



California Natural Gas Vehicle Coalition

January 23, 2009

California Energy Commission
Dockets Office, MS-4
1516 Ninth Street
Sacramento, CA 95814-5512

RE: Docket # 08-ALT-1 AB 118 Advisory Committee

Dear Commissioners Boyd and Douglas:

The California Natural Gas Vehicle Coalition (CNGVC) comprises natural gas utilities, manufacturers of natural gas engines and vehicles, component part manufacturers, fuel providers, and fleet operators of natural gas vehicles. The CNGVC is pleased to submit written comments on the draft *Investment Plan for the Alternative and Renewable Fuel and Vehicle Technology Program* that was the subject of the AB 118 Advisory Committee meeting on January 8. These comments follow and are consistent with the oral presentation we made to the Advisory Committee on January 8.

The CNGVC applauds the work done by staff to develop the draft AB 118 Investment Plan and believes it is largely on the mark. It recognizes the importance not only of the state's 2050 goals for clean transportation fuels, but also its statutory requirements to reduce greenhouse gas emissions by 2020. The Investment Plan appropriately balances the need to deploy available technologies that can help achieve 2020 goals and build the foundation upon which fuels and technologies can develop further to meet the 2050 goals.

The CNGVC strongly believes natural gas and natural gas vehicles have a key role to play in meeting both the 2020 and 2050 clean fuel targets. Conventional natural gas meets and exceeds the 2020 Low Carbon Fuel Standard target of a ten percent reduction in carbon intensity – today. And we believe the development of renewable biomethane, with its extremely low carbon intensity, must play an indispensable part in California's transportation fuel future if we are to meet the very rigorous 2050 goals. We strongly urge the Commission and Advisory Committee to re-examine the potential and the opportunities for biomethane used as a transportation fuel.

The attached includes more specific and detailed comments on the draft AB 118 Investment Plan. Our thanks and appreciation go to the CEC staff for their thoughtfulness and hard work in preparing the plan. We hope the Advisory Committee and Commission will give full consideration to the near- and long-term attributes of natural gas and renewable biomethane in a portfolio of transportation fuels that will achieve the state's alternative fuel and greenhouse gas emission reduction goals.

Sincerely,

A handwritten signature in black ink that reads "Pete Price".

PETE PRICE
Executive Director

**COMMENTS OF THE
CALIFORNIA NATURAL GAS VEHICLE COALITION
ON THE INVESTMENT PLAN FOR THE ALTERNATIVE AND
RENEWABLE FUEL AND VEHICLE TECHNOLOGY PROGRAM
January 23, 2008**

1. Draft Investment Plan is Consistent with AB 118, Related State Policies and Advisory Committee Criteria

The State Legislature and administrative agencies have been very active over the last five years in adopting policies and developing programs to increase the use of alternative fuels and reduce greenhouse gas emissions. One of the most important responsibilities of the California Energy Commission (CEC) pursuant to AB 118 and AB 109 (hereafter referred to as AB 118) is “to develop and adopt an investment plan to determine priorities and opportunities for the Alternative and Renewable Fuel and Vehicle Technology Program...” (HSC 44272.5(a)). The first test of the Investment Plan, then, is whether it meets the requirements of AB 118 and is consistent with other important state policies, such as AB 32, AB 1007 and the Low Carbon Fuel Standard, as well as criteria established by the Advisory Committee.

The CNGVC believes the current draft of the Investment Plan does meet this important consistency test.

a) AB 118: AB 118 (HSC 44272(a)) requires the Alternative Fuel and Vehicle Program to provide funds “to develop and deploy innovative technologies that transform California’s fuel and vehicle types to help attain the state’s climate change policies.” The very next sentence declares that “[T]he emphasis of the program shall be to develop and deploy technology and alternative and renewable fuels in the marketplace, without adopting any one preferred fuel or technology.” AB 118 also limits funding eligibility to, among others, “[D]emonstration and deployment projects that optimize alternative and renewable fuels for existing and developing engine technologies” (HSC 44272(d)(2)).

AB 118’s emphasis on deployment of existing technologies and on a diversity of fuels is reflected in the Investment Plan’s attention to the early GHG reductions that can be achieved by commercially available low carbon fuels like natural gas. Earlier proposals before the AB 118 Advisory Committee to all but eliminate funding for natural gas and natural gas vehicle projects not only ignored the substantial short- and long-term gains from including natural gas in a portfolio of alternative fuels. It also directly contradicted the clear intent of AB 118. The current draft of the Investment Plan rectifies that error and proposes an investment strategy consistent with the early deployment/early gains approach adopted by the State Legislature in AB 118.

b) Related State Policies: AB 118 does not exist in a policy vacuum, but in the context of a set of related policies, including:

- AB 1007, which directed the CEC and the Air Resources Board (ARB) to develop a plan to increase the use of alternative fuels in California.
- AB 32, which requires the state to reduce its greenhouse gases emissions to 1990 levels (or about 30%) by 2020.
- A Low Carbon Fuel Standard (LCFS), established by Executive Order, which requires the state to reduce the carbon intensity of its transportation fuels by 10 percent by 2020.

AB 118 can be seen as a direct descendant of AB 1007, because its funding creates a means of implementing recommendations from the AB 1007 report. That report and its supporting documents showed that even conventional natural gas has “a high potential for greenhouse reductions on a well-to-wheels basis (11-23% HDVs, 20-30% LDVs) as well as substantial potential to offset petroleum

consumption (up to 99%).”¹ The AB 1007 report found that “natural gas use in heavy-duty vehicles alone could represent about 36 percent of the freight and off-road vehicle use by 2050.”²

The Low Carbon Fuel Standard and AB 32 are closely linked, because the LCFS has been identified by the ARB as an Early Action item for achieving needed GHG reductions from transportation fuels and it is a distinct part of the AB 32 Scoping Plan. Both the statutory requirement in AB 32 and the executive directive in the LCFS is for the state to meet a 2020 GHG emission reduction target. While the Governor issued an Executive Order in 2005 (S-03-05) that established non-statutory GHG emission reduction targets for 2010, 2020 and 2050, AB 32, which was enacted and signed a year after the Executive Order, established an enforceable GHG emission reduction target only for 2020.

We make this point not to quarrel with the state’s goal of reducing GHG emissions to 80% below 1990 levels by 2050. In fact, the CNGVC embraces that target and strongly believes natural gas, especially renewable biomethane, has an important role to play in meeting the 2050 target.

But as much as we share the Advisory Committee’s desire to achieve the far-reaching 2050 GHG reduction targets, we believe it is important for the Advisory Committee and the Commission to take seriously the explicit statutory directive in AB 32 to achieve the 2020 GHG reduction target and the explicit executive directive to reduce the carbon intensity of the state’s transportation fuels by 10% by 2020. The Commission simply cannot casually look past 2020 in its desire to reach the 2050 targets. The law does not allow you to do so. It requires you to meet the 2020 target.

The AB 118 Investment Plan, therefore, can only be consistent with these important policies if it ensures the state will achieve the 2020 GHG reduction targets embodied in AB 32 and the LCFS. To the extent feasible, the plan also should build a foundation that will make it possible for the state to achieve the important, albeit non-statutory, 2050 GHG reduction targets. We believe the Investment Plan takes just such an approach.

c) Advisory Committee Criteria: Finally, in previous meetings of the Advisory Committee, staff has proposed and the Advisory Committee has accepted a two-step process to guide the appropriate allocation of AB 118 funds:

- Step 1: Establish the relative contributions of each fuel and vehicle category to meeting 2020 and 2050 goals.
- Step 2: Conduct a “gap analysis” to determine where existing public and private funding is available and where gaps exist in needed funding to meet AB 118’s goals.

Various staff reports and proposals have been submitted to carry out these two steps, and at the last Advisory Committee meeting on January 8, no objections were expressed to the staff’s approach in employing these two steps nor in the specific findings of the two-step analysis. Yet on January 8 some parties objected to the proposed funding allocations that were based on the two-step analysis, specifically arguing that the funding gap identified for natural gas and natural gas vehicles should be ignored or downplayed.

CEC staff reached conclusions on funding needs based on an analytical approach endorsed by the Advisory Committee. The accuracy of the staff’s analysis has not been challenged. We believe it is inappropriate and inconsistent with the Advisory Committee’s own accepted criteria to now argue that the results of the analysis should not be followed in determining the proper allocation of funds. We believe the staff has followed those established criteria in conducting its analysis and has accurately made funding recommendations based on the results of that analysis.

2. Draft Investment Plan Achieves an Appropriate Balance Between 2020 and 2050 Goals

There was much discussion at the January 8 workshop about whether the Investment Plan should focus on achieving the 2020 or 2050 GHG reduction goals. Several Advisory Committee members expressed

concern that the Investment Plan provided too much funding to near-term projects at the expense of projects that would enable the state to achieve the 2050 GHG reduction targets.

The CNGVC believes this is a false dichotomy. The statutory 2020 goals should not be pursued without any recognition of the state's desire to achieve significantly greater GHG reductions by 2050. But for several reasons it is at least as important that the Investment Plan should not focus on projects believed to achieve the 2050 targets without any attention to meeting the 2020 goals:

- **The law requires the state meet the 2020 GHG reduction goal.** AB 32 has a mandate to reduce GHG levels to 1990 levels by 2020. The LCFS, which is an explicit part of the ARB's strategy to meet the AB 32 mandate, requires that the carbon intensity of transportation fuels be reduced by 10% by 2020. It is essential, therefore, that the AB 118 Investment Plan emphasize projects that ensure 2020 compliance.
- **The draft Investment Plan is a two-year spending plan.** CEC staff has stressed that the Investment Plan is a dynamic document focused only on the first two years of proposed funding. This initial spending plan should focus heavily on fuels and technologies with known deployable benefits and should be revised as necessary to reflect the latest technological developments and funding needs.
- **Step-by-step technological progress, not a priori speculation, should guide long-term funding priorities.** An over-emphasis on "2050 projects" in the first years of the Investment Plan will lead the state down the slippery slope of picking "winners" instead of letting them emerge based on technological advancements. Simply put, we cannot know with any degree of certainty in 2009 which technologies will actually be capable of delivering the large and widespread GHG emission reductions needed to meet the 2050 goals. We urge the Commission to adopt a disciplined funding approach that builds on tangible indications of technological advancement.
- **2020 compliance will build a foundation for 2050 compliance.** First generation alternative fuel technologies will build the bridge to subsequent generations of technological advancement that will be necessary for the state to meet its rigorous 2050 goals. The use of conventional natural gas in vehicles, for example, establishes a platform for the use of other gaseous fuels, such as hydrogen; existing natural gas fueling stations can easily be upgraded to accommodate hydrogen. The development of biomethane as a renewable natural gas offers huge untapped opportunities to dramatically reduce the carbon intensity of the state's transportation fuels. In fact, the first generation of all major alternative fuels will pave the way for lower carbon alternatives in the future: for example, corn ethanol to cellulosic ethanol and plug-in hybrids to battery electric vehicles.

Broadly speaking, the CNGVC believes the draft Investment Plan recognizes the importance of meeting the 2020 goals, not only as a matter of compliance with the law but also as the surest path to achieving the 2050 targets as well. We believe staff capture the right approach when they explain the funding recommendations on page 23 of the draft Investment Plan:

The proposed funding recommendations are based on percentage allocation for each fuel and vehicle category on the analysis of relative GHG reductions projected from the present to the AB 32 requirement for 2020, with the intent of meeting the 2050 goals. A funding strategy that emphasizes 2020 goals spurs commercial development of market-ready clean fuels and technology, which fulfills 2020 state mandates and maximizes reductions of GHG emissions in the earliest timeframes possible. This would generate additional private investment to accelerate advances in new fuels and technologies and provide time for technology to mature to achieve even greater amounts of GHG emission reductions and achieve the 2050 goals. As a result, this approach would stimulate step-by-step commercial successes that enhance and quicken the transition to greater uses of super-ultra-low and ultra-low fuels and technologies from the low-carbon fuels and technologies sought in 2020 policy objectives. (Emphasis added)

3. Natural Gas, including Renewable Biomethane, Will Play a Key Role in Achieving a Diverse Transportation Fuel Portfolio that Can Meet 2020 and 2050 Goals

Natural gas is uniquely positioned to help the state meet both its 2020 LCFS goals and its long-term 2050 GHG reduction target. Conventional natural gas is the most widely used alternative fuel that meets the 2020 LCFS standard today. And renewable biomethane contains huge untapped potential to develop an extremely low carbon transportation fuel. The Investment Plan largely overlooks the tremendous GHG-reducing potential of biomethane as a transportation fuel; for example it does not include the availability of biomethane in estimating GHG reductions to 2050 in light-duty or medium- and heavy-duty vehicles. Given that both these estimates show California failing to meet the 2050 GHG reduction goals, we urge the Commission to reconsider the contribution that renewable biomethane can make to achieving the 2050 target.

a) Natural gas meets the 2020 goal today:

Conventional natural gas has been the most successful alternative fuel of the last 20 years. It is clean, low carbon, affordable and available.

- Natural gas is an inherently cleaner burning fuel than diesel or gasoline, with lower tailpipe emissions of criteria air pollutants. Heavy-duty natural gas engines, for example, were certified to meet the state’s very tough 2010 NOx standard (0.2 g/bhphr) in 2007, three years earlier than required.
- Natural gas achieves significant GHG reductions and complies with the LCFS today. Based on the latest carbon intensity (CI) figures, recently amended by the ARB, the CI for natural gas is 28% lower than diesel fuel and 30% lower than gasoline. Even if the CI of diesel and gasoline is reduced by 10% to meet the 2020 LCFS, the CI for natural gas will still be 20% lower than diesel and 22% lower than gasoline. It is worth remembering that the ARB’s determination of a fuel’s carbon intensity takes into account its energy efficiency, meaning that natural gas still has a much lower carbon intensity than diesel fuel even after accounting for diesel’s higher energy content.
- Natural gas is the most affordable transportation fuel available for commercial and public use today. According to the Clean Cities survey from October 2007 to October 2008, a period that experienced wide swings in fuel prices, a gallon equivalent of CNG cost 28% less per gallon than diesel (\$2.90 vs. \$4.01) and 25% less than gasoline (\$2.60 vs. \$3.49). Even those costs understate the true savings to most users of natural gas, because 90% of CNG used in California is consumed by high use fleets like transit buses, school buses and refuse trucks; their costs average \$1.45 to \$1.85 per gallon equivalent. A 2005 TIAX study³ determined that the life-cycle cost of various heavy-duty natural gas vehicles equals its diesel counterpart even at very low oil prices. The annual benefit to the vehicle owners is substantial even at oil is priced at \$60 per barrel, a very reasonable price that most observers expect to be much higher in the near future.

	<u>Break-Even Price of Oil</u>	<u>Annual Benefit @ \$60/barrel</u>
Refuse Trucks	\$21 / barrel	\$ 4,700
Transit Buses	\$30 / barrel	\$ 2,900
Short-haul Trucks	\$28 / barrel	\$ 5,300

- In stark contrast with petroleum, 98% of natural gas comes from North America, with fully 85% from the U.S. and 13% from Canada. And in contrast with earlier projections, available supplies of North American natural gas are growing, not declining. Technological advances have allowed access to vast shale gas resources in all regions of the U.S., allowing midwestern gas that previously was pulled by eastern demand to remain available for use in the west. Shale gas production has increased 5-fold since 1999 and the growth in supplies is expected to continue.⁴ As a result, the impetus for imported LNG has collapsed, LNG terminal projects have been

scrapped, and the relatively low cost of domestic gas compared to the world market price means that the U.S. will be a net exporter, not importer, of natural gas for the foreseeable future.

b) Natural gas is a bridge to advanced technologies that will help meet the 2050 goal:

Natural gas vehicles (NGVs) are commercially deployable in a number of light-duty and medium/heavy-duty applications that not only achieve 2020 GHG reduction goals but also provide a platform for technological advancements that will help achieve the 2050 GHG reduction goals. Short- and medium-haul fleet vehicles that can return to a central fleet fueling facility – from light-duty taxis, shuttle vans and government passenger vehicles to heavy-duty transit buses, school buses, refuse trucks, and short-haul private fleets -- offer the best promise for early carbon reductions.

In the absence of strong state policies, these applications have been concentrated in the south coast air basin, where clean air rules require or incentivize fleet owners to use NGVs. But as AB 32, AB 118 and the LCFS take effect, we believe they will send a powerful signal not only to fleet owners but to vehicle and engine manufacturers that California has a long-term commitment to promoting low carbon alternative fuels and a long-term market for their products will exist.

As with NGVs, the system of natural gas fueling stations in California is larger than any other alternative fuel in the state. Well over 400 fueling stations exist in California and roughly half of those are open to the public; the rest are designed and limited to fleet vehicles.

Existing NGVs and natural gas fueling stations provide a foundation upon which to expand GHG reductions and develop related technologies that will be essential to the state in achieving its rigorous 2050 GHG reduction target. Particularly in the heavy-duty sector, significant opportunities exist for widespread near-term GHG reductions and diesel displacement simply by expanding the use of existing HD engines and vehicles in short- and medium-haul sectors, such as goods movement, port drayage, transit and school buses, and refuse trucks, where they already have proven effective. Additional opportunities exist for large GHG reductions in the previously unregulated off-road sector. The light-duty sector offers similar opportunities to expand known successful fleet applications, such as taxis, shuttle vans and government passenger vehicles.

Beyond broader adoption of existing technologies, NGVs are ripe for advancements such as hybridization and advanced fuel blends. Combining the benefits of hybrid electric technology with low carbon natural gas achieves markedly greater GHG reductions than gasoline or diesel hybrids. For example, the San Diego Metropolitan Transit System is currently operating a prototype hybrid CNG bus, which improves range and fuel economy by 10-20% compared to a standard CNG bus. In the light-duty sector, Toyota is building on its leadership in hybrid technology by unveiling a CNG Camry hybrid at the recent Los Angeles Auto Show. A spokesman for the designer of the vehicle, TMS Advanced Design Strategy, attributed Toyota's renewed interest in CNG to a realization that the growing demand for liquid petroleum will exceed supply and it must look to alternative fuels, including natural gas.

The existing system of natural gas fueling stations provides a ready opportunity for upgrades to supply hydrogen, either as a stand-alone fuel or in blends with natural gas. The use of HCNG, a blend of 10% to 50% hydrogen with CNG, in heavy-duty NGVs not only ratchets down GHG emissions significantly, but also creates an early demand for hydrogen fueling infrastructure even before hydrogen fuel cell vehicles are available and affordable. Transit agencies in Palm Springs and Vancouver are early adopters of HCNG in regular passenger bus service. These are exactly the kind of stairstep advancements that the CNGVC believes are essential for California to develop a viable market for hydrogen fuel cell vehicles.

The CNGVC urges the Commission to look back to its own recently released *Natural Gas Vehicle Research Roadmap*. This excellent document thoroughly examines research, development, demonstration and deployment projects that would advance natural gas transportation fuels and technologies in both the short- and long-term. It recognizes the important role to be played by NGVs as a bridge technology and the importance of the approach taken in the Investment Plan:

Eventually the transportation sector may rely primarily on radical changes in motive power such as fuel cells, advanced batteries, and cellulosic biofuels, but developmental risks and uncertainties are likely to delay widespread use of such options for decades. NGV technology appears to be among the most appropriate interim solutions for use during that crucial transitional period to reduce petroleum dependence and its environmental effects.⁵

c) Renewable Biomethane Is a Near Zero Carbon Intensity Transportation Fuel that can Transform California's Ability to Meet Its 2050 GHG Reduction Goals:

The state possesses vast biomass feedstocks -- at landfills, large animal feedlots and wastewater treatment plants -- that currently are generating and releasing to the atmosphere significant GHG emissions. If the gases from these feedstocks were instead captured and processed, these sites could be transformed from GHG hotspots to producers of a near zero GHG fuel that could make a dramatic contribution to meeting the state's long-term GHG reduction goals.

While the CNGVC is in broad agreement with the approach taken in the Investment Plan, we believe the plan fails to adequately recognize the major contribution that biomethane could make as a transportation fuel. In the sections below we make several recommendations in that regard.

Near zero carbon intensity: In October 2008 the ARB released its well-to-wheels analysis of the GHG emissions from CNG derived from landfill gas.⁶ It determined that biomethane from landfill gas has a carbon intensity of 11.01, meaning that the displacement of gasoline or diesel fuel with biomethane results in an 88.5% reduction in GHG emissions.

Large biomethane resources: Biomethane's extremely low carbon intensity would make a valuable contribution to California's GHG reduction efforts even if available only in small amounts. But in fact a great deal of biogas is available for capture and conversion in California. An estimated 106 billion cubic feet (bcf) of biogas is feasibly recoverable from California landfills and wastewater treatment plants⁷ and an additional 15 bcf from animal feedlots.⁸

Large GHG reduction and petroleum displacement: These 121 bcf of biogas equal roughly .86 billion diesel gallons equivalent (DGE), or 29% of the 3 billion gallons of diesel fuel used in California in 2007 for transportation fuel. In other words, the development of biomethane from feasibly recoverable sources in California would displace the equivalent of 29% of all diesel fuel used in the state and reduce carbon emissions by 8.05 MMTCO_{2e}.

Biomethane is deployable today: The capture and processing of renewable biogas into biomethane that can be used as a transportation fuel is already underway in California and elsewhere in the U.S. Waste Management, a member of the CNGVC, is partnering with Linde-BOC and the Gas Technology Institute at its Altamont landfill in Contra Costa County to produce more than 4 million gallons/year of LNG, which will be used to fuel Waste Management's refuse trucks. Another member of the CNGVC, Clean Energy, has recently purchased the third largest landfill in the U.S., in Texas, to capture and convert the gas to pipeline quality biomethane. Sweden, the world leader in developing biogas as a transportation fuel, meets at least half of its fueling needs for NGVs nationwide with biomethane.

Future biomethane prospects: The CEC Biomass Roadmap also identifies another 250 bcf of dry biomass, such as agricultural waste, forest waste and municipal solid waste, that could be converted through a thermo-chemical gasification and methanation process to a bio-synthetic natural gas. Like biomethane, bio-SNG is interchangeable with conventional natural gas. If another 250 bcf of biomass were converted to a natural gas transportation fuel, it would displace 1.7 billion DGE. When combined with the state's biomethane resources, bio-SNG could displace the equivalent of an astounding 85% of all the diesel fuel used in California for transportation purposes.

Supporting documentation⁹ for the Investment Plan indicates that California will not meet the 2050 goal for GHG reductions from the medium- and heavy-duty transportation sector. In fact, we won't come close: to meet the 2050 goal, GHG emissions from the MD/HD sector would need to be reduced to 8.20

MMTCO_{2e}, while the projection is that emissions from this sector will be approximately 43 MMTCO_{2e} in 2050. The documents also show that the largest part of the GHG reductions, meager though they are, will come from low carbon petroleum – in other words, diesel and low-blend biodiesel fuels – and almost none of the reductions will come from Super Ultra Low Carbon fuels.

From these charts it is clear that biomethane, with its 88.5% reduction in carbon intensity compared to diesel fuel, has not been contemplated as part of the 2050 fuel mix. It is also clear that if biomethane were included in the analysis of GHG emission reductions from the MD/HD transportation sector, California would come much, much closer to meeting its 2050 GHG reduction goal. The CNGVC believes biomethane is a game-changer, a GHG reduction opportunity that simply cannot be ignored. We urge the Commission to fully incorporate biomethane into its Investment Plan.

4. Biomethane Should Be Reclassified as a Super Ultra Low Carbon Fuel

The Investment Plan (p. 5) identifies three “fuel and vehicle” categories: Low Carbon (LC), Ultra Low Carbon (ULC), and Super Ultra Low Carbon (SULC), with GHG emission reduction requirements of 40%, 60% and 82% respectively. Biomethane is designated as a ULC fuel, even though its GHG reductions (88.5%) have been documented by the ARB to exceed the GHG reduction threshold to qualify as a SULC fuel. Biomethane is clearly misclassified as an ULC fuel and should be reclassified as a SULC fuel.

We assume this mislabeling occurred because the ULC category is given over to “biofuels,” and the bulk of the discussion of these fuels in the Investment Plan focuses on specified ethanol and biodiesel fuels. While these fuels may not meet the SULC threshold, biomethane clearly does. We ask the Commission to reclassify biomethane as a Super Ultra Low Carbon fuel, based on the results of the ARB GREET analysis of landfill gas to biomethane.

5. Biomethane Should Be Included in Analysis of Medium- and Heavy-Duty Vehicles

Although CNG, LNG and hydraulic hybrids are among the fuels and vehicles included in the Appendix B analysis of medium- and heavy-duty vehicles, it is clear from the projected GHG reductions in the MD/HD sector that biomethane, as noted above, was not included in the analysis. We note also that biomass to liquids was included in a table of the carbon content of various well-to-tank scenarios, but biomethane was not.

The exclusion of biomethane from the analysis of MD/HD vehicles is the most troubling illustration of how we believe the Investment Plan fails to adequately emphasize the opportunities found in biomethane. As the analysis shows, the MD/HD sector is sorely in need of additional GHG emission reductions, and biomethane offers the opportunity for very large reductions – up to 88% compared to the diesel it would displace. Biomethane blends with conventional natural gas would still yield significant GHG emission reductions and would make the benefits of biomethane available to a much larger pool of MD/HD vehicles that run on pipeline gas.

6. The Greatest Biomethane GHG Emission Reduction Benefits are Realized in Transportation Fuel, not Electricity Generation

To date most attention has been given to biogas as a fuel for onsite electricity generation or to biomethane blended into the natural gas pipeline. There are two reasons for the Commission to reconsider these uses:

- When biomethane is inserted into the natural gas pipeline grid, it displaces conventional natural gas that has a carbon intensity of 68. When it is used as a transportation fuel, it displaces diesel fuel with a carbon intensity of 95.3. Using biomethane to displace conventional natural gas instead of diesel fuel forgoes almost 30% of the GHG emission reduction opportunity.

- Most anaerobic digestion units sited at feedlots or dairies have been built with the intention of using the raw gas to generate onsite electricity. But the engines used to generate the electricity have been unable to receive local air quality permits because of their excessive NOx emissions. This failure is not an indictment of anaerobic digestion but of the technology available to use the gas to generate electricity. Rather than continue to forgo the use of the captured biogas due to excess NOx emissions, the Commission should encourage dairies and feedlots, through the Investment Plan, to process the gas into biomethane so it can be used or marketed as a transportation fuel.

In both these cases, once a market emerges for the GHG emission reductions in low carbon fuels pursuant to the LCFS or AB 32, we believe the market will place a higher value on the use of biomethane as a transportation fuel. The Commission should anticipate the emergence of such a market and align its Investment Plan with these additional GHG reduction benefits that will be recognized by the market..

7. 40 Percent GHG Emission Reduction Requirement for Low Carbon Fuels Should be Clarified or Revised

The Investment Plan describes Low Carbon fuels as low-blend biodiesel, natural gas and propane, provided they show at least a 40% GHG emission reduction. It is unclear on what basis the staff is recommending the 40% GHG reduction threshold. While north American conventional natural gas reduces GHG emissions by up to 30%, it does not meet the assigned threshold.

Nor does the 40% threshold seem appropriate: if that threshold were accurately applied, it would exclude fuels, including natural gas, that meet the 2020 LCFS goal. Surely such fuels should be considered as Low Carbon fuels and qualify for AB 118 funding. This is particularly true for natural gas, given the many ways in which it serves as a transition, or bridge, fuel to more advanced fuels and vehicle technologies. We urge the Commission to clarify the 40% threshold or redesign the Low Carbon category to accommodate fuels that meet the 2020 LCFS goal.

8. California Now Has Major Policies in Place to Change Market and Investment Decisions

Over the last 20 years, the natural gas vehicle industry, through its own hard work and with the support and assistance of the CEC and other public agencies, has established a foothold in a vehicle market completely dominated by petroleum fuels. The California NGV market now offers a variety of light-, medium- and heavy-duty vehicles and engines provided by both OEMs and after-market upfitters. It has built more than 400 fueling stations for both public and private users. And it has reduced vehicular criteria air pollutants and greenhouse gas emissions over the entire period, to the benefit of all Californians. Against all odds in the face of a petroleum monopoly that has prevented other alternative fuels and alternative fueled vehicles from even emerging into the marketplace, the NGV industry has survived.

Notwithstanding this achievement, some suggest that the failure to achieve greater success means NGVs are a failed technology with little to offer. But the rest of the world has proven that there is nothing inherently flawed in natural gas as a transportation fuel. While there are about 27,000 NGVs in California and 150,000 in the U.S., there are 8.6 million NGVs in the rest of the world, and that number is rapidly increasing. More than 20 automakers worldwide manufacture NGVs; GM alone, mainly through its Opel subsidiary, makes 18 NGV models for the world market. More than 75,000 NGVs sold in the five largest European markets (Germany, Italy, Sweden, Austria and Switzerland) in the first nine months of 2008, and 82,000 sold in 2007. Germany, Austria and Switzerland have 1,000 natural gas fueling stations, and Sweden has a growing fueling infrastructure for its renewable biomethane as well as about 1,000 biomethane-fueled buses.

Many of these countries have a set of policies that encourage the development and adoption of alternative fuels and vehicles. And with the implementation of AB 1493, AB 32, AB 118 and the Low

Carbon Fuel Standard, California also now has a set of policies that are beginning to provide stable, long-term signals to both consumers and industry investors. With the adoption of these important state policies, and with the expectation of more supportive national policies as well as ever-higher petroleum prices, there is no basis for predicting future outcomes based on past performance. The natural gas vehicle industry has weathered two decades of policy ambivalence and is now uniquely poised to respond quickly to positive policy and market signals to help California reach its 2020 and 2050 GHG emission reduction goals.

9. Areas of Needed RDD&D for the Natural Gas Vehicle Industry

To maximize the short- and long-term benefits of natural gas as an alternative fuel that can help the state meet its GHG emission reduction targets as well as other statutory goals, such as reduced air pollutant emissions, fuel diversity and petroleum independence, the CNGVC urges the CEC to focus investment in three areas of activity:

- Vehicle purchase incentives
- Development of biomethane as a Super Ultra Low Carbon transportation fuel
- NGV technology advancements to build a bridge to Super Ultra Low Carbon fuels and vehicles

We are pleased to see that the recommendations in the Investment Plan are largely consistent with these priorities. The Plan calls for financial incentives for vehicle purchases; improved natural gas fueling infrastructure for state fleets and other public and private fleets; advancements in medium- and heavy-duty natural gas engines, fueling and fuel storage; development of biomethane as a transportation fuel; mixed-use hydrogen fueling infrastructure; and hydrogen production from renewable feed stocks.

Vehicle Financial Incentives: The Investment Plan recommends financial purchase incentives for light-, medium- and heavy-duty natural gas vehicles, available for both OEM and upfitted vehicles, which are important in many light-duty taxi and shuttle fleets. As the Plan notes, there is a great opportunity for synergy with the ARB's Heavy-Duty Vehicle Air Quality Loan Program and the Lower Emission School Bus Program, as well as ARB and air district programs to replace older diesel trucks at the ports of Los Angeles and Long Beach and in other goods movement corridors. Purchase incentives are particularly crucial at this point as a means of buttressing the policy changes that will motivate automakers to re-enter the California and U.S. markets.

Biomethane: With strategic near-term investments, biomethane can be available in significant quantities as a Super Ultra Low Carbon fuel well before the 2020 target date and can become a major contributor to achieving the 2050 goal. The CNGVC urges the Commission to pursue a full range of projects to assist in developing biomethane as a transportation fuel, including:

- Partnerships to develop biomethane resources at sites where biogas is uncontrolled or captured and flared;
- Development of biomethane projects that need financial assistance to attract private investors;
- Ensuring that captured biogas can be upgraded to meet pipeline quality specifications;
- Production of renewable hydrogen from biomethane.

Advanced NGV vehicle and fuel technologies to build a bridge to Super Ultra Low Carbon fuels and vehicles. Examples include:

- NGV hybrid and plug-in hybrid platforms in both the light-duty and MD/HD sectors;
- Advanced medium- and heavy-duty engine technologies, including HCCI engine technology and engines optimized for hydrogen-CNG blends
- Super Ultra Low Carbon fuel blends, including hydrogen-CNG blends and conventional natural gas blended with biomethane
- Upgrades of existing natural gas fueling stations to accommodate hydrogen and co-location of natural gas and hydrogen at new fueling stations.

We also note that in May 2008 the CEC published a *Natural Gas Vehicle Research Roadmap*, which was developed with extensive input from the natural gas vehicle industry. The Roadmap does an excellent job of identifying priority RDD&D gaps that need to be filled in two broad categories: 1) engine development and vehicle integration and 2) fueling infrastructure and storage. We urge the CEC to refer to the roadmap for additional needed projects.

Notes:

1. CEC, *Full Fuel Cycle Assessment: Well to-Wheels Energy Inputs, Emissions, and Water Impacts*, August 1, 2007. CEC-600-2007-004 REV
2. CEC, *Proposed State Alternative Fuels Plan*. October 19, 2007. pp. ES-5-7. CEC-600-2007-011-CTF.
3. TIAX, *Comparative Costs of 2010 Heavy-Duty Diesel and Natural Gas Technologies*. June 7, 2005.
4. Navigant Consulting, *North American Natural Gas Supply Assessment: Executive Summary and Update*. Prepared for the American Clean Skies Foundation, July 2008, Powerpoint.
5. CEC, *Natural Gas Vehicle Research Roadmap*, May 2008. CEC-500-2008-044-D.
6. ARB, *Detailed California-Modified GREET Pathway for Compressed Natural Gas (CNG) from Landfill Gas*, October 8, 2008.
7. CEC, *A Roadmap for the Development of biomass in California*, November 2006.
8. University of San Diego, Energy Policy Initiative Center, *Biogas Production and Uses on California Dairy Farms*, august 2007.
9. Malachi Weng-Gutierrez, CEC, *California's Medium and Heavy Duty GHG Emissions*, September 19, 2008, Powerpoint.