



The Honorable Mary Nichols  
Chairman, California Air Resources Board  
1001 I Street  
Sacramento, California 95814

November 2, 2015

**RE: Comments on Draft Technology Assessment: Low Emission Natural Gas and Other Alternative Fuel Heavy-Duty Engines**

Dear Chairman Nichols:

Clean Energy would like to offer comments concerning the *Draft Technology Assessment: Low Emission Natural Gas and Other Alternative Fuel Heavy-Duty Engines*. We believe the natural gas transportation fuel and natural gas vehicle industries have a major role to play in support of California's environmental, public health, carbon, and petroleum reduction goals.

As North America's largest provider of natural gas transportation fuel with over eighteen years of leading industry experience, we provide construction, operation and maintenance services for refueling stations. We have a deep understanding of the growing marketplace, and our portfolio includes over 550 stations in 43 states, including a significant presence of 154 stations in California, of which 65 are public. All 65 public stations provide renewable natural gas (RNG) as compressed natural gas (CNG) or liquefied natural gas (LNG) vehicle fuel.

Already used as a clean, low carbon source of energy around the world, natural gas is abundant and proven to be a cost-saving alternative fuel. Natural gas for transportation fuel strengthens our economy with lower fuel costs, increases our energy security, and significantly benefits our environment by reducing carbon emissions and smog-forming NOx emissions by up to 23% and 35%, respectively, relative to diesel fuel. Carbon emissions are reduced even further – between 80 to 90% - when renewable natural gas is used instead of diesel.

The various technology assessments evaluate the current state and projected development of mobile source technologies and fuels. Our industries support ARB planning and regulatory efforts especially relating to integrated freight planning, the State Implementation Plan (SIP) development, funding plans, the governor's goal to reduce petroleum by 50%, and the Short-lived Climate Pollutant plan.

**GAME CHANGER: CWI .01 NOx Heavy Duty Engine**

On page ES-1, the question is asked, "What role can heavy-duty natural gas vehicles play in meeting California's air quality goals?" California will not reach greenhouse gas emission (GHG) reductions and other goals without dedicating significant resources to the heavy duty transportation sector to decrease dependence on diesel fuel and increase the use of much cleaner lower carbon fuel alternatives. To this end, we are pleased the Draft prominently mentions Cummins Westport's 0.02 g/bhp-hr NOx heavy duty engine, which is a **game changer** for the transportation sector and public health. The 9L engine is scheduled for deployment as early as 2016 and the 12L in 2017. These engines will provide immediate environmental and health benefits, whereas waiting for heavy duty hydrogen fuel cells and battery electric technology could take 15-35 years, if not longer.

This engine, powered by natural gas or renewable natural gas, or a blend of the two, will achieve greater environmental benefits than any electrified system for 1/5<sup>th</sup> to 1/10<sup>th</sup> the cost and far fewer operational and logistical challenges, as natural gas technology can be seamlessly integrated into large natural gas fleet operations.

ARB has aggressive emissions goals that cannot be realistically met without accelerating the adoption of natural gas fuel in the heavy duty vehicle sector. Failure to do so will compromise the successful implementation of the following objectives:

- Meet the LCFS goal of 10% greenhouse gas emissions (GHG) by 2020 and 30% by 2030;

- Mandated federal 8-hour ozone attainment goals for NOx reduction in 2023 and 2031;
- 40% GHG reduction by 2030;
- 50% petroleum reduction by 2030;
- 80% GHG reduction by 2050;
- Significant reductions in Short-lived Climate Pollutant of black carbon and methane.

## **NATURAL GAS VS. CLEAN DIESEL TRUCKS**

The Draft poses a question on page ES-4 asking, “How do NOx emission levels from the latest technology heavy-duty natural gas trucks compare to NOx levels from heavy-duty diesel trucks?” The answer provided by staff concludes with “...staff believes natural gas engines are likely to be certified to today’s optional low-NOx emission standards sooner than will diesel engines.”

We are pleased to see this valid comment, however, we believe this answer needs to be updated and improved upon. Natural gas vehicles – an alternative to diesel – are in wide use throughout the heavy- and medium-duty sector today, and a fleet owner could immediately deploy a certified low-NOx engine meeting the 90% NOx reduction target set by ARB for numerous heavy- and medium-duty applications. This is not the case, however, for diesel engines as there is not an approved low-NOx certification on the market. In fact, the ARB *Mobile Source Strategy Draft Discussion* document clearly states on page 22 that certification targets for low-NOx diesel engines are at “either 0.05 or 0.1 g/bhp-hr” and are not anticipated to materialize for another 1 to 2 years. That said, a 0.05 g NOx engine presents only a 75% reduction and a 0.1 g NOx engine presents only a 50% reduction. It is interesting to note however that in several sections of the *Mobile Source Strategy Discussion Draft* that low-NOx engines meeting the 0.02 g/bhp-hr standard are considered necessary and the most technically feasible way to meet the state’s 2030 and 2031 goals that include ozone, PM, carbon, and petroleum reduction goals.

According to the *Mobile Source Strategy Draft Discussion* document, the Mobile Source Strategy October 16<sup>th</sup> workshop and a recent SWRI presentation in Illinois on October 27<sup>th</sup>, there are no diesel engines in development today that are capable of certifying to the 90% low-NOx target. Despite these observations regarding the state of diesel technology, and despite numerous statements throughout the *Mobile Source Strategy Discussion Draft* that a 90% low-NOx strategy must succeed to reach attainment with the 2023 federal 8-hour ozone standard, the document’s narrative on page 30 forecasts that low-NOx engines will be powered by liquid fuels blended with renewables. Such statements must be altered as it completely ignores the fact that natural gas engines run on both gaseous and liquid fuels and it remains to be the only engine strategy certified to meet the 90% low-NOx value of 0.02 g NOx.

## **METHANE LEAKAGE**

On page ES-5, the question is asked, “How do well-to-wheel GHG emissions for natural gas powered trucks compare to those powered in other ways?” A brief discussion on methane leakage is provided in the answer, including, “Thus, unless controlled, methane leakage from the production, distribution and storage of natural gas as well as emissions and leakage from the vehicle could completely offset any potential climate benefit advantages of natural gas.”

The September 3<sup>rd</sup> ARB PowerPoint presentation entitled “*Transportation Fuels: ARB Technology Assessment*” includes a long discussion on the current difficulty in effectively measuring methane leakage. We appreciate the recognition that calculating methane leakage rates is difficult with several different methodologies. Our industry is very interested in the continuing pursuit of scientifically valid methods to standardize and effectively calculate this. The natural gas transportation fuel industry acknowledges there is minimal upstream leakage, but the scientific literature has not demonstrated exactly how much leakage occurs nor can any claim be made that this fuel does not provide sufficient and significant environmental, health and societal benefits. Simply put, the scientific literature has not demonstrated a causal link between methane leakage and reduced climate benefits relative to natural gas transportation fuel. **Therefore, we believe the statement in ES-5 is premature and makes an unfounded assumption.**

Further, it is important to note that the GHG benefits of switching from diesel or gasoline to natural gas are maintained under ARB’s re-authorized LCFS regulations, which include a 1% methane leakage rate. Thus, there is no basis for leakage concerns with offsetting use, as leakage is already factored into the CA-GREET 2.0 model. And with the ongoing interest in pursuing scientific studies, we recommend ARB consider now methane leakage values from utility studies that are scientifically valid which might show better results.

Finally, this discussion also fails to consider the use of renewable natural gas that can deliver up to 90% carbon benefits and sometimes greater depending upon the production process. Much like diesel, RNG can be blended with fossil-based gas and has no restrictions that violate engine warranties.

### **CAN BIOFUELS BE A PRIMARY SOLUTION FOR OUR 2050 GHG TARGETS?**

The Executive Summary includes a discussion thread on the current state of natural gas fueling infrastructure. As previously mentioned, Clean Energy alone has 154 stations in California, 65 of which are open to the public. There is demand for the fuel products and we and our competitors are meeting it. Again, according to the Low Carbon Fuel Standard data, RNG was 48.7% of all vehicle fuel going into natural gas vehicles under the LCFS as of the 3rd quarter of 2015. We believe this percentage will go higher as production continues to expand and in-state production barriers (i.e., interconnect costs and overly stringent fuel quality requirements) are resolved. Using conservative ARB scenarios, this amount achieves now the 2030 goals under AB 32 for all NGVs if you assume a blend.

Clean Energy alone has delivered over 20 million gallons of RNG into the state in FY 2014 and we are very likely to double this figure by year's end. The use of more RNG, particularly in existing transit fleets that have the infrastructure already in place, are in the position to significantly reduce the state's carbon footprint overnight. Applying a low-NOx engine will not only reduce NOx emissions to near zero levels, it will also further reduce methane emissions as these new engines provide a closed crank case system that reduces methane emissions by more than 70 percent. Bottom-line: the natural gas industry is listening to ARB's concerns and we are aggressively answering them with solutions in our technologies and our fuels.

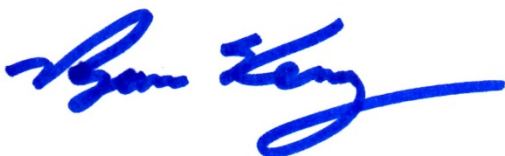
### **ES-12: WHAT OTHER ALTERNATIVE FUEL ENGINES ARE BEING DEVELOPED?**

The response in the Draft is not notable for what IS included in the answer, but rather what ISN'T: heavy-duty battery and fuel cell engines. These technologies are not expected to enter the heavy-duty class 7 and 8 truck space for up to 35 years in some cases, while natural gas heavy-duty engines will be deployed in a few months and positively contributing to the state's environmental, public health, carbon and petroleum reduction goals. In fact, the *Mobile Source Strategy Discussion Draft* specifically states on page 59 that, "Based on ARB staff's technology assessment, the most viable approach to meeting the 2031 and 2030 goals is low-NOx trucks." This assumes low-NOx engines that can meet NOx emissions that are 90 percent cleaner than today's standards, highly efficient PM filters are applied, and approximately 55 percent of the truck fuel demand is met with renewable fuel.

In addition, it is worth noting that battery and fuel cell vehicles are often referred to as zero emission vehicles but their capability of being truly zero in emissions largely depends upon whether or not the vehicle's power source is emissions free. Even with a 50 percent renewable portfolio by 2030, the state is still likely to draw at least half of its power from sources of energy that emit some form of emissions. Meanwhile, low-NOx strategies combined with renewable fuels can demonstrate far superior emissions benefits for NOx and GHG emissions today as neither are dependent upon the composition of the grid.

Thank you for considering our comments. We look forward to continuing our participation in this healthy discussion and process.

Sincerely,



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Clean Energy