

9 pages

July 18, 1989

The Honorable Joseph Petrarca
Chairman
Transportation Committee
Pennsylvania House of Representatives
State Capitol
Harrisburg, Pennsylvania

Dear Chairman Petrarca:

The American Gas Association (A.G.A.) is a national trade association, composed of roughly 150 natural gas distributors and pipelines in all 50 States. We at A.G.A. are honored by your invitation to testify at your Committee's hearings on possible new initiatives to promote Natural Gas Vehicles.

We submit for the record 20 copies of our written testimony.

We also submit for the record 20 copies of two other documents:

1. A June 26, 1987 A.G.A. Issue Brief entitled Natural Gas Vehicle Safety Survey -- An Update. This study concludes that the safety record for Natural Gas Vehicles is better than the safety record for gasoline vehicles.

2. A.G.A.'s March 23, 1989 written testimony before the California Advisory Board on Air Quality and Fuels. Our testimony provides a broad overview of public policy concerns regarding Natural Gas Vehicles. The Appendix to the testimony contains unusually detailed recommendations, including proposed legislative language, on such specific State government questions as insurability and utility rate policies. These recommendations were developed jointly by A.G.A. and California's three largest gas utilities.

We thank you again for the opportunity to participate in these important Hearings. If we can provide further information, or assist the Committee in some other way, please contact me at (703) 841-8464.

Sincerely,



Donald Joseph Schellhardt
Director of State and Local Relations
and Executive Assistant to the
Executive Vice President

Planning & Analysis

Issues

Issue Brief 1987-6

June 26, 1987

Natural Gas Vehicle Safety Survey -- An Update

I. Summary

Injury and death incidence rates per vehicle mile traveled (VMT) for utility fleet natural gas vehicles (NGVs) are significantly lower than comparable incidence rates for the entire population of registered U.S. vehicles according to a recent A.G.A. survey of utility fleet managers whose fleets are at least partially composed of NGVs. According to the survey, NGV fleet injury rates per VMT were 84% less than the national average for injuries per VMT for all U.S. registered vehicles.

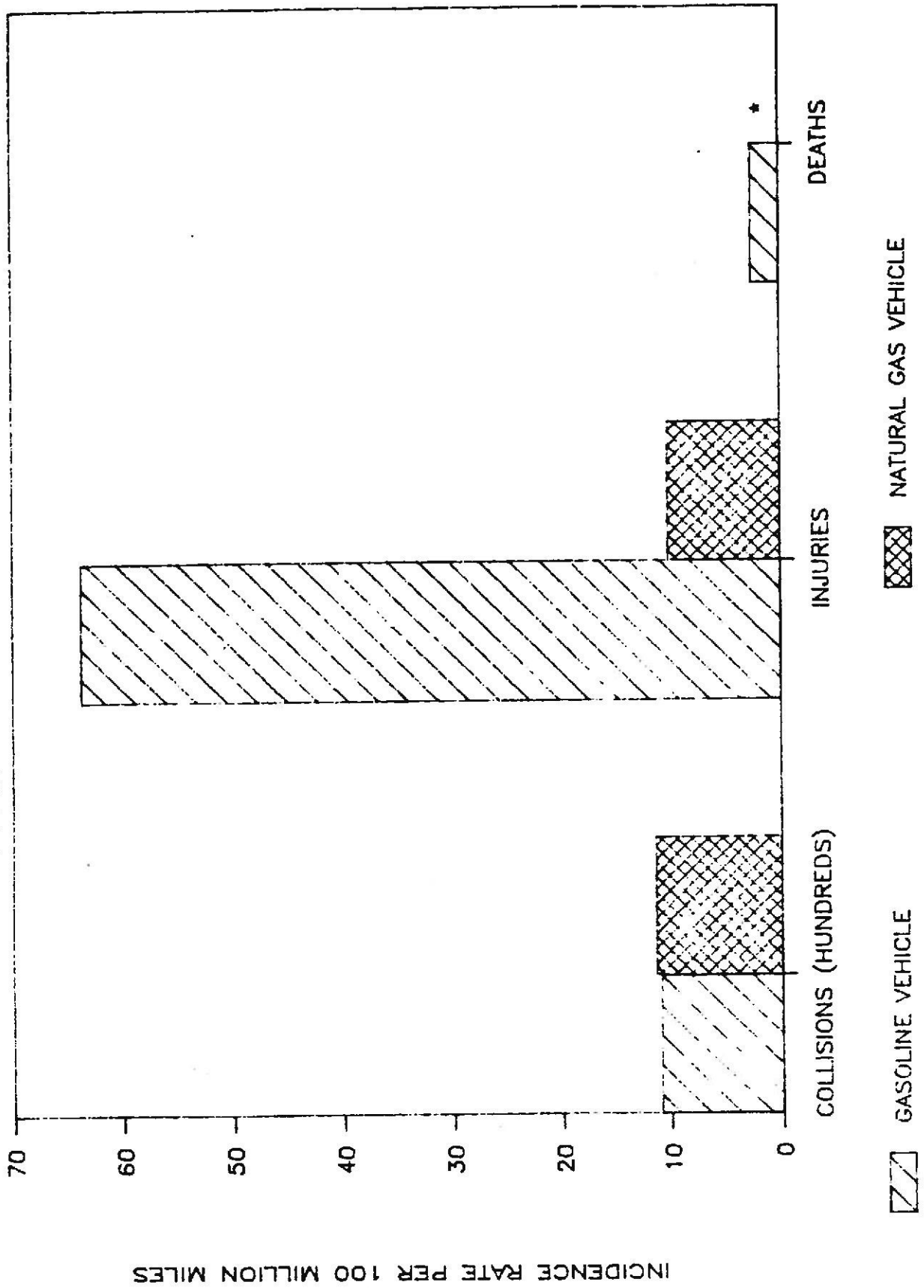
Since there were no deaths incurred in the cumulative 434.1 million miles driven by the sample fleet, it is impossible to compare, on a percentage basis, NGV death rates per VMT and the corresponding rates for all U.S. registered vehicles, which in 1985 was 2.47 per 100 million VMT.¹ The national death rate per VMT translates into one death every 40.5 million miles. At that rate our sample, on average, would have been expected to incur approximately 10 deaths. However, no fatality was reported for any of the NGVs in our sample.

Collision rates per VMT were slightly higher for sampled NGVs as compared to the national average for all vehicles. The collision rate per VMT for NGVs sampled was 4.2% higher than the national average for all U.S. registered vehicles.

Fire incidences per VMT for all U.S. registered vehicles is not compiled and therefore comparisons of surveyed NGV fire incidence rates to national averages is impossible. Our survey yielded a fire incidence rate per 100 million VMT of 2.3 for NGVs. Of these 2.3 fires every 100 million VMT, only 0.5 fires per 100 million VMT were directly attributable to the failure of the compressed natural gas (CNG) system.

ACCIDENT DATA -- VEHICLE IN USE

INCIDENCE RATES PER 100 MILLION MILES



* NGVs incurred zero fatalities in 434 million miles traveled.

II. Background

Energy security and the attainment of national ambient air quality standards for ozone and carbon monoxide, as mandated by the Clean Air Act (CAA), are two of the most pressing issues facing the Administration and public policymakers. Both the President and the Secretary of Energy have stated that the achievement of U.S. energy security is at the forefront of the Administration's policy initiatives. U.S. dependence upon foreign petroleum products, as measured by net petroleum product imports as a percent of total U.S. petroleum product supply, peaked in 1977 at 46.5%, bottomed out at 27.3% in 1985, and has again begun to increase. Net imports of petroleum products jumped to 32.8% of total U.S. petroleum product supply in 1986.

Compliance with the air quality standards set for ozone and carbon monoxide is another issue that requires immediate attention. There are currently 76 metropolitan areas which do not presently meet the legislated ozone standard, and 40 metropolitan areas which do not meet the carbon monoxide (CO) standard.² Metropolitan areas must meet the standards before January 1, 1988, or face mandatory penalties as stipulated by the Environmental Protection Agency (EPA).

The increased utilization of NGVs in place of gasoline vehicles offers a quickly available policy option for addressing these problems. Since 96% of natural gas used in the U.S. is domestically produced, any switch to NGVs from gasoline vehicles would result in significant and immediate reductions in net imports of petroleum products. From an air quality standpoint, conversion of gasoline vehicles to natural gas can reduce carbon monoxide emissions by up to 99%, reduce nitrogen oxide emissions by up to 65%, and reduce reactive hydrocarbon emissions by up to 85%.³ These reduction levels would be most easily met in light trucks, some buses, and older cars, which account for 60-90 percent of vehicular emissions. Actual emissions reductions achieved depend upon a large number of factors including tuning, age and design of the vehicle, and the condition and technology of the gasoline emissions controls and natural gas conversion kit.

The technology to convert gasoline powered vehicles to NGVs, and produce dedicated NGVs, is well established. NGVs have been on the road in the U.S. since the early 1900s, there are presently 30,000 NGVs in the U.S. and as many as 500,000 worldwide. NGV fuel tanks are much stronger than gasoline tanks. They have survived a wide variety of severe abuse tests, including gunfire, heat extremes, fires, collisions and dynamite. Also, the physical properties of the fuel enhance its safety as a vehicular energy source.

Natural gas is lighter than air, allowing it to escape into the atmosphere in the event of a leak and therefore avoid the puddling characteristics inherent in gasoline. Also, given natural gas' narrow gas to oxygen ignition ratio, 4 to 14 percent, and high ignition temperature, 1300^o(F), as compared to 800(F) for gasoline, a fire or explosion is less likely in the event of a fuel leak. Because of the aforementioned properties, natural gas will not explode in an unconfined space. This is not the case with gasoline. This issue brief serves to confirm the conception that NGVs are safe and reinforces earlier work done on NGV safety by Dr. J. Winston Porter.⁴

III. Methodology

To evaluate the safety history of NGVs, A.G.A. conducted a survey of all known utility fleet managers whose fleets include at least 100 NGVs. The survey was supplemented by some managers whose fleets include less than 100 NGVs, but who attended an A.G.A. NGV Committee meeting in May of 1987. As of December 1986, the fleet managers surveyed had a total of 7,104 NGVs under their control, or 23.7 percent of all NGVs in the U.S. The cumulative mileage of the 21 fleets was 434.1 million miles.

Data for injury, death, and collision incidence rates per gasoline VMT were obtained from two sources.^{1,5} Injury and collision rates per VMT for all vehicles were derived from the National Safety Council's Accident Facts, 1985. The death rate per VMT for all vehicles was obtained from the Department of Transportation's Fatal Accident Reporting System 1985.

IV. Results

● Vehicle In Use

Table 1, below, illustrates cumulative NGV accident data from our sample while the vehicle was in use. In this case "in use" implies that the vehicle was being driven. The NGVs included in the survey were involved in 4,925 collisions. As illustrated in Table 1, 10 total fires occurred in 434.1 million miles of dual-fuel NGV use. However, only 2 of these fires were directly attributable to the CNG system, which constitutes one of the two separate fuel-burning capabilities -- gasoline makes up the other -- of the dual-fuel NGV. The NGV sample fleet only incurred 44 injuries, none of which were directly attributable to the CNG system. In the cumulative 434.1 million NGV miles driven, no deaths were reported.

- Vehicle Not In Use

Delineated in Table 2 is NGV accident data while the vehicle was not in use. In this instance, "not in use" implies that the vehicle was not being driven and was either parked, being refueled, or being serviced. As Table 2 illustrates, there were 20 fires while the vehicle was not in use. Of these 20 fires, 12 were directly attributable to NGV refueling, servicing, and other NGV attributable causes. Of the 12 NGV attributable fires while the vehicle was not in use, 8 occurred while refueling, 2 while venting CNG tanks, one was due to the electric circuitry inherent in the CNG system, and one occurred while servicing. As far as injuries are concerned, there were 7 injuries while the NGVs were not in use, all of which were NGV attributable. Six of the injuries were burns, 5 of which occurred while refueling and one which happened while servicing the vehicle. The other injury resulted in a facial bruise when a mechanic was struck by a fitting that broke loose. As was the case for vehicles in use, no deaths were reported for vehicles not in use.

- NGV - Gasoline Vehicle Comparison (Vehicle In Use)

Table 3 compares fire, injury, death and collision incidence rates per 100 million VMT for NGVs and gasoline vehicles, while the vehicle was in use. Both injury and death incidence rates per VMT for the NGV sample were lower than comparable measures for gasoline vehicles. Injuries per 100 million VMT was 10.1 for the NGV sample as opposed to 63.7 for gasoline vehicles. Deaths per 100 million VMT was 0 for the NGV sample as compared to 2.5 for gasoline vehicles. Collision rates per VMT were somewhat higher for the NGV sample as compared to gasoline vehicles. Collisions per 100 million VMT was 1134.6 for NGVs and 1088.6 for gasoline vehicles. As stated earlier, data for vehicle fires is not published and therefore the 2.3 fires per 100 million VMT does not have a comparable gasoline vehicle measure.

Table 1

NGV Accident Data -- Vehicle in Use

<u>Impact Location</u>	<u>Collisions</u>	<u>Fires</u>		<u>Injuries</u>		<u>Deaths</u>	
		<u>Total</u>	<u>NGV Attrib.1/</u>	<u>Total</u>	<u>NGV Attrib.1/</u>	<u>Total</u>	<u>NGV Attrib.1/</u>
Front End	113	1	1	3	0	0	0
Rear End	144	1	0	3	0	0	0
Other <u>2/</u>	4668	8	1	38	0	0	0
Total	4925	10	2	44	0	0	0

Total Cumulative NGV Mileage (Millions) = 434.1

1/ Fires, injuries, and deaths directly attributable to the failure of the compressed natural gas system.

2/ The "other" category contains all incidents which did not occur as a result of a front-end or rear-end collision. It also contains all incidents which could not be classified by impact location. Therefore, the "other" category could contain some rear-end and front-end collisions.

Table 2

NGV Accident Data - Vehicle Not in Use

<u>Fires</u>		<u>Injuries</u>		<u>Deaths</u>	
<u>Total</u>	<u>NGV Attrib.1/</u>	<u>Total</u>	<u>NGV Attrib.1/</u>	<u>Total</u>	<u>NGV Attrib.1/</u>
20	12	7	7	0	0

1/ Fires related to refueling and servicing NGVs.

Table 3

Accident Data -- Vehicle in Use
Incidence Rates Per 100,000,000 Miles

<u>Vehicle Type</u>	<u>Collisions</u>	<u>Fires</u>		<u>Injuries</u>		<u>Deaths</u>	
		<u>Total</u>	<u>NGV</u> <u>Attrib.1/</u>	<u>Total</u>	<u>NGV</u> <u>Attrib.1/</u>	<u>Total</u>	<u>NGV</u> <u>Attrib.1/</u>
NGV	1134.6	2.3	0.5	10.1	0	0	0
Gasoline ^{2/3/}	1088.6	N/A	-	63.7	-	2.5	-

N/A Data not available

- 1/ Fires, injuries, and deaths directly attributable to the failure of the compressed natural gas system.
- 2/ Collisions and injuries per vehicle mile derived from National Safety Council, Accident Facts 1985, 1985.
- 3/ Deaths per vehicle mile obtained from Department of Transportation, Fatal Accident Reporting System 1985, 1986.

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2. Gushee, David E. "Emissions Impact of Oxygenated (Alcohol/Gasoline) Fuels." Congressional Research Service, Library of Congress, 20 May 1987.
3. American Gas Association. "Ozone and Carbon Monoxide: The Role of Natural Gas in Attaining Clean Air Act Compliance." Issue Brief 1987-2. Arlington, VA: American Gas Association, April, 1987.
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5. National Safety Council, Accident Facts 1985. Chicago, IL: National Safety Council, 1985.

4 pages

TESTIMONY OF
DONALD J. SCHELLHARDT,
DIRECTOR OF STATE AND LOCAL RELATIONS AND
EXECUTIVE ASSISTANT TO THE EXECUTIVE VICE PRESIDENT,
AND
ANTHONY J. GENARO,
MANAGER OF NEW MARKET DEVELOPMENT,
ON BEHALF OF THE AMERICAN GAS ASSOCIATION

House Transportation Committee
State Legislature
Commonwealth of Pennsylvania

Harrisburg, Pennsylvania
July 18, 1989

The American Gas Association (A.G.A.) is a national trade association, comprised of more than 250 natural gas pipelines and distributors in all 50 States.

A.G.A. is delighted to learn that the State Legislature of Pennsylvania is considering enactment of landmark new legislation on clean transportation fuels.

A.G.A. urges the Pennsylvania State Legislature to act in this important area. New legislation can be a key first step toward dramatically improving the quality of the Pennsylvania environment, while simultaneously increasing energy self-sufficiency and economic vitality.

Set forth below are some of the reasons why Natural Gas Vehicles -- NGVs -- make sense for Pennsylvania.

General Air Quality Effects of NGVs

Natural gas used in vehicles can dramatically reduce emissions of carbon monoxide and reactive hydrocarbons.

So far, virtually all NGVs on the road are conversions of existing vehicles that previously relied exclusively on gasoline or diesel fuel. EPA estimates that such conversions can yield a 50% reduction in tailpipe emissions of carbon monoxide and a 40% reduction in tailpipe emissions of reactive hydrocarbons (plus a 100% reduction in emissions of reactive hydrocarbons from filling stations and evaporation). Impressive as these EPA estimates are, the natural gas industry views them as conservative. The gas industry's own experience with NGV conversions indicates that, when proper procedures and equipment are used to convert either older or newly manufactured vehicles, from either gasoline or diesel fuel to natural gas, such conversions can reduce emissions of both carbon monoxide and reactive hydrocarbons by more than 80%.

The full extent of the air quality improvement is visible when statutes and regulations recognize the distinction between reactive and non-reactive hydrocarbons. Hydrocarbon emission standards for Natural Gas Vehicles should discount non-reactive hydrocarbons, such as unburned methane. Such hydrocarbons do not appear to interact chemically in the lower atmosphere, and therefore do not contribute to "smog" formation.

Newly manufactured NGVs, whether they are "dual capable" vehicles or "dedicated" vehicles (designed for the exclusive use of natural gas), have even lower emissions

than converted vehicles. Newly manufactured NGVs operate even more efficiently, and therefore have even lower emissions, because their engines are specifically designed with the use of natural gas in mind.

Recently, newly manufactured natural gas buses, owned by Brooklyn Union Gas Company, were tested by EPA at the EPA facilities in Ann Arbor, Michigan. The results of these tests show that emissions from the buses compare favorably with the EPA standards for model year 1991 heavy-duty engines. For carbon monoxide, emissions were 10.6 grams per brake horsepower-hour (g/b-hp/hr), compared to a standard of 15.5; for nitrogen oxides, 1.4 g/b-hp/hr (compared to 5.0); for particulates emitted from urban buses, 0.02 g/b-hp/hr (compared to 0.1); and for hydrocarbons 1.2 g/b-hp/hr (compared to 1.3).

Incidentally, the hydrocarbon emissions were predominantly non-reactive hydrocarbons. As was noted earlier, non-reactive hydrocarbons do not appear to interact chemically in the atmosphere.

Possible Impact on Gas Supply and Demand

Use of natural gas in vehicles would not disrupt existing patterns of gas supply and demand. For example, California's South Coast Air Quality Management District estimates that there are roughly 1 million existing fleet vehicles in the Los Angeles Basin. The District has committed itself in principle to adopting a phased mandate for shifting all of these fleet vehicles, public or private, to clean transportation fuels. We at the American Gas Association estimate that, if all of these existing fleet vehicles were converted to the exclusive use of natural gas, the 1 million vehicles would use roughly 75 billion cubic feet (Bcf) of natural gas per year: less than four-tenths of 1% of 1987 U.S. gas production.

In any event, the natural gas resource base in the United States is impressively large and can comfortably accommodate substantial increases in natural gas demand. A May 1988 study by the U.S. Department of Energy, entitled An Assessment of the Natural Gas Resource Base of the United States, indicates that the remaining volumes of conventional natural gas -- in the lower 48 States alone -- are equal to a 62-year supply at current rates of domestic demand. Vast additional supplies are available from Canada, Mexico, Alaska -- and unconventional sources here in the lower 48.

National Security Benefits of Natural Gas Vehicles

Since the internal combustion engine was invented, oil has held a virtual monopoly in the transportation fuels market. In every other major energy use market -- from chemicals to powerplants -- substitutes for oil are readily available and can be mobilized for use in the event of another disruption of imported oil supplies. In transportation, however, oil still reigns supreme.

To grasp the extent and implications of this oil dominance, consider the fact that transportation absorbs two-thirds of all the oil we use in America. If tomorrow we stopped using oil for everything else -- for heating homes, for making chemicals, for generating power -- we would still have to import oil, just to feed our transportation sector.

Clearly, America will not be able to fully end its vulnerability to imported oil disruptions until America introduces competition in the transportation fuel markets.

Now, at last, the oil monopoly is starting to crack. In its place the marketplace will soon be choosing among several transportation alternatives -- including natural gas, propane, ethanol, methanol and electricity. Natural gas is an excellent choice for a wide range of situations.

Conclusion

Our industry believes that the market for clean transportation fuels should be open to all clean energy sources, from natural gas to alcohol fuels to electricity.

However, the natural gas industry is confident that its product will ultimately be the most popular choice in the clean transportation fuels market. There are strong reasons for this confidence.

First, for a wide range of pollutants, gas is the clean transportation fuel. This fact carries great weight at a time when several dozen urban areas, including some in Oregon, have failed to meet the Clean Air Act deadline for attaining ozone and carbon monoxide standards. Second, gas supplies come mostly from the U.S.A. and almost exclusively from North America. Third, while there are obviously many compressors and refueling stations to be built, the gas industry already has in place a million-mile delivery system to bring natural gas to market. Fourth, while newly manufactured vehicles would be most welcome, the gas industry does not have to wait for Detroit -- because NGV conversion vendors can retrofit existing vehicles.

The day of the NGV is dawning. Informed legislators and regulators can hasten its arrival.

We urge the legislators of Pennsylvania to make a little history by joining in the process.

34 pages

IMPORTANT NOTE TO READERS: THE FOLLOWING TESTIMONY,
WHICH WAS PREPARED FOR THE SPECIAL CALIFORNIA ADVISORY BOARD
ON AIR QUALITY AND FUELS, IS HIGHLY UNUSUAL IN ITS FORMAT.
IN AN EFFORT TO INDUCE CREATIVITY, PARTICIPANTS IN THE
MARCH 1989 HEARINGS WERE ASKED TO ENVISION THEMSELVES
IN THE YEAR 2007, LOOKING BACK. THEY WERE ALSO ASKED
TO ASSUME THAT CALIFORNIA AIR QUALITY IS SUPERB IN 2007.
THE ASSIGNMENT FOR EACH PARTICIPANT WAS THIS: TO OUTLINE
WHAT STEPS WERE TAKEN DURING 1989 THROUGH 2007, BY THE
PUBLIC AND/OR PRIVATE SECTORS, TO ASSURE DECISIVE AIR
QUALITY PROGRESS IN THE PARTICIPANT'S AREA OF EXPERTISE.

TESTIMONY
BEFORE THE
STATE OF CALIFORNIA
ADVISORY BOARD ON AIR QUALITY AND FUELS

SACRAMENTO, CALIFORNIA

March 22-23, 1989

Public Workshop Regarding)	
Mandates and Incentives)	
Associated with the Potential)	LOOKING BACK AT
Introduction of Clean Fuels)	AIR QUALITY PROGRESS,
Into the California Marketplace))	1988-2007

WRITTEN RESPONSE OF THE AMERICAN GAS ASSOCIATION
TO THE CONCEPT PAPER ENTITLED
"THE FUTURE HISTORY
OF THE CALIFORNIA TRANSPORTATION SYSTEM"

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BEFORE THE
STATE OF CALIFORNIA
ADVISORY BOARD ON AIR QUALITY AND FUELS

SACRAMENTO, CALIFORNIA
March 22-23, 1989

Public Workshop Regarding)	
Mandates and Incentives)	LOOKING BACK AT
Associated with the Potential)	AIR QUALITY PROGRESS,
Introduction of Clean Fuels)	1988-2007
Into the California Marketplace))	

WRITTEN RESPONSE OF THE AMERICAN GAS ASSOCIATION
TO THE CONCEPT PAPER ENTITLED
"THE FUTURE HISTORY
OF THE CALIFORNIA TRANSPORTATION SYSTEM"

We at the American Gas Association -- A.G.A. -- are honored to participate in a truly rewarding commemoration.

It was 18 years ago -- March 23, 1989 -- that the special California Advisory Board on Air Quality and Fuels concluded its fourth and final round of hearings. Those of us who can remember those proceedings will recall how we knew, even then, that we were embarking upon a work of historic importance.

Yet even the optimists among us are amazed that we have come so far, so fast. Our journey has been long, sometimes arduous and always adventurous. It has also been rewarding.

Today there are little children, on the streets of Los Angeles, who do not know what smog is.

This did not happen by accident. Committed human beings made it happen.

Those of us who work in the natural gas industry are proud to have been among those committed human beings.

We at A.G.A. represent natural gas distributors and pipelines in all 52 States. With this perspective, we know that the pioneering efforts of California -- from its corporations to its government agencies to its people on the street -- have been an inspiration across the Union.

With this perspective, we also know that California has been a role model for other States in their own efforts to foster widespread use of Natural Gas Vehicles (NGVs).

Of course, we do not, and cannot, claim that NGVs have been the sole factor behind the quantum jump forward in California air quality.

For one thing, a major role has also been played by the progress made in reducing vehicle miles travelled. Today ultra-rapid rail lines crisscross the Los Angeles Basin, and reach far beyond into the Mojave, consigning to history the once-common commuting drives from Irvine to Westside or Victorville to San Bernardino. Today, thanks to tax incentives and other measures, telecommuting is a common workstyle; indeed, 54 percent of California office employees physically report to work 2 days per week or less. Today, due to a string of desalinization plants, water has been freed through displacement for inland use. Within Prevention of Significant Deterioration limits, this has allowed most of California's incremental population growth to occur in areas that are not heavily populated already.

Thus, the dramatic spread in use of clean-fueled vehicles has clearly been complemented by progress in reducing vehicles miles travelled. Further, even in the field of clean-fueled vehicles, natural gas holds no monopoly. Natural gas is the single most popular choice among clean-burning transportation fuels, but major markets have also been established for electric vehicles, for propane vehicles and for vehicles powered by other energy sources. In addition, hydrogen fuel, which could be produced from electrolysis at the State's desalinization plants, may enter the transportation market at some point.

In short, Natural Gas Vehicles have not been the sole solution.

Still, Natural Gas Vehicles have been the single largest part of the solution.

Clean-burning transportation fuels have been the centerpiece of air quality improvement, and natural gas has been the centerpiece of clean-burning transportation fuels.

Between 1988 and the dawn of a new century, three forces converged to make this happen:

Federal Government mandates and incentives

Gas utility initiatives

State and Local Government mandates and incentives

On this day of historic commemoration, let us briefly review how each of these forces helped to forge the outcome.

FEDERAL GOVERNMENT MANDATES AND INCENTIVES

The Federal Government was a key catalyst in the development of California NGVs.

If the Federal Government did nothing else, it did one thing: the Federal Government made it clear that California, and other States in similar situations, would not be given an indefinite chain of unconditional extensions for Clean Air Act compliance deadlines.

Congress gave the first clear signal during the summer of 1988, when it did nothing to extend the August 31 statutory deadline for Clean Air Act compliance in a number of nonattainment areas. The U.S. Environmental Protection Agency -- EPA -- had already sought public comments on how to handle such a contingency. When the reality of an unextended deadline actually materialized, EPA turned to the toughest problem first. The agency quickly issued a ban on construction of any major new facilities in the Los Angeles Basin, and followed this action with a December 7 Advance Notice of Proposed Rulemaking that focused specifically on what EPA should do to assure air quality improvement in Greater Los Angeles.

As 1989 commenced and the 101st Congress convened, Congressional legislators knew that they could not avoid dealing with the dozens of areas that had failed to meet Clean Air Act standards for ozone and/or carbon monoxide.

By the end of 1989, comprehensive new legislation was on the books.

The new legislation had two strategic thrusts:

First, the new law ended the era of the unconditional extension. While nonattainment areas would be able to obtain extensions of Clean Air Act compliance deadlines, those extensions would be explicitly conditioned upon the acceptance of certain specified air quality improvement goals and measures.

Second, the new law divided nonattainment areas into groups, based on the perceived severity of air quality problems. Those areas with the most severe air quality problems would be eligible for the longest extensions. By the same token, however, these severe nonattainment areas would have to accept a more sweeping array of Federal mandates and restrictions.

The emergence of conditional extensions might have been enough, in and of itself, to spur many nonattainment areas toward local action to promote clean-burning transportation fuels. Indeed, as early as the spring of 1988, at the South Coast Air Quality Management District (South Coast) in Greater Los Angeles, plans were already underway to mandate fleet vehicle use of clean-burning transportation fuels. In neighboring Arizona, a limited mandate of this nature was passed by the Arizona State Legislature in 1987 -- and expanded by the Legislature, to add tax incentives, in 1988.

Nevertheless, Congress was taking no chances; it wanted assurances that nonattainment areas would indeed move forward expeditiously on clean-burning transportation fuels.

Therefore, when Congress passed its comprehensive air quality law, Congress included a phased but firm mandate for development of clean-burning fuel capability by newly acquired fleet vehicles in severe nonattainment areas. Both public and private fleet vehicles were affected.

However, like the Arizona State Legislature, Congress decided not to limit itself to mandates alone. It enacted two important new programs that established incentives for production and use of vehicles with the capability to use clean-burning fuels. To these Congressional initiatives, an important Executive Branch initiative was added.

The three Federal incentive programs were as follows:

1. In October of 1988, the Alternative Motor Fuels Act of 1988 --- widely known as "the Sharp/Rockefeller bill" -- was signed into law by President Reagan. The new law established for vehicle manufacturers a system of credits toward meeting Federally mandated Corporate Average Fuel Economy (CAFE) standards. These credits were made available, within certain limitations, for manufacturers of vehicles with the capability to use natural gas, methanol or ethanol. Also, as a separate prong of the same law, \$18 million in Federal funding was authorized for Federal agency procurement of vehicles that could use clean-burning fuels.

2. Also during the fall of 1988, the Urban Mass Transit Administration (UMTA), an arm of the U.S. Department of Transportation, announced that it would make available \$35

million in Federal funds -- on a 3-to-1 matching funds basis -- for community procurement of buses that could run on natural gas, methanol, ethanol, electricity or any other clean-burning fuel. The response, from municipalities across the nation, far exceeded expectations; it also revealed a strong community preference for natural gas as a fuel for heavy-duty engines.

In 1990, UMTA greatly expanded this program and made it a permanent feature. By 1992, buses that ran exclusively on diesel fuel had been made ineligible for UMTA assistance.

3. In the fall of 1989, Congress enacted important tax incentives as a way to partly offset the higher capital cost of vehicles that can utilize clean-burning fuels. The new law was a modified version of H.R. 5223, introduced late in 1988 by Democratic Congressman Michael Andrews of Texas.

As revised, re-introduced and enacted in 1989, the Andrews bill had two key elements:

(a) Those who purchase or lease alternative fuel vehicles, and/or related infrastructure equipment, are now permitted to count 20% of their capital costs as a direct credit against any Federal income tax liability. (Corporations are able to reduce their corporate income taxes and private individuals are able to reduce their personal income tax liability.)

(b) As a way to extend these incentives to State and municipal governments, such governments, when they purchase or lease alternative fuel vehicles, and/or related infrastructure equipment, are authorized to convert 20% of their capital costs into a direct add-on to any Federal transportation funding that such governments would otherwise receive.

With the enactment of both air quality legislation and tax incentive legislation in 1989, Congress completed its two-Session pulse of legislative action. For the time being, Congress would await the results of what it had done.

It took the Federal Government's Executive Branch one to two years to digest the various Congressional initiatives and convert them into established programs and regulations, while simultaneously bringing its own UMTA initiative to fruition. The nation was barely into the 1990's when this came to pass.

Thus, as America moved into a new decade, the action shifted. Now the initiatives on NGVs would have to come -- if they came at all -- from gas utilities, and State and local governments, across the nation.

Fortunately for its people, the State of California had a headstart. Both its utilities, and a number of its governmental bodies, had begun to mobilize for action in 1988.

The utilities began with a small commitment, but the commitment grew dramatically.

UTILITY INITIATIVES

The first California utility stirrings on NGVs can be traced far back into the 1970's. After some early setbacks, the utilities moved into a period of watching and waiting on NGVs -- and, in 1988, they began to move again.

The steps forward in 1988 were moderate: involvement with some R&D and small-scale Demonstration Projects; participation in the special South Coast Advisory Committee on Rule 1601 (the mandate for a phased fleet vehicle shift to use of clean-burning fuels); a campaign to assure the inclusion of NGVs in South Coast's 20-year Air Quality Management Plan.

By 1989, as the merits of NGVs began to win recognition at California agencies, and as the pressure from Washington increased, California utilities became bolder and more activist.

Beginning in 1989, and moving with accelerating momentum into the 1990's, the utilities launched and sustained several initiatives. Some of the more dramatic steps included the following:

1. At the very Hearings that we commemorate today, three California utilities -- Pacific Gas and Electric, San Diego Gas and Electric and Southern California Gas -- unveiled an offer to join with CARB in forming a Joint

Government/Industry Task Force on Quality Control for Natural Gas Vehicle Conversions. This utility initiative recognized, and addressed, two challenging facts of life:

(a) There was an immediate need to improve air quality in California, and therefore an immediate market for NGVs, but no available Original Equipment Manufacturer (at least for light-duty vehicles). Therefore, any short-term growth in the use of NGVs, on any major scale, would have to involve conversions of existing gasoline and diesel fuel vehicles (including newly manufactured gasoline and diesel fuel vehicles).

(b) However, there were no quality control mechanisms in place to assure that both the conversion equipment and the conversion installation would meet the highest standards.

With the utility-initiated establishment of a Joint Task Force on Quality Control, these facts of life were faced directly and constructively. By the summer of 1989, the first Task Force meeting had been held. By the fall of 1990, with the help of some technical experts from outside the State, certification standards and procedures were in place for conversion equipment and conversion installation.

These California certification mechanisms rapidly became a model for the entire United States.

2. The establishment of quality control for vehicle conversion work did not keep the utilities from recognizing the need to bring Original Equipment Manufacturers into the marketplace as quickly as possible. To this end, the three activist utilities began in 1989 to explore pooling orders for their own utility fleets. The objective was to reach

the numerical "critical mass" that would induce an Original Equipment Manufacturer to open an assembly line. The California utilities realized that, until a pervasive NGV infrastructure could be built, "dual capable" NGVs would be needed to penetrate most markets. Nevertheless, as they pooled their orders, the utilities were seeking a "dedicated" NGV that could only run on natural gas. The utilities wanted to show what a gas-only engine could do.

By the early 1990's, the utilities had reached their "critical mass" -- and their dedicated vehicles began to roll off the assembly line. This goal was achieved in three steps:

(a) The three California utilities began to reserve an unprecedented share of their own newly acquired fleet vehicles for the exclusive use of natural gas.

(b) The American Gas Association and the Natural Gas Vehicle Coalition worked to find other utilities across the nation that would "pool" orders with the California utilities. With this nationwide "pool" as a bargaining chip, the two national groups began intensive discussions with auto manufacturers.

(c) To help put the project over the top, the California Department of Transportation agreed to reserve some of its own newly acquired fleet vehicles for the exclusive use of natural gas.

3. By the end of 1989, the three California began to promote the use of natural gas in private vehicles owned by their own 41,000 employees. Many of the utility employees proved receptive, and passed the word along effectively to

their own families and friends. Initially, almost all of the NGVs involved were conversions of existing gasoline vehicles to "dual capability". Such vehicles, while not optimized for the use of natural gas, nevertheless offered dramatically reduced emission levels and generated favorable word of mouth for natural gas as a motor fuel.

Over time, as experience with natural gas proved its benefits, and as the NGV infrastructure was developed, utility employees showed increasing interest in dedicated NGVs.

Historically, these utility employees played a crucial role. They became the first beachhead for entry of NGVs into the mass passenger vehicle market.

4. As noted earlier, gas industry R&D on NGVs was initiated well before the market began its dramatic growth surge. However, in 1989, the three activist California utilities began to recognize the need for a major acceleration of NGV R&D.

The specific trigger was the problem of nitrogen oxide emissions.

Nitrogen oxide was a puzzle; it did not fit the pattern for natural gas. Even "first generation", converted NGVs had displayed the ability to reduce dramatically vehicular emissions of carbon monoxide and reactive hydrocarbons. EPA had conservatively estimated emission reductions of 50% for carbon monoxide and 40% for reactive hydrocarbons. Gas industry sources, based on experience, estimated that

reductions of more than 80% could be attained for both pollutants. Under either estimate, the emission reductions were spectacular.

Yet, when it came to nitrogen oxide, care and effort was required to assure that NGV nitrogen oxide emissions would not exceed those of gasoline.

Because this was a puzzle, it was a fitting subject for R&D -- and such R&D was already underway in the late 1980's. It offered promising results.

A February 1989 study provided a further incentive for utilities to proceed aggressively on this front. Professor Enoch Durbin of Princeton University, in a study entitled Understanding Emission Levels from Vehicle Engines Fueled with Gaseous Fuels, concluded that "from both an emissions and an efficiency point of view, gaseous fuels, and in particular natural gas, are superior to liquid fuels in vehicular applications". Among numerous specific findings, the professor added that "In an engine 'designed for natural gas' it should be possible to achieve oxides of nitrogen emissions much lower than those emissions from gasoline engines".

A copy of this historic study is attached.

The publication of this work, coupled with a growing awareness of the potential size of the NGV marketplace, spurred a major intensification of utility R&D initiatives on NGV nitrogen oxide emissions.

As this R&D bore fruit, it encouraged additional intensified R&D on other subjects, such as storage cylinder technology. This R&D, despite the usual number of blind alleys, bore fruit as well.

The results can be seen on the roads today.

Still, the utilities could not have done it alone. They needed help from State and local governments.

STATE AND LOCAL GOVERNMENT MANDATES AND INCENTIVES

For this 18th Anniversary celebration, we have searched gas industry archives to find a document that goes beyond being historic. The document is prophetic.

We have attached this document as an Appendix.

Written by gas industry executives in March of 1989, for the very Hearings we are now commemorating, the document is entitled "Recommendations for Measures to Encourage the Widespread Use of Natural Gas Vehicles in California".

The document recommends specific mandates and incentives for California to initiate. The prophetic flavor of the document flows from the fact that all of these public policy recommendations were ultimately adopted.

The document begins on well-worn ground. It reiterates two key themes that the gas industry had been hammering relentlessly throughout the late 1980's.

First, the document stressed that development of alternative fuel capability must be mandated. The document asserted that, so long as inexpensive oil supplies flowed freely into the California marketplace, the market would not move measurably forward on its own. Until market acceptance had been won, and sufficient capital raised and expended for infrastructure development, the clean-burning transportation fuels needed to have a portion of the marketplace where they would compete only against each other.

Second, the document stressed that both mandates and incentives should preserve a "level playing field" for all clean-burning transportation fuels. The document asserted that, so long as government leadership assured that all of the competing clean-burning fuels represent significant progress over gasoline, on at least some major pollutants, the public would only benefit from having a choice.

By the end of 1989, both of these principles had become accepted foundations of California public policy. As immediate manifestations of this acceptance, South Coast's Rule 1601 was put on the books -- in a form that allowed Natural Gas Vehicles to enter the affected markets -- and the California Air Resources Board decided to retain a reactive hydrocarbon standard for heavy duty natural gas engines.

Still, if the document's first few points were familiar to California legislators and regulators, the rest of the document broke new ground. It set forth several specific public policy recommendations that had never been put forth before.

As noted earlier, all of these recommendations were ultimately adopted.

A brief review of these recommendations will quickly remind us of how much progress we have made. Bear in mind that these recommendations were new ideas in 1989:

1. Ratebasing policies, by the California Public Utilities Commission (CPUC), should allow recovery of gas utility capital costs for NGV infrastructure development. The CPUC should allow a gas utility, when it makes a particular NGV infrastructure investment, to elect one of two options:

(a) GUARANTEED COST RECOVERY, WITHIN PRE-ESTABLISHED GUIDELINES.

(b) WAIVER OF COST RECOVERY IN EXCHANGE FOR DEREGULATION OF RATES AT THE PUMP.

2. Ratebasing policies, by the CPUC, should encourage gas utilities to dramatically increase their expenditures on NGV-related Research and Development (R&D). To insure accelerated R&D by California gas utilities, while still heeding the interests of gas utility customers, the CPUC should establish two new ratebasing policies for gas utility R&D expenditures:

(a) GUARANTEED COST RECOVERY, WITHIN PRE-ESTABLISHED GUIDELINES. In effect, a "budget" should be established for utility R&D expenditures. Corporate expenditures which remain within this "budget" should be deemed prudent and otherwise eligible for recovery through utility rates.

(b) GUARANTEED RECOVERY OF SOME OF THE PROFITS FROM SUCCESSFUL UTILITY R&D. California gas utilities suggest an even split: 50% for the utility customers who provide the capital; 50% for the utility shareholders whose executives make the planning decisions and guide the work.

3. The California Insurance Commission, or the State Legislature, should bar insurance providers from discriminating arbitrarily against new, clean-burning transportation fuels.

The following language is suggested:

"No provider of insurance shall discriminate against any clean-burning transportation fuel, or any related equipment, in rates or coverage or any other material respect, except to the extent that such provider of insurance demonstrates, through a clear preponderance of the evidence, that a specific clean-burning transportation fuel poses substantially greater risks to safety and/or reliability than the refined oil product that would otherwise be used, and that the particular form of discrimination against the specific fuel, or against the specific related equipment, is directly and proportionately related to the increase in such risks."

This language does not prohibit discrimination against a clean-burning fuel if such discrimination is reasonably related to actual risks. The language is aimed at arbitrary discrimination against a clean-burning fuel.

4. The State Legislature should require sweeping revision of well-intentioned safety regulations and practices, adopted before the era of clean-burning transportation fuels, which may operate in practice to discriminate arbitrarily against these new transportation fuels. Throughout the nation, both local laws and private sector practices operate to bar natural gas from tunnels, underground parking lots and even from schoolbus engines --

despite the fact that the safety record of NGVs is better than the safety record for gasoline or diesel fuel.

The following statutory language is suggested:

"Other provisions of law notwithstanding, no State agency, local government or private party shall adopt or enforce a safety or operational regulation or practice which has the effect of discriminating against a clean-burning transportation fuel, except to the extent that such State agency, local government or private party demonstrates that a specific clean-burning transportation fuel poses greater risks to safety than the refined oil product that would otherwise be used; that the particular regulation or practice is directly and proportionately related to protection against such risks to safety; and that the particular regulation or practice is in fact likely to accomplish the objective of providing greater protection against such risks."

As with the previously proposed language, this language is aimed at arbitrary discrimination. The language permits discrimination that is reasonably related to actual protection against actual safety concerns.

5. The State Legislature should establish meaningful tax incentives for inducing the marketplace to overcome capital cost barriers to alternative fuel vehicles.

The suggested approach, drawn from the Federal level, is the "Andrews bill", sponsored by Congressman Michael Andrews, a Texas Democrat who serves on the House Ways and Means Committee. (HISTORIAN'S NOTE: As mentioned earlier, the Federal version of this bill was enacted during the 101st Congress.)

A State version of the Andrews bill would have two key provisions:

(a) Those who purchase or lease alternative fuel vehicles, and/or related infrastructure equipment, may count 20% of their capital costs as a direct credit against any State income tax liability. (Corporations would reduce their corporate income taxes and private individuals would reduce their personal income tax liability.)

(b) As a way to extend these incentives to municipal governments, such governments, when they purchase or lease alternative fuel vehicles, and/or related infrastructure equipment, may convert 20% of their capital costs into a direct add-on to any State transportation funding that such governments would otherwise receive.

6. State regulatory agencies should establish grants for alternative fuel research, development and demonstration programs. Currently, State funds are available for alternative fuels but these funds are being utilized mainly for methanol-related programs. Alternative fuel funds should be spread over all qualified fuels on a "level playing field" basis.

7. The California Department of Transportation should begin purchasing "dedicated" alternative fuel vehicles (that is, those that can only operate on a clean-burning transportation fuel).

The Natural Gas Vehicle Coalition and the American Gas Association are currently soliciting orders for "dedicated" NGVs. The goal is to "pool" enough orders to provide an "economic order quantity" that can entice a major U.S. auto manufacturer to begin making dedicated Natural Gas Vehicles.

This order is crucial if the U.S. is ever to see original equipment manufacture of dedicated NGVs that can optimize the performance of natural gas. Therefore, a quantity of the State's alternative fuel vehicle purchases should be specified as Natural Gas Vehicles, and combined with gas industry orders to achieve the necessary quantity.

The arguments for each of these recommendations are set forth in the attached Appendix. Needless to say, the arguments were effective.

So were the incentives, once they assumed the force of law.

It was these incentives -- coupled with the State and local mandates, the Federal mandates, the initiatives of the utilities and the open minds of the public -- that made a world of difference for a beautiful State.

CONCLUSION

We have come a long, long way from where we were in 1989. To accomplish this, many, many people had to commit themselves to many, many efforts. Our brief history has merely spotted some of the more prominent milestones; it cannot begin to tell the whole story.

Still, if there were one single image, one single symbol, to illustrate how far we have come, that symbol might be this:

When the President of the United States comes to town tonight, to formally open our commemorative celebration, she will be riding in a natural gas limousine.

APPENDIX:
JOINT CALIFORNIA GAS UTILITY/AMERICAN GAS ASSOCIATION
RECOMMENDATIONS FOR MEASURES TO ENCOURAGE THE WIDESPREAD USE
OF NATURAL GAS VEHICLES IN CALIFORNIA

I. MANDATES

A. First and foremost, development of alternative fuel capability must be mandated. So long as current market conditions prevail, with inexpensive oil supplies flowing freely into the California marketplace, the market will not move measurably forward on its own. The market will not "self-start"; it needs a "jump start".

Mandates are required first to get the market started. Once the market development process reaches a meaningful level of activity, then incentives can be used to influence the pace of NGV development, including required support infrastructure.

B. Both mandates and incentives should preserve a "level playing field" for all clean-burning transportation fuels. As long as government leadership assures that all of the competing clean-burning fuels represent significant progress over gasoline and diesel fuel, on at least some major pollutants, the public can only benefit from having a choice.

In the immediate future, applying this principle means:

1. Assuring that the final version of the South Coast Air Quality Management District (South Coast) mandate, under Rule 1601, will allow Natural Gas Vehicles (NGVs) to compete on their own merits against vehicles fueled by methanol, ethanol, propane, electricity and other clean-burning fuels. Newly manufactured NGVs and retrofitted NGVs, "dedicated" NGVs and "dual capable" NGVs: all should be allowed to compete, within the parameters of environmental requirements.

2. Withdrawal of that portion of a proposed rule, by the California Air Resources Board (CARB), which would make heavy duty gaseous-fueled vehicles subject to a total hydrocarbon standard. Instead, the CARB should retain the current reactive hydrocarbon standard for gaseous-fueled vehicles. NGVs can easily meet the current standard, which measures only the reactive hydrocarbons that are known to harm the lower atmosphere. However,

most retrofitted NGVs and some newly manufactured NGVs would not be able to meet the standard if, as proposed, it is changed to include chemically inactive hydrocarbons. Thus, for the sake of avoiding some emissions that are not chemically reactive in the lower atmosphere, the CARB proposal would keep off the road vehicles with a known capability to dramatically reduce emissions of carbon monoxide and ozone precursors.

II. INCENTIVES

A. Ratebasing policies, by the California Public Utilities Commission (CPUC), should allow recovery of gas utility capital costs for NGV infrastructure development. Natural gas utilities -- like electric utilities -- have become extremely cautious about making capital investments. Utility investment planning is marked by a pervasive concern that regulators might decide, after an expenditure has been made, that the investment was "imprudent" or otherwise ineligible for recovery of costs through utility rates. This concern about cost recovery is particularly acute when utility planners are dealing with a new type of investment -- such as NGV refueling stations -- where there is no "track record" for assessing how regulators might react. It is difficult to overstate the "chilling effect" of this uncertainty, and resolution of this utility concern is therefore a crucial key to inducing utility investment at an accelerated pace.

As a concept, cost recovery for NGV infrastructure expenditures should be easy to justify. Such investments clearly serve the interest of the public at large by improving air quality. They also serve the interests of gas utility customers by spreading fixed system costs over a larger base of gas volumes sold. However, when we move from general concepts to specific projects, regulators can be concerned with the possibility of waste or abuse; they are naturally reluctant to provide a "blank check" for expenditures that may or may not be used wisely. The funds invested are -- after all -- drawn from bills paid by customers whom these regulators are pledged to protect.

As a compromise approach, to address the concerns of regulators and utilities alike, the CPUC should allow a gas utility, when it makes a particular NGV infrastructure investment, to elect one of two options:

1. **GUARANTEED COST RECOVERY, WITHIN PRE-ESTABLISHED GUIDELINES.** A gas utility's NGV infrastructure expenditures would be presumed prudent and recoverable to the extent that they remain within the parameters of pre-established CPUC guidelines. For example, an expenditure for a small "fast fill" compressor station might be presumed recoverable to the extent that it does not exceed \$50,000, and an expenditure for a standard "fast fill" compressor station might be presumed recoverable to the extent that it does not exceed \$100,000. The guidelines should be developed through generic Statewide proceedings to determine the fair market value for relevant equipment and services (bearing in mind that there will be some fluctuations as rising NGV demand boosts efficiencies of scale on the one hand while bidding up existing stocks on the other). Ideally, the guidelines should take into account regional price differences within the State, and should be automatically adjusted for inflation at least once a year. Once established, these "real dollar" guidelines should represent an upper limit on guaranteed cost recovery. To avoid establishing the functional equivalent of price controls, with their proven ill effects, a utility should be empowered to ask the CPUC for recovery of amounts in excess of the guidelines. However, to recover any increment of costs above the guidelines, a utility should bear the burden of proof under a rigorous standard of accountability.

2. **WAIVER OF COST RECOVERY IN EXCHANGE FOR DEREGULATION OF RATES AT THE PUMP.** This option keeps the broader community of utility customers out of the action. The utility does not collect a dime from such customers; its NGV infrastructure expenditures come out of the pockets of shareholders, and its NGV infrastructure revenues come out of the pockets of those who buy natural gas for their vehicles. In short, the NGV retail operation is treated as if it were not a utility investment, and sales past the meter are deregulated.

Either of these options would greatly boost the pace of NGV investments, while protecting regular utility customers against waste or abuse. Since management values differ from utility to utility, and since conditions differ from investment to investment, it makes sense to let a utility choose between these two options on a case-by-case basis.

B. Ratebasing policies, by the CPUC, should encourage gas utilities to dramatically increase their expenditures on NGV-related Research and Development (R&D).

Within the world of regulated utilities, R&D investments fall prey to the same "chilling uncertainty" that inhibits major capital investments in new areas of activity.

Two concerns are frequently voiced when gas utility executives meet to decide upon R&D budgets:

"If this flops, the regulators may not let us recover the R&D costs."

And...

"If this succeeds, the regulators may not let us keep the profits. We could be told to pass them through to our consumers by proportionately reducing our rates."

Regardless of what regulators would actually decide to do, utility R&D investments are regularly discouraged by fear of what regulators might decide to do. In such an environment of uncertainty, R&D expenditures are frequently viewed as "all downside and no upside".

The public interest in California would be served superbly by ratebasing policies that encouraged NGV R&D instead of inhibiting it.

The potential payoffs for the public are substantial. Already, with a technology that is proven but not yet mature, the U.S. Environmental Protection Agency (EPA) estimates that NGVs can yield a 50% reduction in tailpipe emissions of carbon monoxide and a 40% reduction in tailpipe emissions of reactive hydrocarbons. Gas industry experience indicates that even more dramatic reductions -- exceeding 80% for both pollutants -- are attainable.

With accelerated R&D on NGVs, the gas industry can add to this list of NGV benefits a significant reduction in tailpipe emissions of nitrogen oxide. Although at present it requires care and effort to simply hold our own against gasoline on this pollutant, evidence both theoretical and practical indicates strongly that accelerated R&D could quickly make major headway on this front.

In addition, it is our assessment that R&D expenditures can reduce tailpipe emissions of unburned methane, should the body of evidence suggest at some point that phased-in emission reductions are advisable.

Further, when we move beyond emissions-related R&D, there are major opportunities for progress in such areas as extending range and accelerating the "fast fill" refueling process.

Simply put, the public interest could justify boosting NGV R&D expenditures by an order of magnitude. However, such a level of investment is not likely to materialize until the aura of regulatory uncertainty is dissipated.

To insure accelerated R&D by California gas utilities, while still heeding the interests of gas utility customers, the CPUC should establish two new ratebasing policies for gas utility R&D expenditures:

1. GUARANTEED COST RECOVERY, WITHIN PRE-ESTABLISHED GUIDELINES. In effect, a "budget" should be established for utility R&D expenditures, and corporate expenditures which remain within this "budget" should be deemed prudent and otherwise eligible for recovery through utility rates. Such a concept would recognize that R&D is a realm of trial, error and experimentation, where most "leads" are dead ends and some waste of time and money is unavoidable. Because of this very fact, successful R&D requires enough funding and flexibility, with enough exploration of enough options, to find that one "lead" in ten with the payoff that makes all the dead ends worthwhile.

To provide this funding and flexibility, the CPUC should permit guaranteed cost recovery for R&D expenditures that do not exceed 1% of a given utility's gross revenues. Any incremental R&D expenditures above this level should be recoverable when a utility can meet the burden of proof for affirmatively demonstrating prudent investment behavior.

1% of corporate gross income is a balanced figure for a utility's R&D budget. The figure is high to permit major new R&D initiatives and acceleration of existing R&D. At the same time, in comparison to many unregulated industries, such as electronics and pharmaceuticals, this level of R&D investment is extremely conservative.

2. GUARANTEED RECOVERY OF SOME OF THE PROFITS FROM SUCCESSFUL UTILITY R&D. Once again, we suggest a balance. Utilities will never be very enthusiastic about R&D if they cannot keep a meaningful share of the profits from that "one lead in ten" which pays off. On the other hand, since the ratebased R&D funds are collected from the utility's customers, regulators often conclude that these customers should share in the benefits.

In the finest traditions of American horsetrading, we suggest an even split: 50% for the utility customers who provide the capital; 50% for the utility shareholders whose executives make the planning decisions and guide the work. Such a 50-50 split should provide a real incentive for gas utility managers while still preserving tangible benefits for consumers.

C. The California Insurance Commission, or the State Legislature, should bar insurance providers from discriminating arbitrarily against new, clean-burning transportation fuels.

If insurance for NGVs (and related facilities) is not easily available at reasonable rates, the momentum toward use of clean-burning transportation fuels will suffer a severe setback. Under such a situation, voluntary shifts to alternative transportation fuels will occur rarely if at all, and those who face mandates will fight compliance with those mandates in every way they can.

We suggest adding the following language to California insurance regulations and/or California statute books:

"No provider of insurance shall discriminate against any clean-burning transportation fuel, or any related equipment, in rates or coverage or any other material respect, except to the extent that such provider of insurance demonstrates, through a clear preponderance of the evidence, that a specific clean-burning transportation fuel poses substantially greater risks to safety and/or reliability than the refined oil product that would otherwise be used, and that the particular form of discrimination against the specific fuel, or against the specific related equipment, is directly and proportionately related to the increase in such risks."

We stress that this language does not prohibit discrimination against specific fuels, where it can be demonstrated that such discrimination is reasonably related to actual risks. The target of our proposed language is arbitrary discrimination.

D. The State Legislature should require sweeping revision of well-intentioned safety regulations and practices, adopted before the era of clean-burning transportation fuels, which may operate in practice to discriminate arbitrarily against these new transportation fuels.

For example, throughout the nation both local laws and private sector practices operate to bar NGVs from tunnels, from underground parking lots and even from schoolbus engines -- despite the fact that the safety record of NGVs is better than the safety record for gasoline or diesel fuel.

If we try to undo these regulations and practices one by one, we will waste a great deal of precious time. The gas industry suggests slashing the Gordian knot with a single new State statute:

"Other provisions of law notwithstanding, no State agency, local government or private party shall adopt or enforce a safety or operational regulation or practice which has the effect of discriminating against a clean-burning transportation fuel, except to the extent that such State agency, local government or private party demonstrates that a specific clean-burning transportation fuel poses greater risks to safety than the refined oil product that would otherwise be used; that the particular regulation or practice is directly and proportionately related to protection against such risks to safety; and that the particular regulation or practice is in fact likely to accomplish the objective of providing greater protection against such risks."

As with our previously proposed language, this language is aimed at arbitrary discrimination. The language permits discrimination that is reasonably related to actual protection against actual safety concerns.

E. The State Legislature should establish meaningful tax incentives for inducing the marketplace to overcome capital cost barriers to alternative fuel vehicles.

There is, of course, a wide range of possibilities for structuring such tax incentives.

Our favorite, at the Federal level, is the "Andrews bill", sponsored by Congressman Michael Andrews, a Texas Democrat who serves on the House Ways and Means Committee. Introduced in 1988 as H.R. 5223, the bill will be reintroduced shortly, in slightly modified form and with considerably greater support.

The 1989 version of this bill, like the 1988 version, will have two key provisions:

(a) Those who purchase or lease alternative fuel vehicles, and/or related infrastructure equipment, may count 20% of their capital costs as a direct credit against any Federal income tax liability. (Corporations would reduce their corporate income taxes and private individuals would reduce their personal income tax liability.)

(b) As a way to extend these incentives to State and municipal governments, such governments, when they purchase or lease alternative fuel vehicles, and/or related infrastructure equipment, may convert 20% of their capital costs into a direct add-on to any Federal transportation funding that such governments would otherwise receive.

We expect that this bill will be enacted -- and effective. However, there is no need for California to wait for Congress.

We urge the California State Legislature to move now toward the enactment of a "Little Andrews bill", designed to provide credits against State income tax liability, plus direct add-ons to State transportation assistance for California municipalities.

F. State regulatory agencies should establish grants for alternative fuel research, development and demonstration programs.

Currently, State funds are available for alternative fuels but are being utilized mainly for methanol-related programs. Alternative fuel funds should be spread over all qualified fuels on a "level playing field" basis.

G. The California Department of Transportation should begin purchasing "dedicated" alternative fuel vehicles (that is, those that can only operate on a clean-burning transportation fuel).

As noted in previous comments, the Natural Gas Vehicle Coalition and the American Gas Association are currently soliciting orders for "dedicated" NGVs. The goal is to "pool" enough orders to provide an "economic order quantity" that can entice a major U.S. auto manufacturer to begin making dedicated Natural Gas Vehicles. This order is crucial if the U.S. is ever to see original equipment manufacture of such dedicated NGVs. Therefore, a quantity of the State's alternative fuel vehicle purchases should be specified as Natural Gas Vehicles, and combined with gas industry orders to achieve that necessary economic order quantity.

We have provided a relatively long list of mandates and incentives for California to consider. If these recommendations are adopted, the level of NGV development in California will rise dramatically.

March 1989