California Natural Gas Vehicle Coalition

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DOCKET
06-AFP-1
DATE Nov 03 2006
RECD. Nov 03006

November 3, 2006

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Subject: Docket # 06-AFP-1 – AB1007 Alternative Fuels Plan
Comments on the TIAX Market Assessment

The California Natural Gas Vehicle Coalition (Coalition) appreciates the opportunity to offer comments on the TIAX Alternative Fuel Market Assessment (Market Assessment). The Coalition is concerned that the Market Assessment has been completed without the input and direct participation of stakeholders. As a result, the Coalition finds itself correcting errors and omissions that would not have been created had the process of developing the report been a more collaborative stakeholder process.

GENERAL COMMENTS:

TIAX Market Assessment

The Market Assessment is not really a market assessment. The report is a snapshot of the market today in terms of technology and product availability. It does little to shed light on the economics or make any forward projections of future market penetration based upon those economic forecasts. The elements missing from the report are an understanding of the economics leading up to today's market penetration and the longer range economics and price forecasts needed to determine future market penetrations.

The Coalition is concerned that the CEC economics and price forecasts that are needed for a viable market assessment of natural gas vehicles contain major flaws that the natural gas vehicle (NGV) industry has been trying to address since 2003 – and that remain essentially unchanged today. Applying existing CEC price forecasts to the current market status of natural gas vehicles will lead to misleading and erroneous conclusions and recommendations on which alternative fuel paths have potential for California.

Essentially the "market assessment" for natural gas vehicles relies solely on the CEC staff applying faulty economics – that haven't been pier reviewed – to determine future market penetrations. CEC projections of market penetration for NGVs in general have been very low in comparison to NGV industry projections. Those projections are roughly an order of magnitude off: CEC predicting 100-200 million gallons per year petroleum displacement in 2025/2030 timeframe while the NGV industry predicts 1-2 billion gallons per year petroleum displacement "highly likely" over the next 25 years.

It is ironic that the current TIAX report agrees with low projections of natural gas penetration in the CEC 2005 IEPR whereas the 2005 TIAX report commissioned for the NGV industry indicated that natural gas in the heavy-duty vehicle arena would be very competitive with diesel on a life cycle cost basis at oil prices above $31 per barrel. Current CEC projections for fuel displacement are obviously outdated given the NGV industry's milestone of achieving 100 million gallons displacement in 2005.

The Market Assessment on the bottom of page 2-6 states:

> The table [Table 2-4] indicates that by 2030, the petroleum fuel displaced by natural gas fuel will total 176 million gge. This quantity is in the range of that estimated in the supporting documentation for the 2005 IEPR for CNG use in light duty vehicles, 82 million gge in 2025, but is less than the total displacement of 1.2 billion gge in 2025 (0.08 bgge CNG in LDVs plus 1.1 bgge for CNG/LNG use in HDVs) for a business as usual scenario.[23]

The above statement apparently "validating" the fuel displacement potential in the 2005 IEPR gives the reader the impression that TIAX was not developing a true Market Assessment but to only "validating" previous Commission work on market potential based on flawed CEC economics. Had TIAX been able to expand on the report commissioned by the natural gas vehicle industry, the petroleum displacement potential for NGVs would have been significantly higher. As noted later in this submittal, CEC and TIAX estimates of current natural gas fuel displacement are grossly understated.

It is unfortunate that TIAX was not allowed to use its full capabilities to go beyond documenting the current market. TIAX should have challenged the fuel price economics developed by the CEC and produce a more meaningful discussion of future market penetration of alternative fuels.

Economics are <u>everything</u> in determining the future penetration of alternative fuels. This is the reason that the Coalition has asked for meetings with the CEC staff to present rationale for a price forecast based on EIA data and review the assumptions and forecasts the CEC is using for its projections – which the NGV industry think are wrong.

Where are the Energy Price Forecasts?

Conducting a market assessment for alternative fuels depends upon price forecasts for conventional gasoline and diesel fuel and price forecasts for the alternative fuels. A major omission in the TIAX Market Assessment is data on the price forecasts of crude oil, gasoline and diesel fuel that should be included in Section 1 – California's Transportation System. Without this data for petroleum (crude oil, gasoline and diesel fuel) and corresponding price forecasts for the other alternative fuels, TIAX is in no position to conduct a true "market assessment" of alternative fuels.

Use of EIA Reference Case – and How it Depositions Alternative Fuels

The CEC uses EIA's Reference Case for projecting future prices of oil. Many feel that these projections are too conservative and project much lower oil prices than should be used. Given EIA's Reference Case oil price forecast, the need for a major petroleum reduction strategy for California is not evident given the projected availability of low price oil and low fuel prices at the pump through 2030. EIA's Reference Case forecast assumes away the primary reason why oil prices have been extremely high in recent years – geopolitical instability in the world.

The CEC's use of low oil price projections forces alternative fuels to compete on paper against unrealistically low gasoline and diesel prices. Given that alternative fuels need to develop fuel production facilities, distribution systems, and fueling infrastructure (not to mention developing vehicles and public awareness); it is unreasonable to expect new alternative fuels to enter the market competitively priced below gasoline and diesel fuel.

E85 advocates have been interested in developing a California market for years. Making headway has always been difficult given the low prices for gasoline at the pump. While the governor's biofuels initiative certainly gave a shot in the arm to the ethanol industry – that push was insignificant in comparison to the motivation of $3.50 per gallon gasoline prices in 2006.

Alternative fuels, given their high startup costs, will show substantial negative net benefits when compared to low gasoline and diesel fuel prices. The impact on state policies will mean that alternative fuels will have to be subsidized – placing a financial burden upon taxpayers. If the public and policy makers view the subsidies as too expensive, the entire concept of promoting alternative fuels for the state could be at risk.

A more promising basis for a CEC Market Assessment would be to use EIA's high oil price scenario. Even that forecast has been viewed as too conservative – but at least it gives alternative fuels a more realistic chance to compete with higher priced fuels in the marketplace. The use of higher priced fuel forecasts minimizes subsidies needed to introduce alternative fuels into the market.

Figure 1 shows how well EIA's Annual Energy Outlook (AEO) reports predicted the 2005 average oil price.

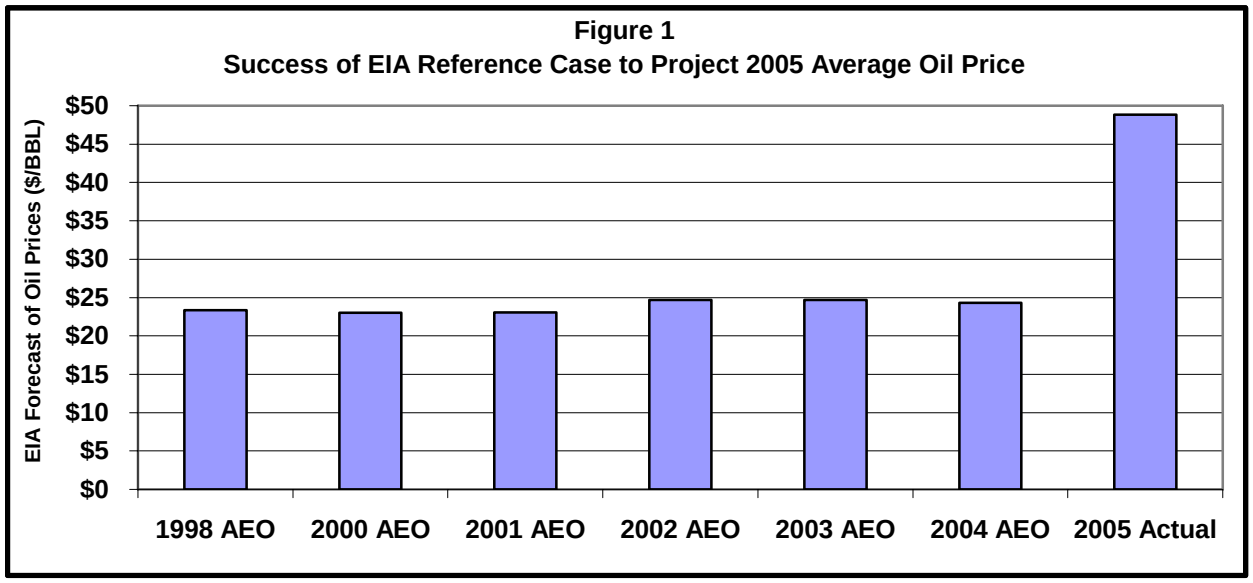


Figure 1 shows that all the projections from 1998 thru 2004 grossly underestimated 2005 oil prices.

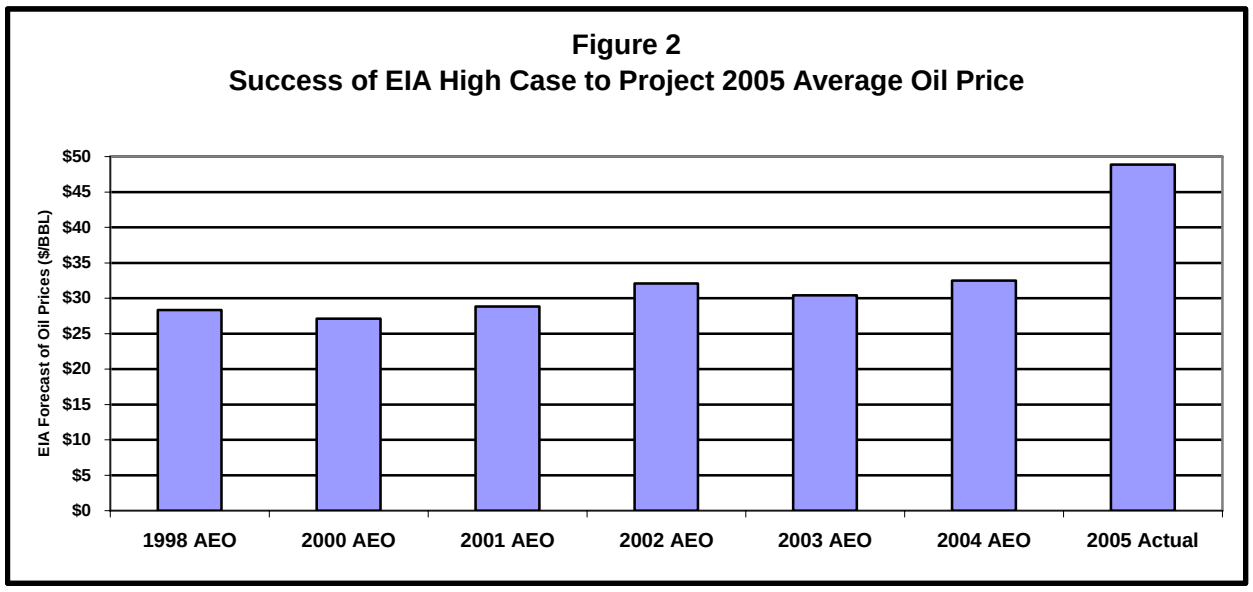
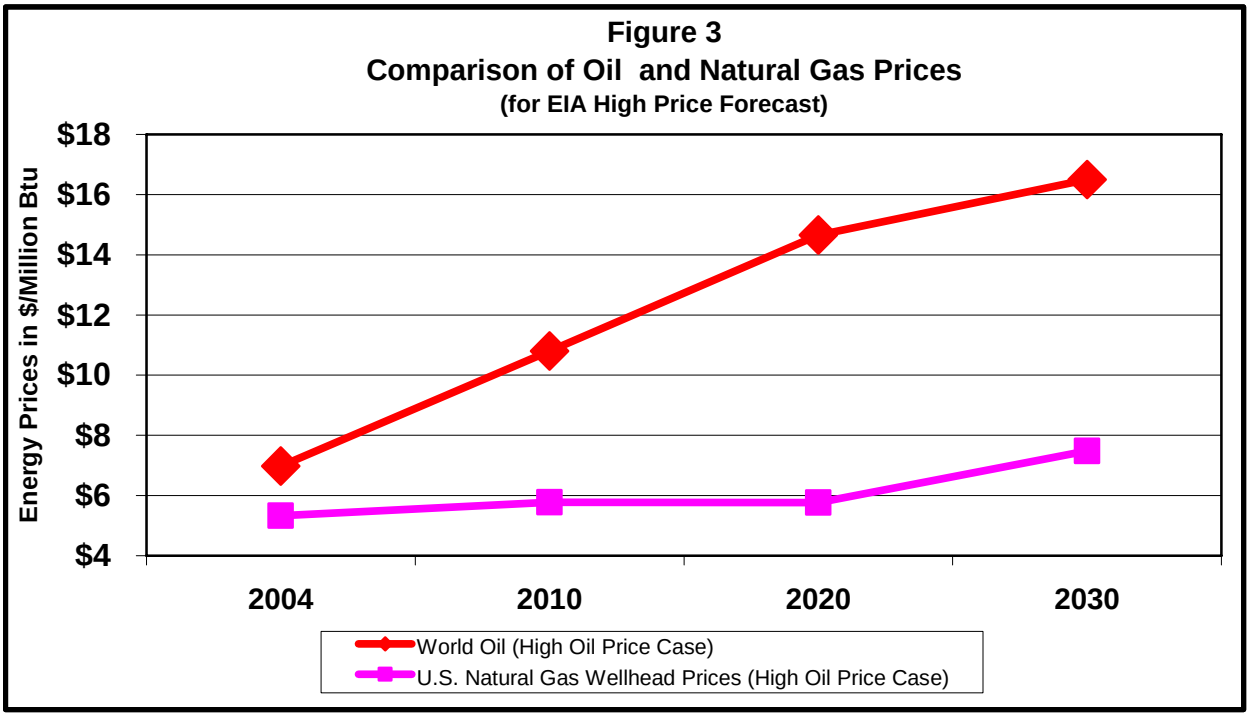


Figure 2 shows how much closer the EIA high oil price forecast was in predicting the average oil prices of 2005. Given that EIA's reference case significantly underestimates real world prices, and that EIA's high oil price case gives closer forecast to actual prices, the CEC should adopt EIA's high price energy forecast for purposes of conducting alternative fuel analyses. In adopting EIA's high price forecast, the CEC will significantly strengthen the cost benefit analyses for alternative fuels and minimize the need for taxpayer subsidies to initiate the markets.

EIA Forecasts More than Oil Prices

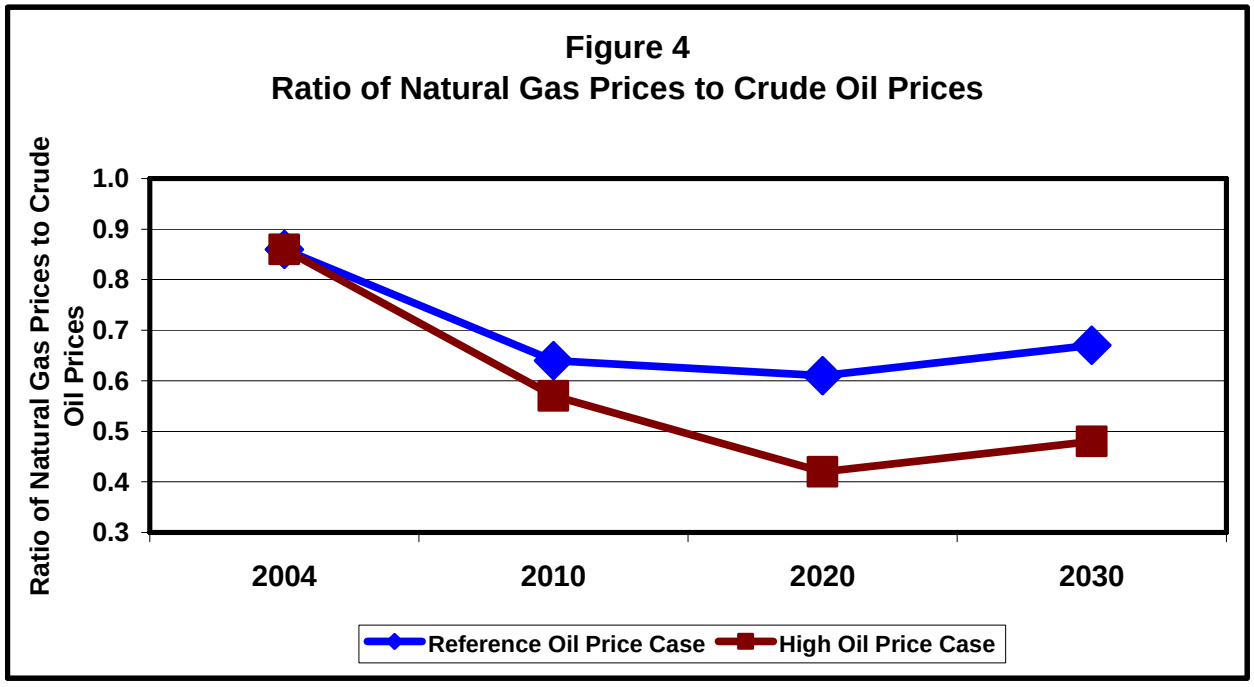
EIA forecasts more than oil prices. They also develop price forecasts for all types of energy for the U.S. In terms of natural gas, EIA forecasts wellhead prices for natural gas as well as delivered retail prices for each natural gas market segment (residential, commercial, industrial, electricity generation, and natural gas as a transportation fuel). EIA also forecasts prices for gasoline and diesel fuel as well as other alternative fuels. Gasoline and diesel forecasts are for the U.S. but backup data does reflect regional price differentials such as west coast pricing for these fuels.

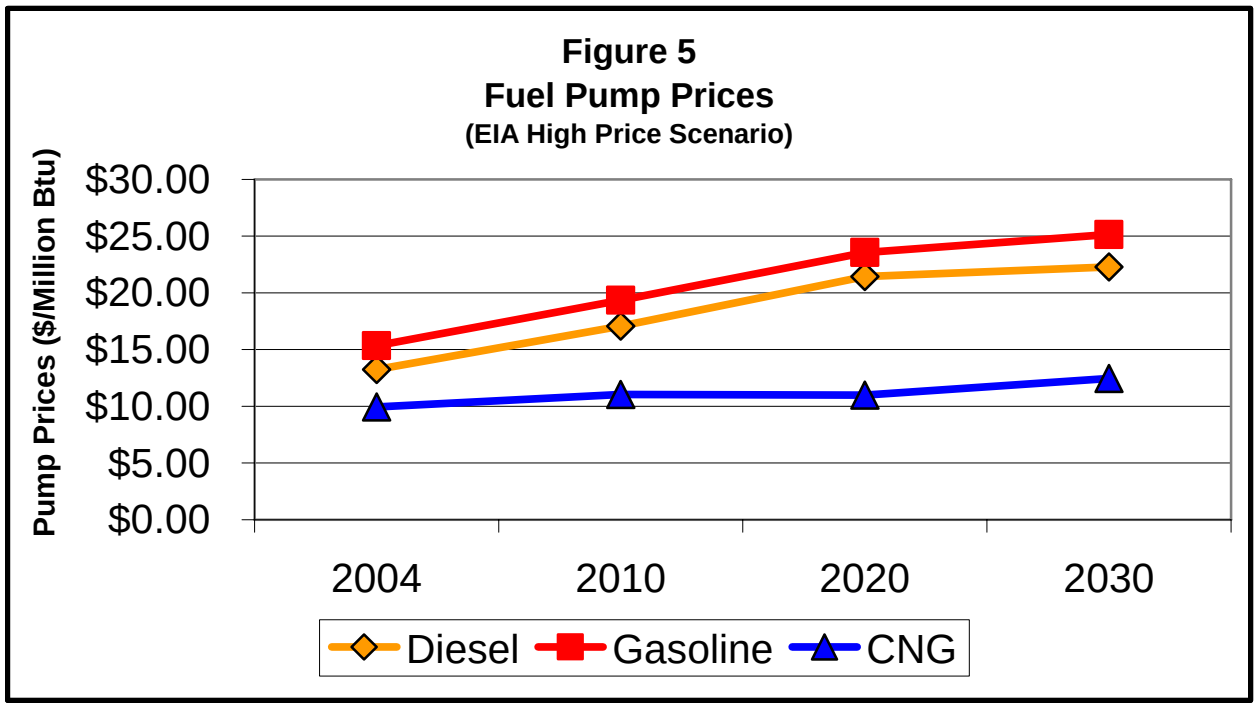
EIA projects a growing price differential between crude oil prices and natural gas well head prices. This can be seen in Figure 3. Figure 3 reflects the EIA High Oil Price Scenario and the corresponding High Natural Gas Price Scenario. Similar curves would be seen for the Reference Case (mid price case scenario) for both fuels – a growing differential between crude oil and wellhead natural gas prices.



The growing differential between fuel prices is seen in Figure 4 – the ratio of natural gas prices to crude oil prices. This shows that while oil prices increase over the years for both the high and reference case scenarios – natural gas prices climb slower – and thus produce a growing price differential between natural gas and gasoline or diesel fuel.

Figure 5 shows graphically the Price at the Pump difference for diesel, gasoline, and natural gas (measured in $ per million Btus). Figure 5 reflects EIA data on the high price forecast scenario. One can see that as oil prices climb, the price differential between gasoline/diesel and natural gas grows – making natural gas a more economic option over time.





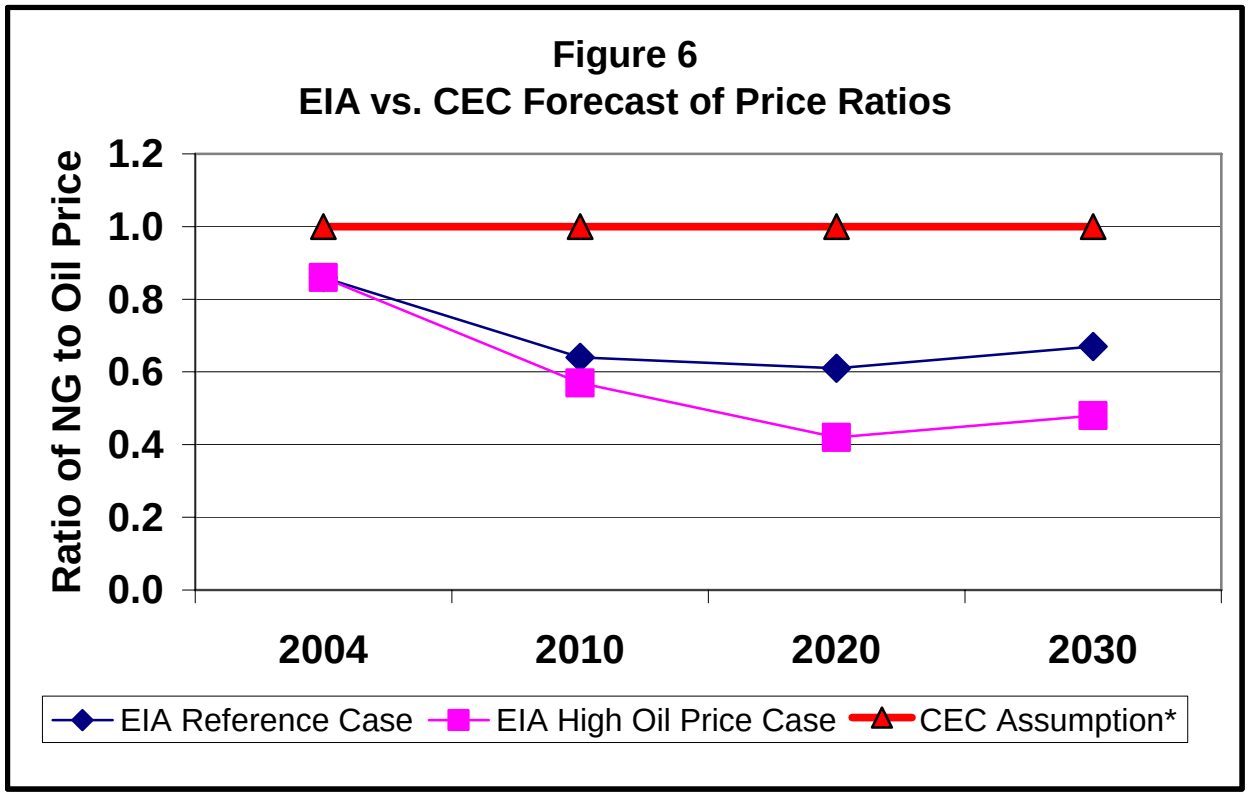
It is therefore disturbing that the CEC while embracing EIA's oil price forecasts would elect to ignore EIA's well developed and sophisticated natural gas transportation fuel price forecast and try to develop its own natural gas fuel price forecast.

CEC's Natural Gas Price Forecast

The CEC is content to use the EIA database and energy forecasts for oil, diesel fuel, and gasoline – but rejects EIA's forecasts for natural gas and natural gas as a transportation fuel in favor of its own projections. The CEC is trying to create a relational database between oil and natural gas prices by comparing the price differentials over the last 26 years. This seems absurd given the much longer track record of the Department of Energy and EIA to analyze and compare not only past relationship but dynamic relationships that are changing the future.

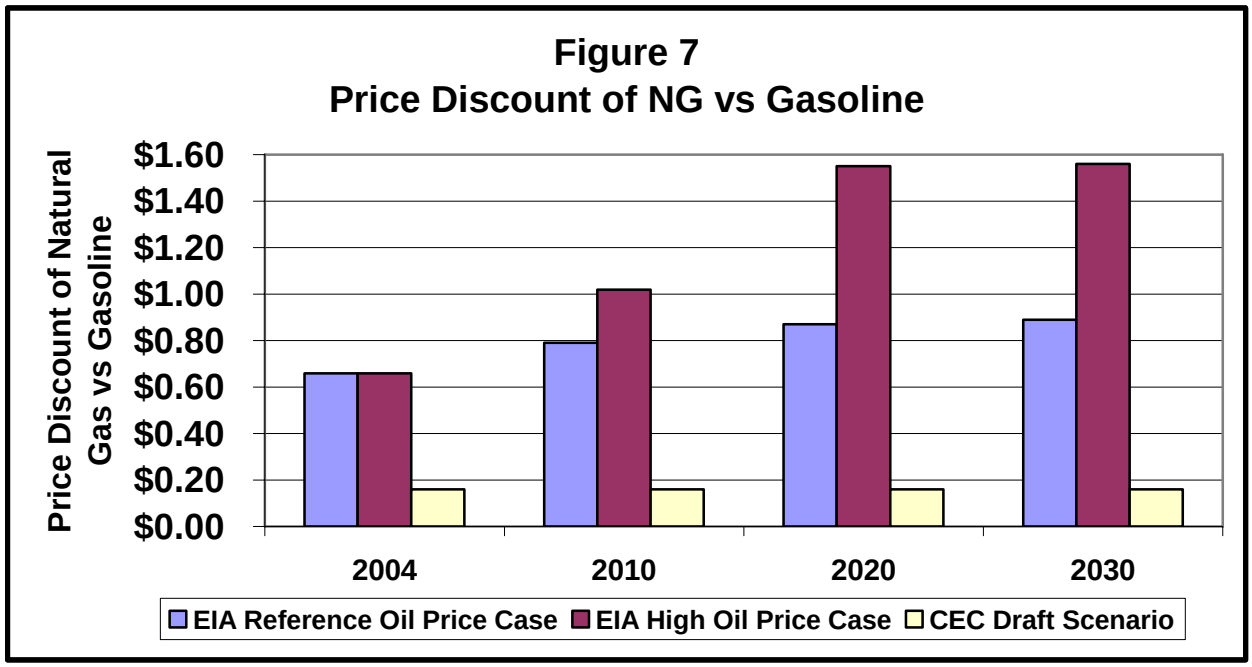
In contrast to the CEC staff's approach, the DOE/EIA's National Energy Modeling System (NEMS) which is used to develop the Annual Energy Outlook (AEO) forecasts is a highly sophisticated forecasting tool supported by a large number of experienced energy professionals. In contrast to the staff's approach, forecasts are peer reviewed and compared with other major forecasts. DOE/EIA periodically performs back cast analyses to evaluate the accuracy of its previous forecasts.

If the CEC uses EIA's forecasts for oil, gasoline, and diesel, then it needs to be consistent and use the entire EIA database forecasts for all fuels – including natural gas. In data the CEC was developing for a natural gas fuel price forecast in May/June of 2006 – the CEC was electing to use a $0.16 per gallon price advantage for natural gas over gasoline. Rather than allowing this price margin to grow over time as the price of oil and natural gas diverge, it elected to fix the price margin advantage at $0.16 per gallon over the entire forecast period to 2030. So instead of having the ratio of natural gas to oil prices appear as the EIA forecast in Figure 4 – the CEC was imposing essentially a 1:1 ratio of natural gas to oil prices as seen in Figure 6.



The impact of CEC's "adjustment" of the natural gas price ratio to oil is destroying on paper the competitive price advantage natural gas has over oil in the transportation fuel market. Natural gas currently is one of the fuels that have a significant price advantage over gasoline and diesel fuel. Figure 7 compares the price differential advantage

that EIA data projects for natural gas vs. gasoline over the forecast period. Also shown in Figure 7 is the $0.16 per gallon advantage the CEC wanted to project over the same forecast period.



Price Forecasting is the Problem

A market assessment of the competitiveness of alternative fuels depends upon the assumptions and energy price forecasts to determine potential market penetration of fuels. A CEC price forecast that suggests that natural gas will only have a $0.16 per gallon price advantage over gasoline will produce a very low market penetration over the next 24 years. Relying on EIA's forecasts of energy prices gives one an entirely different market penetration potential. EIA's data says there is currently a $0.60 to $0.65 per gallon competitive price advantage of natural gas over gasoline (what is actually being seen in the marketplace for large fuel use fleets). EIA projects that this competitive price advantage over gasoline will grow to $0.90 to $1.55 per gallon by 2030 (depending on whether you use the EIA Reference Case or the EIA high price forecast). One would certainly project a much greater market penetration of natural gas in the market if the EIA price differentials between fuels were achieved.

The California NGV Coalition therefore recommends that CEC abandon its efforts to develop its own natural gas price forecast and use EIA forecasts for oil, petroleum fuels, natural gas, and other alternative fuels. The Coalition also recommends that the CEC adopt the EIA High Price Case (vs. the Reference Case) for its determination of future prices. The use of the EIA High Price forecast will more clearly capture the geopolitical instability in world oil prices that we see today and provide a better reference point for alternative fuel penetration in the future.

COMMENTS ON SECTION 1: California's Transportation System

California Goals need Recalibration

When the issue of petroleum dependence emerged several years ago, the analyses principally focused on California's growing demand for petroleum based fuels and the limitations of in-state refinery capacity to address long-term demand. Analyses highlighted the need to reduce future demand for petroleum based fuels to limit the economic disruptions when California refinery capacity went down and higher priced finished fuels had to be imported into the state. This scenario has been highlighted in the 2003 AB 2076 Report and the 2003 and 2005 IEPRs. While the supply/demand balance between California oil refinery capacity and in-state petroleum fuel

demand is still an issue, it has been displaced by world oil prices and world competition for a dwindling supply of conventional petroleum resources. The magnitude and duration of price spikes at the pump that were the concern of the 2003 AB 2076 report are far less than the economic disruptions caused in the last two years with world oil prices peaking at $78 per barrel.

In 2003, the CEC highlighted the need to reduce petroleum demand in California 15% below 2003 petroleum consumption. That continues to be a "goal" that California wants to achieve. But one has to question whether achieving this goal would do anything to avoid the massive economic disruptions to the state caused by oil prices reaching record highs. If the goal of alternative fuel penetration, efficiency gains for vehicles, and development of a California biofuels industry is only to balance supply and demand capabilities for California's refineries – then even if achieved, California will still face major economic disruptions to its economy as geopolitical instability around the world puts upward pressure on world oil prices.

A California strategy that seemed appropriate in 2003 is now woefully inadequate in addressing the future economic needs of California. The CEC and CARB should make a major effort to recalibrate the need for alternative fuels in California. When world oil prices climb, it won't make any difference whether oil used in California is in-state production, from Alaska, or from foreign suppliers – it will all be priced high as a world commodity. The economic impact to the California economy will be orders of magnitude greater than caused by refinery supply disruptions in California.

California needs to look seriously on how large an alternative fuel industry it can develop and support versus trying to quantify specific niches for finite quantities of petroleum fuel displacement for alternative fuel options. Obviously one place to start is taking a more supportive view of fuels like natural gas that do have a competitive price advantage over gasoline and diesel fuel now and have the capability of being more competitive in the future.

2006 Gasoline Prices Caused by High Oil Prices

On page 1-8, there is a discussion of how increases in oil prices impact gasoline prices at the pump. In this discussion, TIAX fails to factor in refinery margins with the increase in oil prices. In California, refinery margins are about 50% meaning that a $50 increase in oil prices will mean a $2 per gallon increase in the price of gasoline at the pump (vs. the $1 per gallon claimed by TIAX). This means that it only takes a $25 per barrel change in oil prices to increase gasoline prices at the pump by $1 per gallon.

World Oil Prices Will Remain High

Here again, the Market Assessment focuses on the EIA Reference Case forecasts for oil prices that predict that oil prices will remain in the $50-60 per barrel range for through 2030. In today's market where we are at $60 +/- per barrel – with OPEC discussing a $60 per barrel price support level – it seems totally inadequate for prediction purposes to imply that we won't get any worse than we are today. From what we know today about world competition for oil and the need to bring online non-traditional sources of oil in the future – it seems more prudent to adopt EIA's High Oil Price projections than continue to use the Reference Case as the benchmark for evaluating future alternative fuel opportunities.

Alternative Fuels are Effective Strategies to Displace Petroleum

Table 1-5 gives an excellent list of lessons learned from California's experience with alternative fuels. Two lessons that should be included in the table relate to fuel pricing and bi-fuel/flexible fuel vehicles.

NGV market development in the early 1990s was based upon bi-fuel vehicles – vehicles capable of operating on either CNG or gasoline. Natural gas prices at the time were indexed to gasoline prices offering customers a substantial price saving over gasoline pump prices. When natural gas utilities were forced to abandon fuel indexing, and petroleum prices dropped – there was no incentive for owners of light-duty NGVs to continue to fuel vehicles with natural gas and fuel use dropped.

The NGV industry strategy was modified to focus on dedicated natural gas vehicle for both the light- and heavy-duty markets. Bi-fuel vehicles and price volatility between natural gas and gasoline represented too large a risk to the NGV industry – not necessarily to vehicle owners but to infrastructure developers. Fuel providers could not risk spending capital to develop stations and have throughput and return on investment suffer when oil prices fell.

With growing interest in FFVs for California, the potential to revisit the bi-fuel scenario for natural gas vehicles is great. In the case of FFVs, it is not necessarily the station owners that fall into this trap but the developers of production facilities for ethanol and biofuels. If efforts to introduce E85 into the market are successful, producers of ethanol will be impacted by falling gasoline prices as E85 customers switch to gasoline whenever it offers a fuel price savings. Decreased revenue and increases in E85 inventories will tend to hurt the overall financial health of producers – endangering the survivability of the market.

Regulations and Incentives Have Had Limited Success in Promoting Alternative Fuels

The Market Assessment implies that there have been "considerable efforts" made nationally and in California to promote and develop alternative fuels – and that these efforts have essentially failed. Table 1-6 lists numerous examples of legislative and regulatory actions but this list does not contain several specific California initiatives that have produced significant achievements in changing the status quo as far as alternative fuels.

In 1998, legislation created the Carl Moyer program to provide incentives to reduce NOX and PM emissions from heavy duty diesel vehicles. In over seven years, the program provided more than $150 million in incentives to reduce emissions. Heavy-duty NGVs were the primary recipient of funds in the on-road area. For over 12 years, heavy-duty NGVs have provided superior emissions to diesel and have thus qualified for Carl Moyer Program funds based on their being cleaner than the heavy duty standard for a given model year. The Carl Moyer Program has been directly responsible for placing more than 5,500 heavy-duty NGVs on the road in California and displacing the lion's share of 100 million gallons per year of diesel fuel.

The CPUC and California Utilities responded to a legislative initiative in the 1990s to create the Low Emission Vehicle (LEV) Program to promote and develop a sustainable market for both NGVs and electric vehicles. Several years after being created, the oil industry intervened and had the CPUC cut program funding 80+%. But before being cut, the utilities were able to make a substantial contribution to infrastructure development and product development that sustains the NGV industry today.

The Carl Moyer Program compliments other regulatory programs like the CARB Transit and Refuse Rule, the SCAQMD fleet rules, the California Clean School Bus Initiative, and the utility LEV programs. Coordinated efforts have been able to achieve significant results in California. And that is the issue here – coordinated efforts.

Essentially the list in Table 1-6 (page 1-23) is a disjointed list of initiatives that has no sustained focus. One of the primary "failures" is the federal Energy Policy Act of 1992. This legislation was to reduce national petroleum demand by 10% by 2000 and 20% by 2010 – very similar to the AB 2076 goals identified in 2003. The federal government, who purchases approximately 60,000 vehicles per year, was identified by the General Accounting Office as being the largest violator of EPACT. FFVs and bi-fuel vehicles were purchased but never operated on alternative fuels – the real intent of the legislation. The Department of Energy was supposed to develop private fleet purchase requirements in 1997/1998 – but never preceded with the mandated rulemaking. The failure of the federal government to comply with their own regulations was the model for other regulated entities to similarly avoid many of the provisions of the regulation. It is thus not a surprise that OEMs have become disenchanted with EPACT and stopped producing NGVs. The federal government in 2006 has developed an alternative compliance strategy for EPACT mandated fleets that actually requires them to use alternative fuels in their vehicles – a novel approach that is 14 years late in making it to the table.

While it is easy to poke fun at policy initiatives and regulations that have gone wrong, the more important focus should be on defining within policy, executive orders, regulations, appropriations, etc. what has to be done to get the results the state needs. It isn't going to take one legislative bill or one regulation to change the status quo. In Table 1-6 under California, there are a number of legislative bills that have been passed. Changing the status quo will require much more legislation and regulation. For example, AB 32 defines what we want to happen in terms of

greenhouse gases. There will be a need for far more legislation and regulation to define how the results will be achieved.

COMMENTS ON CHAPTER 2 – Natural Gas

Current Natural Gas Petroleum Displacement

Natural gas use as a transportation fuel and the current petroleum displacement contained in the Market Assessment are incorrect. In the report, TIAX used obsolete EIA data on natural gas as a transportation fuel. EIA projects national demand for natural gas as a transportation fuel [Table 1] then assigns a percentage of that demand to individual states. California is the largest NGV market in the U.S. In the mid 90s, EIA noted the growth in the California NGV market by noting that 43.11% of the national natural gas transportation fuel market was in California. Since 1997, EIA estimates that the California market represents only 18.55 to 18.77 percent of the national natural gas fuels market. By the late 1990s, it was recognized in the NGV industry that California represented nearly 50% of the national natural gas transportation fuel market.

Table 1
EIA Projected U.S. and California Demand for Natural Gas as Transportation Fuel

Year	U.S. Annual Transportation Fuel Use BCF	Calif % of total U.S. Vehicle Fuel	Calif. Vehicle Fuel (BCF)
1997	8.3	18.73	1.6
1998	9.3	18.55	1.7
1999	11.6	18.69	2.2
2000	12.8	18.66	2.4
2001	14.5	18.67	2.7
2002	15.0	18.72	2.8
2003	18.3	18.71	3.4
2004	20.5	18.71	3.8
2005	22.3		

DOE and EIA realize that they haven't paid attention to the natural gas vehicle market in over 10 years. DOE has a contract with the Clean Vehicle Education Foundation (CVEF) to document and characterize the U.S. NGV market (both throughput and vehicle populations). The Coalition is a subcontractor to the CVEF to document the California market.

Table 2 reflects input from the California natural gas utilities on natural gas throughput for NGVs over the last five years. Natural gas for NGVs is sold under a separate CPUC tariff for each utility. Utilities require separate billing meters for gas sold as a transportation fuel and know precisely the number of stations and annual throughput for NGVs. This information has been provided in annual reports to the CPUC on utility Low Emission Vehicle Programs since 1996. Utility throughput for natural gas vehicle use is also reported to the CEC as part of submittals to the California Gas Report.

Table 2 shows the growth of the CNG market in California. The 100 million therms achieved in 2005 represents 10 BCF of natural gas or 80 million gasoline equivalent gallons of petroleum displacement (at 125,000 Btu/GGE – the same conversion used by TIAX in the Market Assessement). This is far higher than the 3.84 BCF reported in the Market Assessment for CNG. All throughput in Table 2 goes through the utility distribution system. The above volumes don't reflect the volume of natural gas consumed by LNG customers.

Table 2
NGV Throughput for California Utilities

	Station Throughput in Millions of Therms				
	2001	**2002**	**2003**	**2004**	**2005**
SoCalGas					
Compressed	1.74	1.43	1.32	1.60	1.33
Uncompressed	41.79	53.89	57.43	64.12	69.77
SoCalGas Total	**43.53**	**55.32**	**58.75**	**65.72**	**71.10**
SDG&E					
Compressed	0.18	0.19	0.22	0.18	0.27
Uncompressed	5.28	6.81	7.97	8.36	9.30
SDG&E Total	**5.46**	**7.00**	**8.19**	**8.54**	**9.57**
Sempra Total	**48.99**	**62.32**	**66.94**	**74.26**	**80.67**
PG&E Total	**10.84**	**13.11**	**14.99**	**18.89**	**19.84**
Total Calif Utilities	**59.83**	**75.43**	**81.93**	**93.15**	**100.51**
Percent Growth		**26.1%**	**8.6%**	**13.7%**	**7.9%**

LNG use in California is growing. There are two suppliers delivering LNG into the state. They combine for 10 loads of LNG per day into the state. These are 10,000 gallon loads that are delivered to customers for dispensing as either LNG for heavy-duty vehicles or CNG for light-, medium-, or heavy-duty vehicles. None of these volumes are captured in utility throughput numbers.

LNG use in the state amounts to 36.5 million gallons per year or an additional 31 million therms per year in natural gas content or 24 million GGE per year. These numbers show that 23% of the natural gas consumed in California is in the form of LNG that currently bypasses the natural gas distribution system in California. LNG volumes need to be added to the 100 million therms of CNG or 80 million gasoline gallon equivalents from the utilities, bringing natural gas use for the state to approximately 104 million gallons in 2005. Given the growth rate of both CNG from the utilities and LNG growth, natural gas fuel use in California in 2006 will be more than the original 112 million gallons anticipated for 2025 in the 2003 AB 2076 Report and 2003 IEPR. This essentially says that the NGV industry is 19 years ahead of schedule in meeting the CEC's unreasonably low projections.

Combined CNG and LNG use in the state should be corrected to 104 million gallons in 2005 (vs. the total 54 million gallons for 2004 reported in the Market Assessment). This natural gas usage reflects a small percentage (0.5%) of the transportation fuels market in California (19.9 billion gallons per year). But since 90% of the natural gas through the utility system displaces diesel – and nearly 100% of the LNG imports displace diesel – natural gas penetration of the 4.1 billion gallon diesel market is more than 2.2%. This is not an insignificant amount given that everyone takes pride in showing that ethanol use of 900 million gallons per year is displacing 5.7% of gasoline.

The size of the current market is important for three reasons. First, the goals expectations in the 2003 report (and the 2005 IEPR) reflect fuel pricing forecasts that indicated that indicated that NGV growth could not be sustained on economics. If the economics of the natural gas had been more correctly stated, it would have warranted a much more favorable assessment of market growth over the long term. Environmental incentives for heavy-duty vehicles, such as the CARB Moyer Program, have been less effective since 2003 in promoting NGVs. Economics are now

the most important factor for market growth. Secondly, if the economics were as poor as staff reported, then market growth to today's levels would not have been possible. Given the market growth to date, it is important for the CEC to revise its price forecasts for natural gas to correctly capture the future market potential of the fuel. And thirdly, the current size of the California NGV market means that future market projections need massive recalibration.

Fuel Consumption per Vehicle

For over a decade, the NGV industry has focused market development efforts on high fuel use fleets. The vehicle population reported in the Market Assessment is 26,700 of which 5,400 are heavy duty vehicles. The California Transit Association's 2005 annual report shows that there are 3,800 CNG transit buses as well as about 200 intermediate size CNG shuttles/buses. Transit buses consume more than 55 million gallons per year (an average of over 14,000 gallons per year per vehicle) of CNG/LNG fuel or about 50% of the states natural gas transportation fuel. Over 1,260 heavy-duty refuse trucks consume an additional 13 million gallons of fuel. The state's fleet of 900 CNG school buses consumes an additional 3 million gallons. The state's CNG taxi fleet consumes an additional 5 million gallons. These modest size fleets in themselves consume approximately 76 million gallons of the total. The remainder of the NGVs in the state (about 21,000 vehicles) consumes the remaining 27 million gallons – for an average per vehicle consumption of 1,267 gallons per vehicle average – mainly in fleet vehicles.

The TIAX Market Assessment notes that 750,000 medium- and heavy-duty vehicles in California consumed 4.1 billion gallons of diesel fuel in 2004. This is an average of nearly 5,500 gallons per vehicle. The NGV industry thus feels that given current and future price differentials between diesel and natural gas, that NGVs will be able in 20 years to successfully penetrate 100,000+ of the highest fuel use medium- and heavy-duty vehicles and displace over 1 billion gallons of petroleum fuel displacement from this market alone.

Station Infrastructure

Station infrastructure is another area in the TIAX report that deserves further clarification. Figure 3 shows the growth of CNG station infrastructure over the last five years. This information again is reported in utility annual LEV reports to the CPUC.

As one can see, the growth of CNG stations in California is significant. It is no wonder that TIAX personnel were confused by different numbers given by different individuals over time. A recent poll of California stations showed that the total number of stations in California had grown from 383 at the end of 2005 to 408 by July of 2006. It should be noted that the utility station account don't include residential home fueling appliances (Phill). Given the new utility tariffs for residential home refueling, residential customers are not required to have separate meters for measuring NGV fuel consumption.

A subset of this station infrastructure is Public Access stations. The number of public access stations is growing due to local public policies that provide financial incentives to companies installing natural gas fueling for their fleet if the company also adds public access.

The numbers of public access stations increase and decrease according to other factors besides infrastructure expansion. Some stations that have been public for many years do not have the capability of adopting payment via major credit cards. Some of these stations have closed their operations to the public when other more convenient CNG stations open in their area. Utilities like PG&E have even restricted public access to small windows of opportunity for the public as their internal fueling requirements grow and servicing the PG&E fleets takes a priority. Private stations that have offered public access within their yards have had to close their facilities to public access as security and liability issues have arisen since 911.

Figure 3
Growth of California CNG Infrastructure

Category	CNG Station Count for Calif. Utilities				
	2001	2002	2003	2004	2005
SoGalGas Compressed	16	17	20	22	22
SoCalGas Uncompressed	133	143	159	171	185
SoCalGas Subtotal	**149**	**160**	**179**	**193**	**207**
SDG&E Compressed	5	6	6	6	6
SDG&E Uncompressed	19	24	27	27	27
SDG&E Subtotal	**24**	**30**	**33**	**33**	**33**
Sempra Energy Total	**173**	**190**	**212**	**226**	**240**
PG&E Total	**94**	**122**	**118**	**142**	**143**
Calif. Utilities Total	**267**	**312**	**330**	**368**	**383**
Percent Growth of Stations		**16.9%**	**5.8%**	**11.5%**	**4.1%**

In addition to the stations listed in Table 3 are the 41 LNG/LCNG stations that have been built over the last 10 years. These 41 stations represent 9% of the total number of stations (408 plus 41 = 448) and dispense 23% of the natural gas fuel in California.

Station infrastructure capacity has changed significantly since the mid 90s. Ten years ago, the industry was trying to build stations with a capacity of 100-200 standard cubic feet per minute (SCFM) compressor capacity for $350,000 to $400,000. Today, public access stations are being installed with 1,000 SCFM capacity for about $1 million. Very large CNG stations for transit fleets (5-6,000 SCFM) are being installed for $2-4 million.

Product Availability

Many point to the lack of NGV products as a negative in promoting natural gas vehicles. They view the market potential for vehicles as limited. Nothing could be further from the truth. In the heavy-duty arena, the same engines used to power transit buses, refuse trucks, school buses, street sweepers, etc. can be used in nearly any heavy-duty vehicle application. The heavy-duty vehicle market is composed of chassis builders that integrate nearly any engine a customer wants into its chassis. The NGV industry has focused on some core markets like transit and refuse, but essentially any heavy-duty vehicle is a candidate for development as an OEM product. Transit and refuse have been target markets driven by environmental regulations where natural gas has superior performance compared to their diesel counterparts. High petroleum fuel prices in the last two years are driving customers to demand natural gas in other chassis to be able to exploit fuel savings advantages of operating natural gas vehicles. The NGV industry views it is only a matter of time before product offerings are expanded.

The NGV industry is launching a 400+ HP engine to address the needs of the Class 8 truck market in California. This engine (ISX engine by Westport Innovations) will deliver diesel efficiency and fuel economy for trucking applications. California pioneered the Interstate Clean Transportation Corridor (ICTC) program years ago to address long haul trucking in the western states. The infrastructure built as part of the ICTC program is still in place and capable of addressing the needs of long haul trucks.

State policy initiatives need to focus on education efforts to make the public and businesses aware of alternative fuel options. Public education can accomplish a great deal in generating market pull for new natural gas products.

The light-duty market is similar to the heavy-duty market. There is no gasoline engine in the market that couldn't be modified to operate on natural gas and meet the most stringent environmental standards. Every light-duty manufacturer in the U.S. offers a factory OEM natural gas product somewhere in the world today. Public education and awareness can create consumer demand for new products.

First Cost Premiums and Federal Incentives

NGVs have always been burdened by higher first costs than their gasoline or diesel counterparts. For light-duty vehicles, the price differential has ranged from $4,000 to $9,000. For heavy-duty vehicles, the price differential is anywhere from $20,000 to $60,000 depending upon the amount of fuel capacity desired by the customer. In high fuel use fleets like transit that operate vehicles for 12 or more years, fuel consumption of 15,000 gallons per year per vehicle and fuel savings of $0.50 or more per gallon are more than sufficient to cover the high $50,000 first cost differential of the vehicle. In high fuel use light-duty fleets like taxis and shuttles, fuel savings on 7,000 to 8,000 gallons per year per vehicle can offset the first cost differential.

In 2005, the federal Energy and Highway bills introduced new federal incentives into the equation. Purchasers of alternative fuel vehicles can take advantage of a federal tax credit ranging from $4,000 (light-duty) to $32,000 (heavy-duty) per vehicle. A federal tax credit of $0.50 per gallon is also available to fuel providers – identical to the tax credit ethanol has had for years. These federal tax credits should help expand the market for NGVs beyond just the high fuel use fleet customers. And while the tax credits are currently set to expire in three years – the industry is working to request that these tax credits be extended to at least 2014. The tax credits are examples of energy policy that is purposefully designed to stimulate market expansion of alternative fuels, displace petroleum, and diversify energy options for transportation. The state of California needs to look hard at this tax policy and formulate complementary policies that will further expand the NGV market in California.

The premium cost of NGVs will come down over time as sales and economies of scale are achieved by OEMs.

Factors that may Discourage Substantial NGV Growth in California

Table 2-14 highlights several factors that may discourage substantial NGV growth in California. One has to look at each of these "factors" and decide which are real barriers and which are solvable by new initiatives.

The limited variety of light-duty OEM product offerings is something that can only be solved by customer demand. If California really wants to foster the growth of alternative fuels, it also has to be prepared to submit orders to OEMs for the entire range of products it wishes to see in the market. The state can't want to promote NGVs but not purchase the vehicles that are available. The state needs to exercise its purchasing power by demanding a suit of alternative fuel vehicles and use not purchasing from an OEM if it doesn't offer the desired fuels. All U.S. OEMs manufacture and sell NGVs overseas. There is no reason that they can't sell products in California. The state needs to take the lead and set the example.

The decreased emission advantage of NGVs vs. diesel products is not an issue. Right now, heavy-duty NGVs will be introduced in 2007 that meet the 2010 emission standards. Until such time as diesel does meet the emission of NGVs – NGVs still have an advantage that California needs in the marketplace.

The limited selection of heavy-duty natural gas engines is not a market deterrent. Existing natural gas engine manufacturers would like nothing more than to develop and introduce more engines. The existing engines

(including the ISX engine for Class 8 trucks) are sufficient to address 85% of the existing truck market. Greater consumer education and demonstrations can create significant market pull for natural gas integration into new truck chassis.

Certainly public interest in hybrids, biofuels, and hydrogen is much higher than interest in NGVs. Other than hybrids, the other fuels still don't have much of a market presence and the costs associated with those fuel options are still unknown. There is no reason that hybridization can't be applied to NGVs. It is ironic that people are "concerned" about the price premium of light-duty NGVs but willingly accept the higher price of a hybrid. Consumer education that the Honda Civic NGV can qualify for up to $5,000 in federal tax credits (vehicle and home fueling unit) and can produce fuel at home for $1.25 per gallon may significantly increase public interest in NGVs.

Concerns about LNG availability have been an issue. Nearly all the LNG used in California is transported in from other states. LNG can be manufactured in California from pipeline gas, landfills, or biomass. One major fuel provider is planning to build a major LNG plant in California of sufficient size to equal or exceed the LNG transportation fuel production of the Sound Energy Solutions LNG terminal proposed for Long Beach. In the long run, LNG whether from LNG terminals or from pipeline or renewable sources is not going to be a problem.

NGV RD&D funding for engine development is insignificant when compared to funding for such technologies like hydrogen fuel cell vehicles. The advantage that NGVs have is the fact that the technology is already developed, proven, and exceeding current emission standards. By next year, heavy-duty engines meeting 2010 standards will be on the market. This will be achieved by spending millions of dollars vs. the billion or so dollars still being spent by diesel engine manufacturers to achieve the illusive 2010 standards. On the light-duty vehicle side, technology exists to achieve the cleanest of emission standards today. The Honda Civic is noted as being the cleanest internal combustion engine vehicle ever certified in the world. Modest amounts of funding are needed to engineer and do the vehicle integration of natural gas engines in heavy-duty vehicles.

EPACT continues to focus on purchase of vehicles vs. use of alternative fuels in vehicles. If California wishes to truly expand alternative fuel use, it will have to do much better than the federal government on implementing regulations and enforcing compliance.

CONCLUSIONS:

Natural gas is currently better positioned than any other fuel option to help California down the road to petroleum diversity. Fuel usage for the industry in California has been seriously underestimated by DOE/EIA and the CEC. More than 100 million gallons of petroleum were displaced in 2005 by natural gas through more than 400 stations. Infrastructure expansion has been significant with public policy incentives to build public access stations rapidly expanding a public access network of stations. Economics, not emissions, is the major driver for market expansion today. Natural gas is sold at a substantial discount to gasoline or diesel fuel for high fuel use fleets. Residential fueling tariffs by the major California utilities offer the consumer the ability to "manufacture" their own fuel for about $1.25 per gallon. The industry in 2006 has introduced a natural gas engine for the Class 8 truck market that can duplicate the performance and fuel efficiency of diesel. Plans are underway to build California's first large scale LNG production plant. Federal tax credits for vehicle purchases, building infrastructure, and fuel tax credits will be a major stimulus to the industry. NGVs still hold a significant emission advantage over diesel vehicles with 2010 emission engines being offered for sale in 2007. With greenhouse gases becoming a major issue for California, NGVs deliver 20% or more greenhouse gas reductions in both the light-duty and heavy-duty markets. The NGV industry also has a business model for market expansion that does not require the participation of the oil industry at this time.

Natural gas as a transportation fuel has great potential to assist the state achieve its petroleum displacement goals. Projections of potential market impact have to be significantly revised. The NGV industry stands behind the projection that 1-2 billion gallons of petroleum can be displaced in California by 2030.

If you have any questions, please don't hesitate to call me.

Sincerely,

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