuel Prices *Assumes* A Slight (\$0.16/gallon) Advantage for CNG Relative to Gasoline From 2010 Through 2025



Source: CEC Staff Work Paper  
October 16, 2006

Mark P. Sweeney Consulting,  
San Diego, CA.



## Shakespeare's Maxim that "Past is Prologue" Isn't a Good Guideline for Energy Price Forecasting

- A Chain Is Only As Strong as Its Weakest Link
- The CEC Staff Forecast the Spread Between Petroleum Product and CNG/LNG Retail Prices Using a Very Simplistic and Unsophisticated Methodology Based Entirely on Historical Relationships
- The Staff's CNG/LNG Fuel Price Forecasts Are Based on Per Gasoline Gallon Equivalent (GGE) Unit Utility Compression Rates That Are High Due to Relatively Low Per Station Throughput Compared With Non-utility Service Providers
- The Kind of Fixed "Linkage" The Staff Assumes Between Gasoline and CNG/LNG Prices Is Virtually Never Exhibited by Energy Prices in the Real Marketplace
- No Explanation Has Been Provided By the Staff To Justify Why Their Assumptions Should be Assigned Any Predictive Value
- Natural gas markets in North America are Geographically and Geopolitically Insulated from World Oil Markets
- Energy Markets Are Highly Dynamic, Not Static. This Results From:
  - Technological Change in Resource Exploration and Production
  - Changing Resource Production and Conversion Costs
  - Changes in Transmission and Distribution Margins
  - Changing Environmental Requirements
  - Volatile International Geopolitical Conditions
  - Changing Energy Policy Initiatives
  - Changing Consumer Preferences, Etc.
- Over the Long-term, the Prices of All Energy Commodities are Interrelated, But They are Not "Linked" in the Way Staff Has Assumed

# The Projected Impact of LNG Imports on US Natural Gas Prices Is Just One of the Many Reasons Why Future Gasoline and CNG/LNG Prices are Not “Linked”

- The DOE/EIA's 2006 Annual Energy Review Shows That Forecast U.S. Natural Gas Prices Will Be Lower the Higher the Level of LNG Imports
- The Impact of LNG Imports on US Natural Gas Prices is a Factor Almost Completely Independent of Developments in Petroleum Markets
- LNG Imports Will Be “Price Takers” Rather than “Price Makers”
- LNG Imports Directly Into California Will Reduce California's Natural Gas Prices From What They Otherwise Would Be

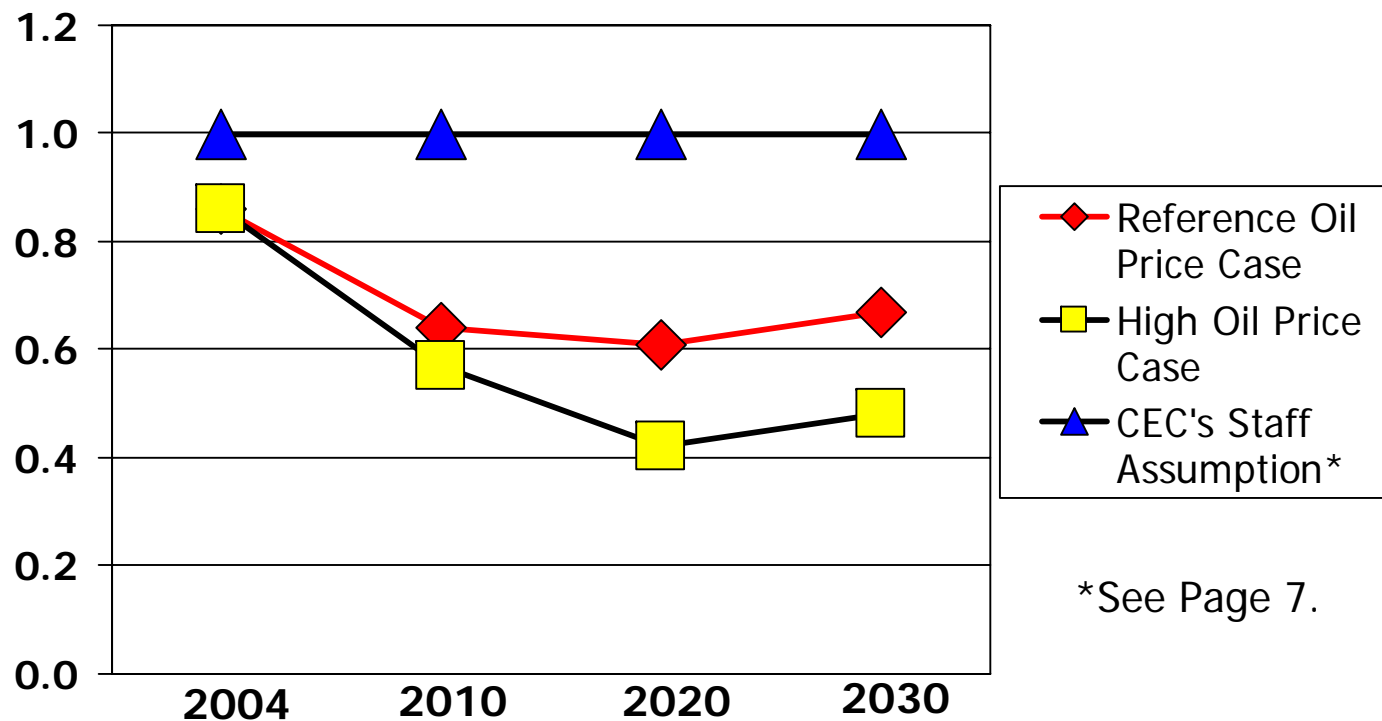
U.S. Natural Gas Prices as a Function of LNG Import Levels (2004\$/Mcf)



Source: DOE/EIA 2006 AEO, Page 90.

# The National Energy Modeling System Used by DOE/EIA Forecasts the Current U.S. Price Advantage of Natural Gas Relative to Crude Oil to Increase Over Time, and Especially With Higher Oil Prices

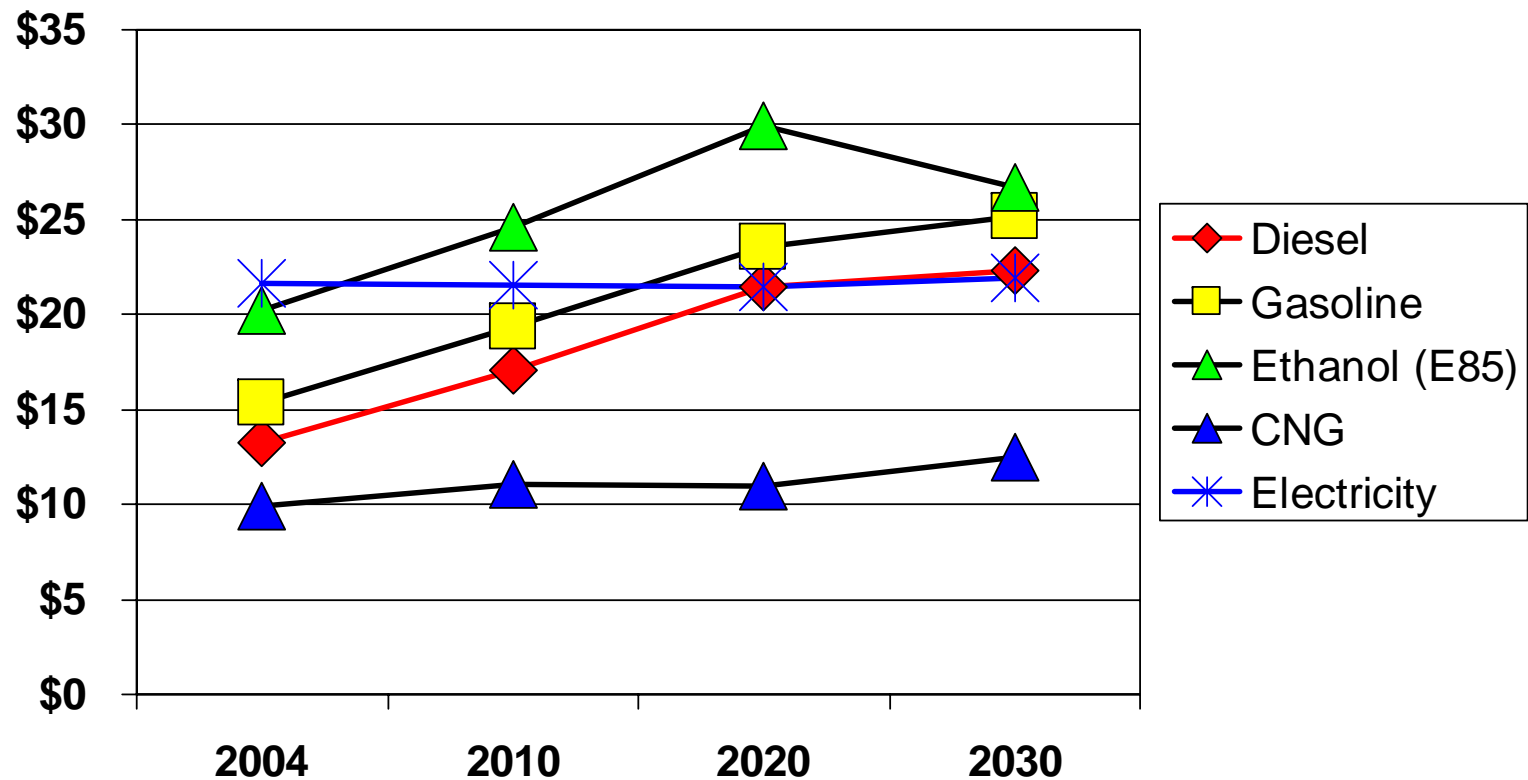
Ratio of U.S. Wellhead Prices to the Forecast World Oil Price (2004\$/MMBtu)



\*See Page 7.

Source: DOE/EIA 2006 Annual Energy Outlook

# DOE/EIA Forecasts A Significant Transportation Sector Retail Price Advantage for CNG Relative to Gasoline and Other Transportation Fuels (High Oil Price Case, 2004\$/MMBtu)

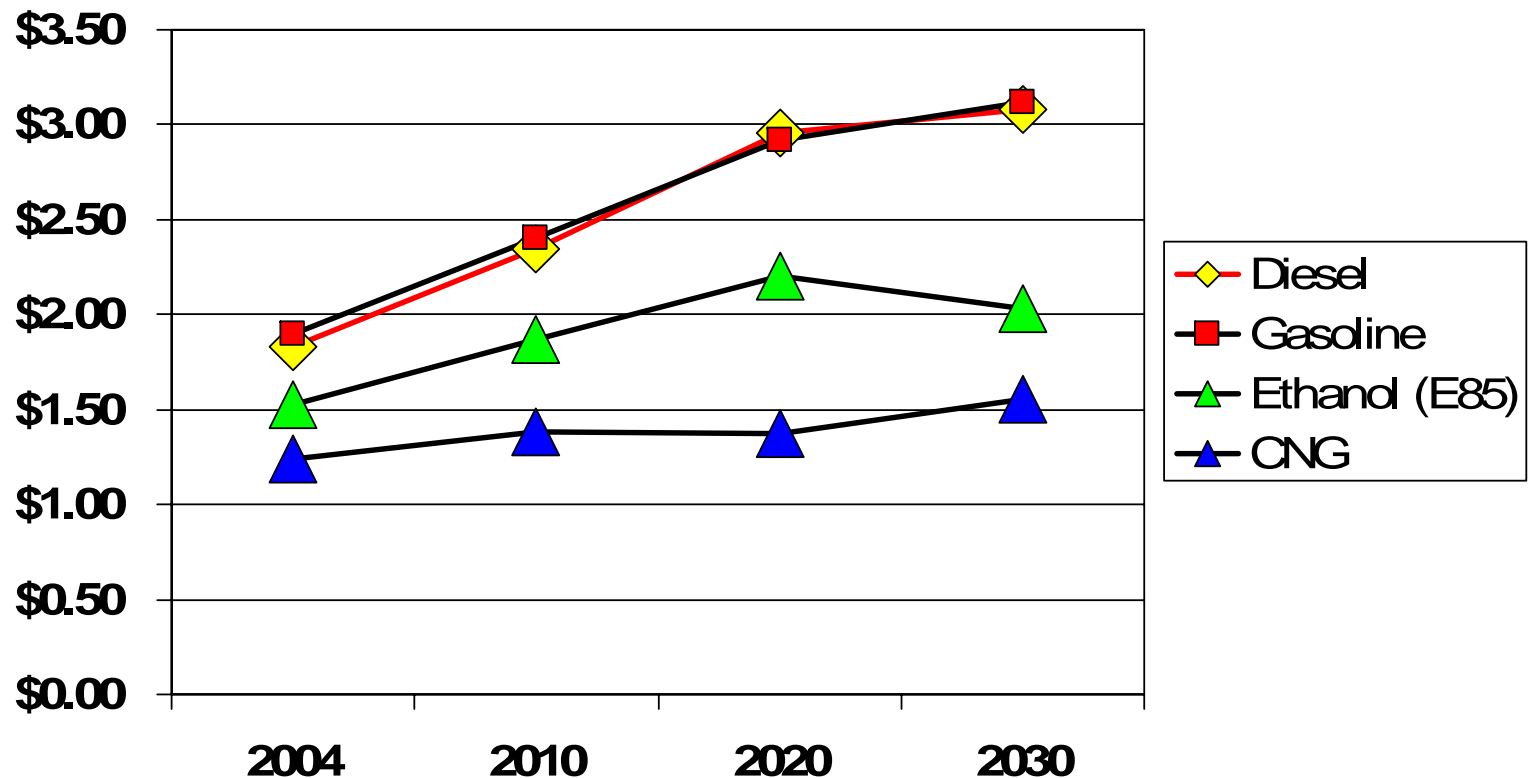


Source: DOE/EIA 2006 Annual Energy Outlook

Mark P. Sweeney Consulting,  
San Diego, CA.

October 16, 2006

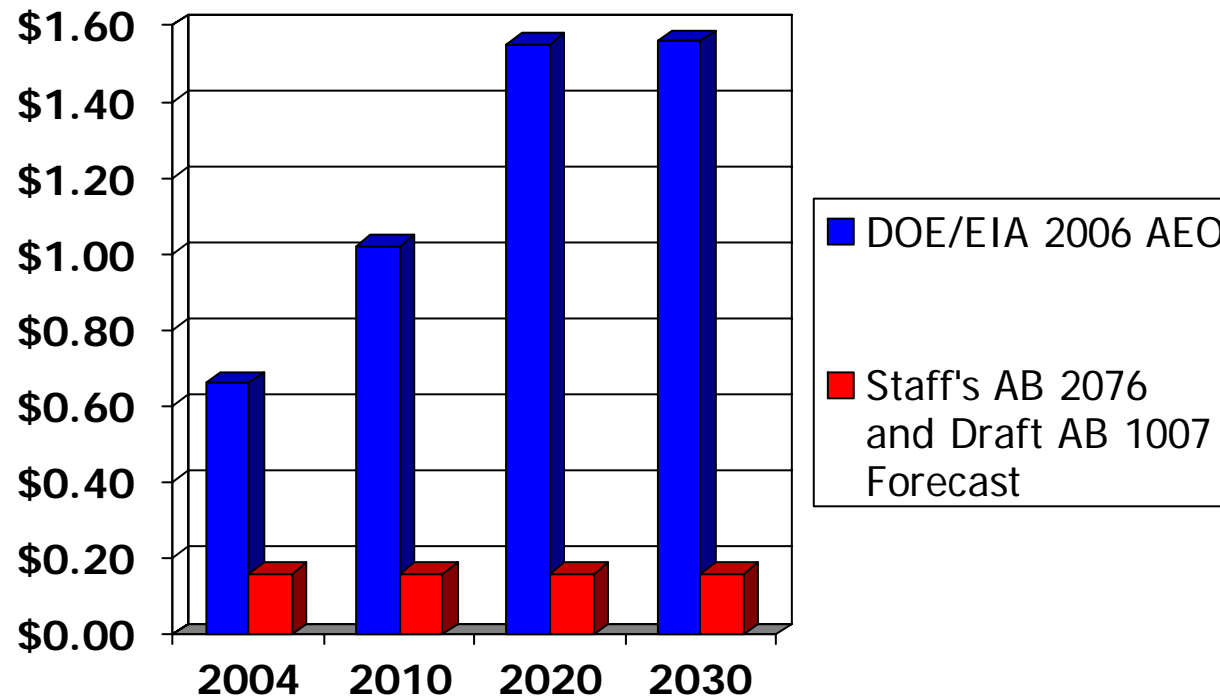
# The Transportation Sector Retail Price Advantage for CNG Relative to Gasoline and Other Transportation Fuels on a Per Gallon Basis (High Oil Price Case, 2004\$/Gallon)



Source: DOE/EIA 2006 Annual Energy Outlook

Mark P. Sweeney Consulting,  
San Diego, CA.

# Transportation Sector CNG Discount from Retail Gasoline Prices: DOE's Forecast Compared to the Staff's AB 2076 and Draft AB 1007 Forecasts (2004\$/Gallon)



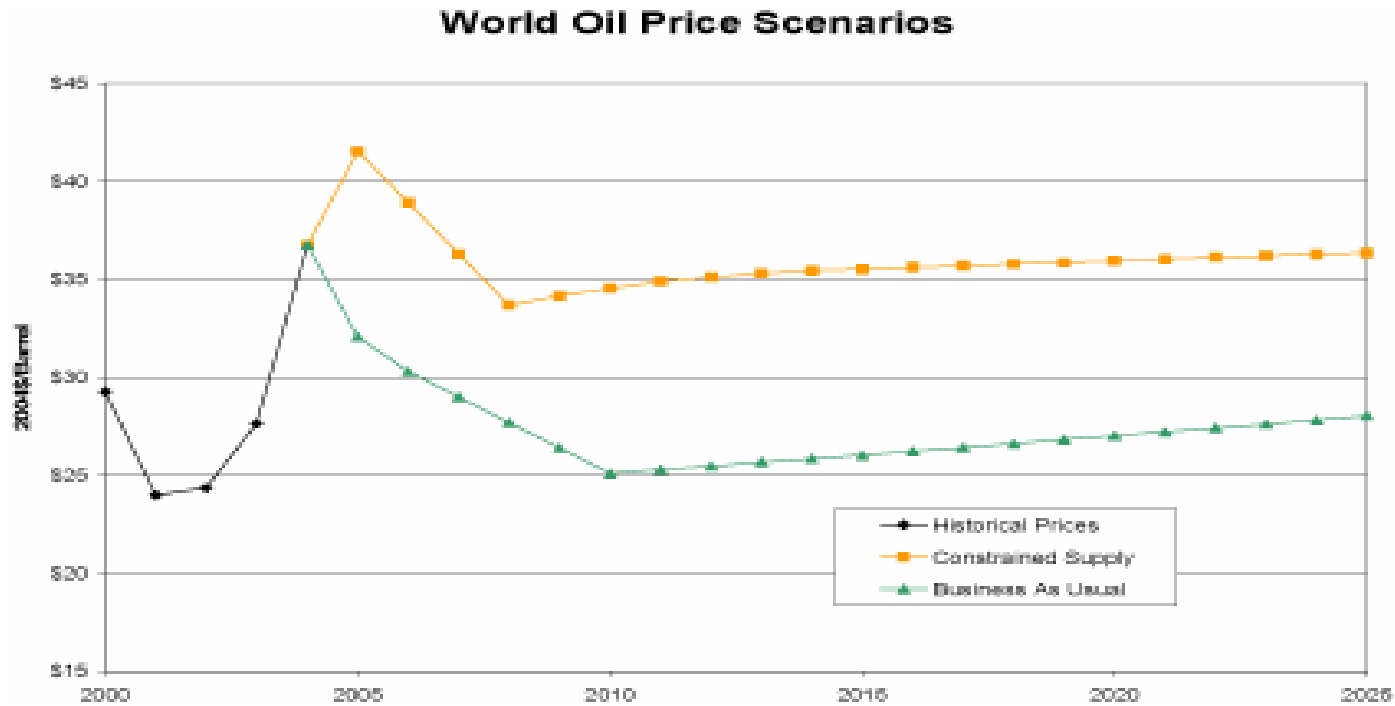
Source: DOE/EIA 2006 Annual Energy Outlook and Staff Work Paper, See Page 21.

Mark P. Sweeney Consulting,  
San Diego, CA.

October 16, 2006



# CEC's Crude Oil Price Scenarios for the 2005 Energy Report Have Sharply Under-Forecast Oil Prices



Staff Paper Entitled "Overview of Proposed Transportation Fuels Analyses for The 2005 Energy Report," November, 2005, Page 7.

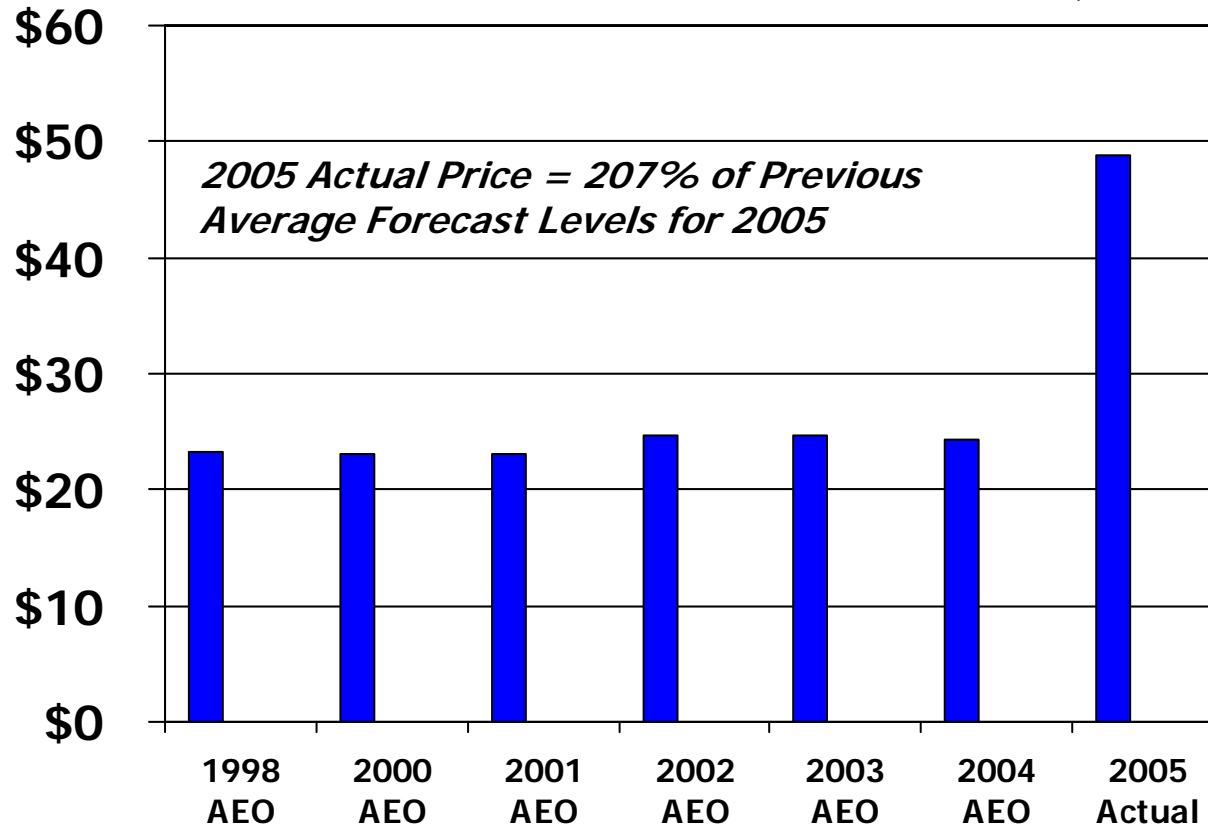
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# In Previous DOE/EIA AEOs, the Forecast World Crude Oil Price for 2005 in the Reference Oil Price Case Has Significantly Underestimated the Actual World Oil Price in 2005

Reference Oil Price Case Forecasts for 2005 from Previous AEO's (2005\$/Barrel)



Source: DOE/EIA Annual Energy Outlooks for 1998, 2000, 2001, 2002, 2003, 2005 and 2006

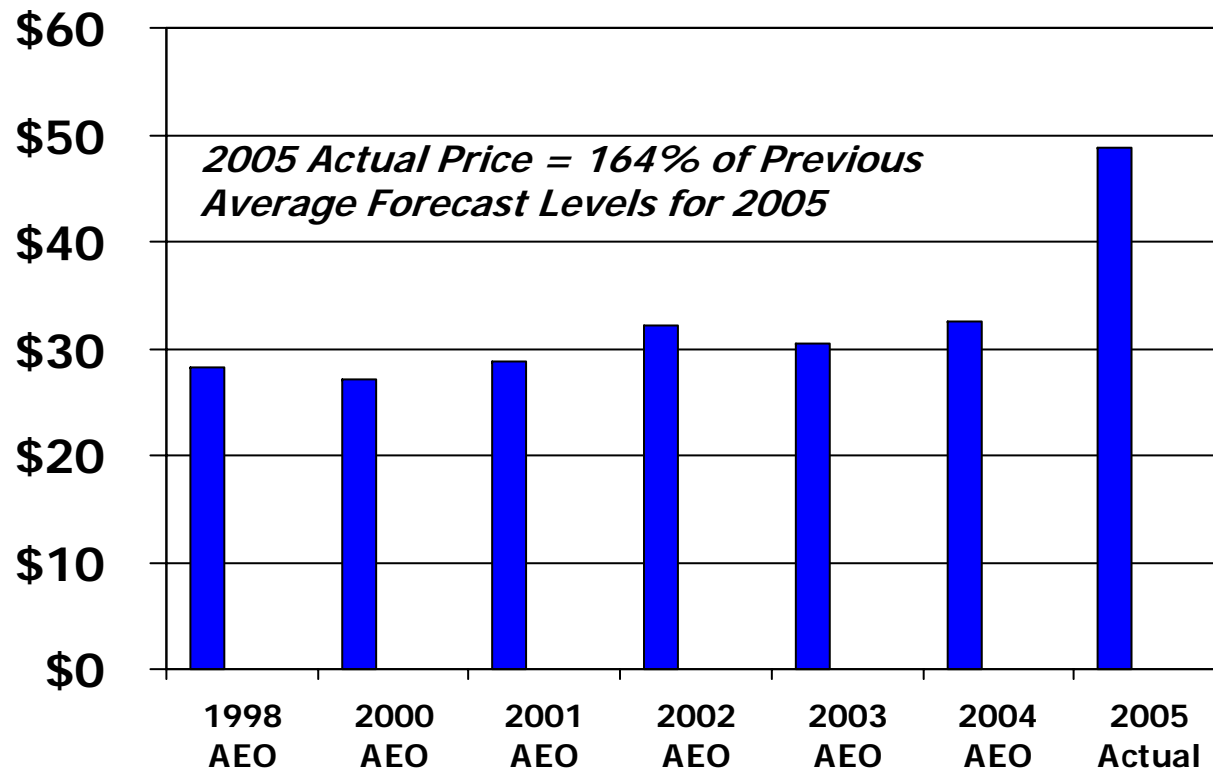
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# Even the High Oil Price Case Forecasts for 2005 Have Significantly Underestimated the Actual World Oil Price in 2005

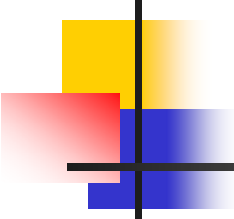
High Oil Price Case Forecasts for 2005 from Previous AEO's (2005\$/Barrel)



Source: DOE/EIA Annual Energy Outlooks for 1998, 2000, 2001, 2002, 2003, 2005 and 2006

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## TIAX's Estimate of the External Cost of Petroleum Dependence (for the AB 2076 Analysis) Needs to be Updated and Increased Based on More Recent Studies

- External Costs Arising From Petroleum Dependence Are Those Costs Which Are “Borne by all Citizens in the Country, but Are Not Reflected in the Market Price of Crude Oil”
- There Are Two Broad Categories of External Costs: (1) Military and Foreign Policy, and
- (2) Economic
- The Military and Foreign Policy Costs Include Defense and Foreign Aid Expenditures Attributable to Securing Stable Access to Mid-east Oil and the Costs of the Strategic Petroleum Reserve (SPR)
- The Economic Costs Encompass “Economic Rent” Transfers to Oil Producing Countries and Reduced U.S. GDP When Oil Prices Are Above a Competitive Market Level, and Short-run Macroeconomic Harm Resulting From Oil Price Spikes
- All of the Studies Cited in Support of This Estimate Were Completed In 2002 or Before, Prior to the Beginning of the War In Iraq, one as early as 1992
- The Previous Estimate Was \$0.12/Gallon for Petroleum-based Fuels, Based on a Study That Was Completed in 1997
- It Doesn't Appear that Inflation to Today's Dollars Was Included in This Estimate
- More Recent Studies Including One By a Nobel Price Winning Economist Released Earlier This Year Have Estimated the Eventual Cost of the Iraq War Alone at \$1-2 Trillion
- The \$0.12/Gallon Number Needs to Be Re-estimated Based on More Recent Analyses And Measured in Today's Dollars

# Staff's Draft AB 1007 Fuel Price Forecasts

Proposed AB 1007 Fuel and Retail Prices				
	June 6, 2006			Draft Example
	2012	2017	2022	Comments / Source
Gasoline & [Ethanol E10 (on a volume basis)] & [LPG (on an btu basis)]	\$2.24	\$2.33	\$2.43	2005 IEPR - Very High Price
Diesel & [GTL, CTL, Renewable, Bio-Diesel, Coke-Diesel (on a volume basis)]	\$2.18	\$2.27	\$2.37	2005 IEPR - Very High Price
<sup>1</sup> Fleet Prices - Gasoline	\$2.14	\$2.23	\$2.33	10 cents less than prevailing retail prices (based on OCTA's diesel data)
<sup>1</sup> Fleet Prices - Diesel	\$2.08	\$2.17	\$2.27	10 cents less than prevailing retail prices (based on 1 Fleet OCTA)
<b>CNG -Retail - For Gasoline (GGE)</b>	\$2.08	\$2.18	\$2.28	CNG 16¢ < gasoline - SoCal and PG&E Vs OPIS retail prices 1998-present
<sup>2</sup> CNG -Home Refueling - For Gasoline	xx	xx	xx	xx cents less than Prevailing Retail Prices
<sup>1</sup> CNG -Fleet Pricing - For Gasoline	yy	yy	yy	yy cents less than Prevailing Retail Prices
<b>CNG -Retail For Diesel (DEG)</b>	\$2.30	\$2.39	\$2.49	Use CNG/Diesel Price Relationship (CNG cost 0-5 cents > diesel)
<sup>1</sup> GNG - Fleet Pricing (DEG)	zz	zz	zz	zz cents less than Prevailing Retail Prices
<b>LNG</b>	kk	kk	kk	kk cents more or less than prevailing NG prices
	0.76	0.79	0.83	See Ethanol Blending Analysis Tab
<b>E85</b>	\$1.48	\$1.54	\$1.61	BTU adjusted price relative to gasoline retail prices
<b>Hydrogen (GGE)</b>	\$5.56	\$6.47	\$7.46	Uses CEC Power Generation Natural Gas Price Forecast
<b>Hydrogen (DGE)</b>	\$6.33	\$7.37	\$8.49	Uses CEC Power Generation Natural Gas Price Forecast
<b>To Do List:</b>				
<sup>1</sup> Staff need to survey a minimum of 10 fleets to determine the average and range in fuel prices specific to a date, and per retail prices				
<sup>2</sup> Staff need to investigate and document the Home Refueling Appliance Price Advantage or Pricing details for comparison to retail prices				

Source: Staff Work Paper

Mark P. Sweeney Consulting,  
San Diego, CA.

October 16, 2006