

ENVIRONMENTAL LAW GROUP

MEMORANDUM

TO: General Wesley Clark, Co-Chairman Growth Energy
Jeff Broin, Co-Chairman Growth Energy

FROM: Jim Mennell, Founder

RE: Environmental Benefits from Higher Ethanol Blends

DATE: February 15, 2009

ENVIRONMENTAL BENEFITS FROM HIGHER ETHANOL BLENDS

Advancing from ethanol-gasoline blends at 10 percent ethanol (E-10) to ethanol blends at 15 percent ethanol (E-15) or higher not only will increase energy security and independence, enhance economic development, create American jobs, retain billions of dollars in the U.S. economy, and reduce transportation costs, such advancement will result in significant benefits to the environment. Recent and extensive research by federal and state governments and private and public groups demonstrate that use of higher ethanol blends will dramatically reduce greenhouse gas emissions, reduce harmful tailpipe emissions, reduce smog, use less energy for the equivalent amount of fuel, protect natural resources, and increase use of renewable energy. Advancing to E-15 will enhance protection of the environment in the following important ways:

- **E-15 Reduces Greenhouse Gas Emissions.** Climate Change is regarded by many in the scientific community as the largest environmental threat to the world. According to studies by Argonne National Laboratory and a recent peer-reviewed study published in the Yale Journal of Industrial Ecology (2009), on a life-cycle analysis basis, ethanol produced from corn reduces greenhouse gas emissions by 48 to 59 percent compared to gasoline. Cellulosic ethanol use is projected to reduce greenhouse gas emissions by over 90 percent compared to gasoline. The U.S. Department of Energy calculated that 13 million tons of greenhouse gases were avoided in 2007 because of biofuels production and use. Use of E-15 instead of gasoline would offset more than 40 million tons of CO₂ per year--equivalent to offsetting the greenhouse gas emissions from the annual use of approximately 10.5 million cars.
- **E-15 Reduces Harmful Tail Pipe Emissions.** Ethanol contains 35% oxygen, making it burn more cleanly and completely than gasoline. When compared to

gasoline, ethanol-blends have been shown to: (1) reduce carbon monoxide by at least one-third; (2) reduce particulate matter emissions by 36 percent from newer vehicles and more in older vehicles; (3) reduce toxic hydrocarbon tailpipe pollutants such as benzene by 16.5 percent; (4) reduce overall hydrocarbon emissions; (5) reduce formaldehyde emissions; and (6) reduce evaporative emissions. Recent studies confirm that higher ethanol blend fuels similarly reduce harmful emissions. Those recent studies include:

- Oak Ridge National Laboratory for the U.S. Department of Energy (2008) (confirming that E-15 significantly lowers hydrocarbon and carbon monoxide emissions compared to gasoline)
- Rochester Institute of Technology (2008) (confirming reduced carbon monoxide, nitrogen oxide, and total hydrocarbon emissions from a higher ethanol blend (E-20))
- Stockholm University (2005) (confirming fewer evaporative emissions of hydrocarbons from use of E-15 than lower ethanol blends).

Use of E-15 instead of gasoline will result in the reduction of carbon monoxide, hydrocarbon particulate matter equivalent to removing >32 million, >28 million, >62 million vehicles respectively from the road each year.

- **E-15 Reduces Smog.** Ground-level ozone or “smog” aggravates respiratory diseases such as asthma, emphysema, and bronchitis, and can cause permanent lung damage. Ethanol-blended fuels generally, and E-15 specifically, reduce vehicle tailpipe emissions of carbon monoxide and volatile organic compounds, both of which are smog-forming emissions. Ethanol has been the preferred fuel to meet Clean Air Act reformulated gasoline requirements to reduce ozone and many states credit ethanol-blend gasoline with significantly reducing urban ozone levels. The American Lung Association of the Upper Midwest similarly credits ethanol-blend fuels with reducing smog and has embraced ethanol-blend fuels as part of its Clean Air Choice Initiative. Use of E-15 instead of gasoline will result in the reduction of ozone forming emissions equivalent to removing approximately >4 million vehicles from the road each year based solely on the reduction in NOx emission reductions.
- **E-15 Requires Less Energy to Produce Than Gasoline.** Substituting ethanol for gasoline conserves energy because it takes less energy to produce ethanol than it does to produce the energy equivalent amount of gasoline. The U.S. Departments of Energy and Agriculture report a net energy balance for ethanol production of 1.67 on average. In other words, for every unit of energy used to produce ethanol, 1.67 units of energy result. By contrast, the U.S. Departments of Energy and Agriculture report that gasoline refining has a negative energy balance and every unit of energy expended in its production results in just 0.79 energy units in the form of gasoline. Literally, use of E-15 instead of gasoline could result in the displacement of 900,000 barrels of oil per day with a more energy efficient fuel.

- **E-15 is a Better Incremental Step than Gasoline.** While the ethanol production process continues to become more efficient and environmentally friendly, enhanced oil recovery ensures that gasoline is headed in the other direction. According to a recent study from the Argonne National Laboratory at the U.S. Department of Energy, dry mill ethanol plants in 2006 used 22 percent less energy and 26.6 percent less water while producing 6.4 percent more ethanol per bushel than in 2001. Meanwhile, the “easy sources” of oil are becoming a thing of the past and our addiction is starting to be fed by places like Canadian Tar Sands. Experts estimate that oil from the Tar Sands produces two to three times the greenhouse gas emissions of conventional oil. By moving to E15, we will use a much more sustainable source of energy to fuel our vehicles.

- **E-15 Increases Use of Renewable Energy.** Unlike gasoline which is derived from oil that must be extracted from the earth, ethanol is derived from crops that may be re-grown on a regular basis. Use of E-15 will provide fuels necessary to sustain our economy and reduce the rate of depletion of the earth’s finite resources.