MYTHS AND REALITIES OF PHASING OUT LEADED GASOLINE



The Alliance To End Childhood Lead Poisoning is a non-profit public interest organization dedicated to eliminating lead poisoning in the United States and throughout the world. The Alliance was formed in 1990 by nationally and internationally recognized leaders in the diverse fields needed to mount an effective interdisciplinary attack on lead poisoning: environmental protection, public health, low-income housing, environmental justice, education, pediatrics, occupational health and safety, children's welfare, and civil rights.

The Alliance's mission is to frame the agenda, formulate innovative approaches, and bring critical resources to bear – scientific and technical knowledge, public policy, economic forces, other organizations, and community leaders – to prevent lead poisoning. The Alliance's activities include:

Education to inform policy makers and the public of lead hazards and the benefits of prevention.

Policy Support to develop prevention strategies and programs at the community, national, and international levels.

Advocacy to implement prevention strategies by changing public policy, enlisting the private sector in solutions, and mobilizing other resources and organizations.

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PURPOSE

This document provides policy makers and opinion leaders in national governments, industry, and international organizations with the facts needed to understand the opportunity at hand to complete the phase-out of leaded gasoline. The evidence of leaded gasoline's harmful effects on human health is overwhelming. Alternative technologies and substitute products are readily available and both developed and developing countries have demonstrated their feasibility and cost-effectiveness. International support for phasing out leaded gasoline is strong and private financing is available, yet leaded gasoline use continues in most countries.

A major obstacle to leaded gasoline phase-out is the persistence of several myths. These myths simply do not hold up when forced to stand side-by-side with the facts. The purpose of this document is to examine and refute these myths.

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The Alliance is solely responsible for the accuracy and contents of this document.

INTRODUCTION

<u>Leaded Gasoline Phase-Out Is an Urgent Priority</u>. Leaded gasoline causes more widespread human exposure to lead than any other single source. This is due largely to the dispersive nature of its use. When leaded gasoline is burned, extremely fine particles of lead compounds are emitted into the air, where they can remain suspended for weeks. These particles can travel significant distances and are absorbed very easily through the lungs.

Lead eventually falls out into soil and dust, creating a reservoir of lead that can pose a health hazard for decades, if not centuries, to come. Young children, who are most vulnerable to lead's harmful effects, ingest lead in dust and soil as a result of their normal hand-to-mouth behavior.

These three factors – the dispersive nature of leaded gasoline use, the ease with which it enters the human body, and the particular vulnerability of children to lead's harmful effects – combine to make leaded gasoline phase-out a pressing international environmental health and sustainable development priority. The projected increase in global motor vehicle use and the legacy of lead in soil and dust that leaded gasoline leaves behind make its phase-out all the more urgent.

<u>Phasing Out Leaded Gasoline Benefits Society</u>. More than a dozen countries have already eliminated leaded gasoline. In each case, significant health and economic benefits have been realized, including improved air quality, reduced health care costs, and enormous savings in vehicle maintenance. Phase-out also enables children to enter school "ready to learn" and allows individuals to become productive members of society, ultimately improving national competitiveness.

<u>Now Is the Time to Act</u>. We have the knowledge, technology, experience, and international commitments to complete phase-out by the turn of the century. Phasing out leaded gasoline has proven technologically feasible and cost-beneficial in both developing and developed countries. International fora and institutions have repeatedly endorsed leaded gasoline phase-out as a top priority for sustainable development, children's health, and the environment. The World Bank, the U.S. Environmental Protection Agency, the U.S. Agency for International Development, and other organizations are supporting the implementation of these commitments by providing technical and other assistance.

Now is the time to translate these commitments and opportunities into action. The failure to act today will adversely affect generations to come.

ALLIANCE TO END CHILDHOOD LEAD POISONING

Because lead poisoning only presents identifiable symptoms at high levels, some have dismissed lead as "an insignificant theoretical risk" to human health. In addition, they maintain that there is continuing controversy over the science of lead's toxicity.

Reality: The Health Effects of Lead are Severe and Indisputable

Lead is the most studied of all human toxins, and the weight of evidence of its damaging effects on health and the environment is overwhelming. The data on lead's toxicity to various organs and systems converge from hundreds of clinical, epidemiological, laboratory, and cellular studies. After a comprehensive review of the science, the U.S. National Academy of Sciences unequivocally reaffirmed the evidence of adverse human health effects caused by even low-level lead poisoning in its definitive 1993 report, <u>Measuring Lead Exposure in Infants, Children, and Other Sensitive Populations</u>.

At high levels, lead poisoning causes coma, convulsions, and death. In children, lead levels too low to present obvious symptoms cause reductions in IQ and attention span, reading and other learning disabilities, hyperactivity, behavior problems, impaired growth, and hearing loss. In adults, lead poisoning causes increased blood pressure, liver and kidney damage, and impaired fertility. Hypertension caused by lead exposure contributes to thousands of deaths every year, particularly of men between the ages of 35 and 50.

The effects of lead on a particular locality can be devastating. For example, the World Bank estimates that lead causes hundreds of infant deaths and approximately ten thousand adult deaths in Cairo each year. The Bank has also found that the average child living in urban areas of Manila has lost 2.2 to 6.4 IQ points as a result of lead exposure.

At all levels of exposure, lead poisoning causes severe adverse health effects in both children and adults, affecting their ability to learn and thrive, their productivity, and ultimately national competitiveness. Opponents of leaded gasoline phase-out frequently argue that leaded gasoline is not a significant source of lead exposure. They claim that other sources, such as lead-based paint or lead-soldered food cans, are responsible. Perpetuators of this myth argue that each country must undertake extensive research to measure sources of lead exposure before taking action to phase out leaded gasoline.

Reality: The Direct Relationship Between Leaded Gasoline Use and Lead in Blood Is Well Documented

The existence of other sources of lead in the environment does not in any way reduce the significance of leaded gasoline as a source of human exposure. Studies have demonstrated the direct correlation between the use of leaded gasoline and population blood lead levels. In the U.S., the virtual elimination of leaded gasoline resulted in a 77% decrease in the average blood lead level of the population between the years of 1976 and 1991. In the U.K., a 50% drop in gasoline lead levels corresponded with a 20% drop in blood lead levels.

Furthermore, studies using isotopic analysis, through which it is sometimes possible to trace the source of lead in blood, have proven that leaded gasoline use contributes substantially to blood lead levels. In Turin, Italy, for example, isotopic analysis showed that leaded gasoline contributed 30% to 40% of total blood lead levels in the city's population.

Regardless of other sources of lead in the environment, the direct correlation between gasoline and blood lead levels is well established. This relationship does not vary significantly from country to country, because the chemistry of burning leaded gasoline, the pathways of exposure to lead, and the biology of the human body remain the same.

It is irresponsible and unnecessary to delay action to phase out leaded gasoline until proof of this relationship is documented on a country-by-country basis. According to popular belief, using unleaded gasoline in older cars with "soft" exhaust valve seats causes engine damage. This is because lead, which is added to gasoline to boost octane, also coats valve seats made with cast iron or soft steel. It is argued that without the lubrication that lead additives provide, these soft valve seats will wear down, a phenomenon known as "valve seat recession."

Reality: All Cars Can Operate on Unleaded Gasoline

Extensive research and actual experience confirm that all cars – including older ones with soft valve seats – can operate on unleaded gasoline under normal driving conditions. Even in the case of engines subjected to high stress, such as in heavy duty farm equipment and motorcycles, unleaded gasoline has not caused significant engine damage. Valve seat recession is unlikely to occur except in extreme conditions – for example when vehicles are run constantly for days on end, *and* at high speeds, *and* carrying heavy loads.

In countries where vehicle fleets are very old (the U.S. and Europe stopped producing cars with soft valve seats in the 1970s), the use of alternative additives that provide valve seat lubrication protects against any small risk of valve seat recession. This strategy has been used successfully in some countries, including the Slovak Republic.

In any case, switching from leaded to unleaded gasoline reduces vehicle maintenance costs overall. This is because lead additives cause far more damage to engines than they prevent, by corroding exhaust valves, exhaust pipes, spark plugs, and mufflers. As a result, vehicles using unleaded gasoline need fewer tune-ups and part replacements. A 1985 U.S. EPA study on the costs and benefits of leaded gasoline phase-out confirmed that switching to unleaded gasoline provides significant savings in maintenance costs to drivers.

Fears of valve seat recession are illusionary. All cars can operate safely on unleaded fuels, often at lower cost.

It is argued that removing lead from gasoline requires increasing the use of cancercausing aromatics, such as benzene. While proponents of this myth concede that catalytic converters control emissions of benzene and other pollutants, they contend that countries where catalytic converters are not common will have increased cancer rates as a result of switching to unleaded gasoline. Proponents of this myth conclude that since the risks posed by lead are "theoretical and inconclusive," while benzene is a proven carcinogen, the best course of action is to continue the use of leaded gasoline.

Reality: Most Available Alternatives Are Safer Than Leaded Gasoline

The choice between lead and benzene is a false one. There are many alternatives to lead additives that do not increase benzene emissions. These include alternative additives such as MTBE and ethanol, upgraded production methods such as isomerization, and the use of alternative fuels. Still another option is to use new petroleum-based additives that reduce the octane requirements of engines so that neither benzene, other additives, nor upgraded production is needed.

<u>All</u> gasoline contains benzene and other aromatics. Therefore, the real issue is not whether phasing out leaded gasoline represents a benefit to public health and the environment. Clearly it does. Rather, the issue is that intelligent choices are needed among readily available technologies to avoid increases in the amount of aromatics or other harmful substances when leaded gasoline is phased out.

Since leaded gasoline renders catalytic converters inoperable, its phase-out provides an opportunity for countries concerned about urban air quality to introduce this pollution prevention device. However, the widespread use of catalytic converters is not a prerequisite to leaded gasoline phase-out. **Because there are many alternatives to leaded gasoline that do not increase benzene emissions, stalling phase-out until catalytic converters are commonplace is completely unnecessary.** Proponents of this myth allege that alternatives to leaded gasoline are simply too expensive. They argue that consumers will have to pay higher prices for unleaded fuels, and that refineries cannot afford the capital investments required for conversion.

Reality: Phasing Out Leaded Gasoline Makes Economic Sense

Phasing out leaded gasoline is economical for both vehicle owners and refineries. Converting to unleaded gasoline does, in fact, entail some cost. (The World Bank estimates an average of \$0.07 (U.S.) per gallon or \$0.02 per liter.) But considering only the short-term costs of conversion is what economists call a "partial analysis." It addresses one aspect of costs and ignores others.

Vehicle drivers can actually realize net savings from phasing out leaded gasoline. For example, an U.S. EPA study found that the savings to drivers from reduced maintenance costs alone more than offset the increased cost of unleaded gasoline. When vehicle maintenance costs are calculated with reduced health care costs and improved energy efficiency, it is estimated that the U.S. saved \$10 for every \$1 invested in conversion.

The initial cost of refinery conversion depends on the amount of refinery reconfiguration required, the level of octane desired, and how the improvements are financed. But financing conversion costs is not an insurmountable obstacle. Investment capital to replace "old technology" with "new technology" is always available when revenues from the investment are sufficient to pay back the cost. The World Bank considers shifting from leaded to unleaded fuels to be such an inherently good investment that conversion often can be financed entirely from private sources.

The continued use of leaded gasoline costs individuals and societies far more in health and vehicle maintenance costs than its phase-out.

Some argue that promptly phasing out leaded gasoline in developing countries is impractical. This argument typically invokes other myths to assert that phase-out is too difficult and costly in developing countries: phasing out leaded gasoline will hurt consumers by increasing fuel prices; the older car fleets typical of developing countries require leaded gasoline; introducing unleaded gasoline into a market where catalytic converters are rare will increase benzene exposure; and, refineries using older technologies would require massive investments for conversion.

Reality: Developing Countries Will Benefit the Most from Phasing Out Leaded Gasoline Now

Developing countries have the opportunity to phase out leaded gasoline before levels of vehicular and gasoline use match those typical in developed countries. It is not necessary for them to repeat the mistakes made by developed countries and bear the high cost of cleanup after the fact. The health dangers and social costs of leaded gasoline are abundantly clear, and alternative technologies and substitute products are now readily available.

Phasing out leaded gasoline provides an opportunity for developing countries to invest in their refinery industry to increase efficiency (and eventually profits). At the same time, removing lead from gasoline provides the opportunity for developing countries to introduce modern, efficient, and less polluting automobile engine technologies.

The best case for phasing out leaded gasoline comes from actual experience in developing countries. Countries such as Brazil, Colombia, and Thailand have already demonstrated that leaded gasoline phase-out is feasible and that the benefits are substantial. *The resources and assistance currently being provided by the World Bank, U.S. EPA, U.S. AID, and other organizations makes now an ideal time for developing countries to embark on leaded gasoline phase-out.*

M y t	Myths	Realities
h s v	<i>"Lead poisoning is not a problem."</i>	The health effects of lead are indisputable. Lead is the most studied of all human toxins, and the weight of evidence is overwhelming.
- R e	<i>"Leaded gasoline does not cause lead poisoning."</i>	The direct relationship between leaded gasoline use and lead in blood is well documented.
a I i t i	<i>"Some vehicles, especially older vehicles, require leaded gasoline."</i>	Numerous studies and actual experience with a broad range of vehicle and engine types have proven that <u>all</u> cars can run on unleaded gasoline.
e s o f	"The only alternative to lead is benzene – a known carcinogen."	The choice between lead and benzene is a false one. A wide range of safer alternative technologies and substitutes is available.
P h a s	<i>"Phasing out leaded gasoline costs too much."</i>	Phasing out leaded gasoline makes economic sense for vehicle owners, for refineries, and for society.
e O u t	"Phasing out leaded gasoline is not practical for developing countries."	Developing countries can take advantage of available technologies and resources to phase out leaded gasoline now. In fact, many developing countries have already done so.

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