LETTERS

Defending electric cars

Dear Editor: I must take exception to the way the potential ozone benefit of electric vehicles (EVs) in New York City is so quickly dismissed in the recent Policy Analysis article by Lave et al. on battery-powered vehicles (Sept. 1996, pp. 402A-407A).

First, the conclusion is drawn that since power plant NO_x emissions are comparable to conventional gasoline-powered vehicles (GPVs), the authors "expect little net impact on NO_x emissions in New York from using EVs." The implied equivalency of these precursor emissions with respect to the ozone problem overlooks several important points.

(1) Ozone exceedances are a daytime problem, but EVs are recharged at night. The timing of emissions associated with recharging EVs would generally occur overnight, not during rush hours.

(2) GPVs continue to emit when EVs don't. When 500,000 EVs are stopped at traffic lights and in rush hour traffic jams, they are not emitting; GPVs continue to emit whether or not they are putting miles on the odometer. This makes the use of kWh/mi questionable as a calculational factor in the analysis.

(3) Gasoline engine emissions performance deteriorates over time.

I also question the value of using air quality models to predict ozone concentration changes due to the introduction of 500,000 EVs. It is my understanding that such models are relatively insensitive to small changes in emissions (changes involving less than 10% of the inventory). The low benefit projected by isolating the relatively small EV "piece of the pie" may therefore not be instructive in establishing a balanced, comprehensive, long-term strategy dealing with all source categories involved in the ozone problem.

I understand the authors' concern that reliance on lead battery technologies for EVs, even as an interim solution, carries environmental consequences which need to be understood and addressed. However, the larger issue is the lead demand associated with 125 million conventional automobiles already in use. How quickly will environmentally superior batteries be developed if a strong push for better EVs and other battery-based electrotechnologies did not exist?

Solving the ozone problem in major metropolitan centers of our nation will ultimately require substantial electrification of the transportation sector, whether that means EVs, fuel cell vehicles, and/or substantially increased electric mass transit. This is the road we need to be on, and as soon as possible. Reports that seek to trivialize or "scare off" erstwhile efforts to move forward along this road are not productive.

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Dear Editor: The recent study by Lave et al. concluded that increased production and recycling of lead-acid batteries for battery-powered vehicles (BPVs) will dump excessive amounts of lead into the environment and offset clean air benefits from these vehicles. The report follows a similar Carnegie Mellon University paper with similar conclusions. That study was dismissed by the California Air Resources Board, the U.S. EPA, and at least eight diverse industry organizations for containing errors and obsolete data.

This report is the same. It is riddled with false information—serious errors, misleading data, and inaccurate citations of reputable reports—and preys on the public's fear of lead.

The study contains two major distortions: it repeatedly and seriously overreports lead emissions from battery plants, and it does not differentiate the public health effects of various lead wastes. This makes all lead emissions appear to be a health menace, and skews the conclusion against BPVs.

The majority of lead releases the authors cite are slag, the rocklike material left after the lead is extracted at smelters, and not the significantly smaller amount of particulate air emissions from battery manufacturing and recycling plants. Those emissions are strictly limited by federal regulations and may never exceed the limit, regardless of production volume.

Further, the authors' model for measuring the environmental impact of lead is based on the amount of lead released into the environment for each unit of lead processed, handled, or recycled. This model is wrong. It makes slag appear to be a major pollutant, and it does not take into account the bioavailability of lead in different matrices.

The lead in slag is virtually insoluble and can't move rapidly through environmental systems. By law, slag cannot even be put into a landfill until it is treated and rendered nonhazardous. Moreover, a number of recent studies have demonstrated that lead in soil presents far less threat to public health than previously believed. Yet the lead aerosol emissions from gasoline are easily absorbed by inhalation. It is misleading to equate the effects of lead in gasoline and lead in slag.

The lead-acid battery industry is improving the performance of a proven technology, and we have the best track record of any other industry for recycling our product and using the reclaimed material in new batteries. If our society is to have sustainable development, we must reduce the world's dependence on petroleum-based fuels. Lead-acid battery-powered vehicles are one alternative.

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Authors' Response

Martin Smith assumes that our study equated power plant NO_x emissions to mobile source NO_x emissions. We used emissions factors drawn from more comprehensive studies of rela-

tive emissions from EVs (e.g., power plant NO_x) and GPVs (tailpipe and associated NO_x emissions) and found them comparable. Stricter controls on power plants were assumed than are currently in place. The results from the AQIRP study showed a relatively small, and ambiguous, impact from NO_x reductions from automobiles. A much stronger response was found from changes in GPV VOC emissions. ROMNET 2.2 results also suggest that peak ozone in the New York City area is also more responsive to VOC reductions. The real impact from using EVs is to reduce VOC emissions.

Smith comments that ozone is a daytime phenomenon, while EVs will be charged at night. Even if true, emissions at night affect ozone levels during the day. It is now understood that ozone and its precursors are transported over many days.

In response to points (2) and (3), our calculations did account for the actual operations of GPVs, including emissions at traffic lights. Our emissions estimates also accounted for the deterioration in gasoline engine performance that results over time in some "super-emitters."

Our estimate of the impact of 500,000 BPVs is based on interpolation of results for a bigger, significant change in ozone. Work by Chang suggests that the models are relatively linear up to a change in VOC emissions of about 30%. We are within that range.

No one should trivialize the small ozone improvements: most of the easy methods to lower ozone are in place, and we are left with piecing together many methods with small individual impacts. However, lead-based BPVs are desirable only if environmental discharges are much smaller.

Graham Spurling notes that industry associations have "rejected" the results of our current study and the previous study, but he offers no data or analysis. If the study is "riddled with false information," Spurling and the Battery Council International owe it to the public to detail the problems in a scientific forum. We would welcome their evidence on the environmental fate of nonrecycled batteries and long-term slag weathering.

Spurling dismisses the health risks from processing lead. One of the biggest public health victories of our time has been reducing human exposure to lead. Without clear evidence of social benefit, we should not require products with new uses of lead.

The current study concludes that 500,000 lead-acid BPVs would increase U.S. lead use by 20%. If lead discharges are not to rise 20%, Spurling has to show what new and more stringent controls will be introduced throughout the lead life cycle.

Since our article was first submitted, California has delayed its zero-emissions vehicle mandate. This will provide more time for better battery technologies to develop and to better assess the tangential environmental impacts. We applaud this action on technological, economic, and environmental grounds.

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When EVs age

Dear Editor: The recent Policy Analysis article on battery-powered vehicles (Sept. 1996, p. 402A) serves as a useful reminder that an apparently environmentally benign program may not in fact be so. The calculations presented in that article appropriately take into account the fact that emissions of real on-road vehicles are larger than their certification emissions.

Another consideration that will affect real-world emissions is the fact that battery-powered vehicles will, toward the end of their battery charge life, become more and more overweight and sluggish. In Los Angeles, with its hills and occasionally free-flowing freeways, there would come a time when a few sluggish electric vehicles would cause enough traffic slowing that the gasoline-powered fleet would have increased on-road emissions caused by the congestion. Thus, a realistic fleet of electric vehicles in realistic service is likely to increase on-road emissions.

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