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Comments on
Revisions and Additions to Motor Vehicle Fuel Economy Label
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The American Council for an Energy-Efficient Economy (ACEEE) is pleased to comment on the joint EPA/NHTSA proposal Revisions and Additions to Motor Vehicle Fuel Economy Label. ACEEE is a nonprofit organization dedicated to advancing energy efficiency as a means of promoting economic prosperity, energy security, and environmental protection.

ACEEE applauds the agencies for their thoughtful and thorough effort to redesign the fuel economy label in light of the changing factors relevant to car buyers. ACEEE's fourteen years of rating vehicles for environmental performance[1] gives us a keen appreciation of the complexity of this task, and we find much of value in the agencies' work in this area. We have reservations regarding certain important aspects of the proposed changes, however. ACEEE's views on the pros and cons of the proposal are discussed below. Page references are to the Federal Register of September 23, 2010 (Vol.75, No.184), unless another source is cited.

Overview

EPA and NHTSA have two aims in redesigning the fuel economy label: i) to help consumers choose more efficient and environmentally friendly vehicles, and ii) to help consumers understand the performance of advanced technology vehicles. The agencies have made several useful proposals that can promote the first of these aims, including highlighting vehicles' fuel consumption, as well as fuel economy, and adding information on GHG and criteria pollutant emissions to the label. ACEEE does not always agree with the agencies on the proposed implementation of these features on the labels, and in particular we believe that fuel efficiency and environmental performance should be treated as distinct attributes. We strongly support the agencies' proposal to rate all vehicles on a single scale, rather than provide within-class ratings only. We also support a categorical environmental rating as a central component of the vehicle label if the rating properly captures the GHG emissions of the vehicle, including full fuel-cycle emissions, and is oriented toward comprehensive environmental performance. None of the proposed labels meets this criterion, however.

With regard to the second aim, ACEEE does not find the agencies' proposal to be successful, largely as a consequence of its consideration of tailpipe GHG emissions only. Unfortunately, this element has the potential to do damage that goes beyond confusion of consumers, to undermining both the credibility of EPA and public support for advanced technology vehicles.

[1] See GreenerCars.org.

Proposed Revisions to Label Content

Greenhouse gas performance

ACEEE strongly disagrees with the agencies' proposal to consider only tailpipe emissions in assigning vehicles greenhouse gas scores and regards this as the single most problematic feature of the proposal. Clarifying the complex issues of comparative environmental impacts of new technologies and fuels is one of two primary stated goals in the label redesign, and the omission of upstream emissions serves only to confuse on this issue.

The agencies note: "This approach [zero upstream] is also consistent with the vehicle GHG emissions compliance levels recently adopted by EPA, which treat GHG emissions for electric operation as zero up to a cumulative production cap per manufacturer." (58091) ACEEE opposed that decision on GHG emissions compliance levels. In that setting, however, EPA at least recognized that assigning EVs zero GHG emissions was a temporary measure to incentivize early EV production:

> The purpose of these provisions is to provide a temporary incentive to promote technologies which have the potential to produce very large GHG reductions in the future…EPA will reassess the issue of how to address EVs, PHEVs, and FCVs in rulemakings for model years 2017 and beyond, based on the status of advanced vehicle technology commercialization, the status of upstream GHG control programs, and other relevant factors.[2]

For purposes of providing consumer information, there is no justification for mischaracterizing emissions information in this way, even temporarily. The label is not, or should not be, a means of boosting sales of a given technology, but should rather be a tool to improve understanding.

The agencies seek comment on whether "tailpipe only" "will be readily and uniformly understood to mean that upstream GHG emissions are not being reflected on the label" (58091). While this statement may be widely understood, it does not help consumers evaluate the relative environmental impacts of EVs and conventional vehicles. It is especially unhelpful in the context of a label that prominently features a rating of vehicles based on their (tailpipe only) GHG emissions.

The agencies note that some focus group participants suggested that upstream emissions should be represented on the label, but that given the difficulty of adequately representing those emissions, "participants tended to agree that this issue could be adequately addressed by a statement on the label indicating that the CO_2 values on the label represented tailpipe emissions only" (58091). We question whether participants had sufficient information to assess the adequacy of the proposed resolution of the problem, especially given that the GHG-based letter rating was not presented in the focus groups (58092).

A recent National Academy of Sciences panel considered how to take into account upstream emissions in dealing with appliance energy use. The panel made the following recommendation:

> DOE/EERE and the Federal Trade Commission should initiate a project to consider the merits of adding to the Energy Guide label an indicator of how an appliance's total

[2] Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards; Final Rule, Fed. Reg. May 7, 2010, p. 25341

> energy consumption might affect levels of greenhouse gas emissions. Such a project would include development of specific data on greenhouse gas emissions associated with the appliance's operation, formulation of pertinent information for addition to the appliance's energy efficiency label, and research with a sample of consumers to test various options for encouraging consumers' understanding and use of information on full-fuel-cycle energy consumption and its impacts."[3]

We believe this recommendation is equally applicable to vehicle labels, and that EPA and NHTSA would be remiss of they were not to follow it.

Fuel Economy and Greenhouse Gas Rating Systems

A combined fuel economy and GHG rating is a central feature of the proposed label redesign. We believe that this idea is fundamentally flawed, especially given that the label is intended to clarify the differences in environmental and energy performance among technologies and fuels. The label should instead underscore that performance on fuel economy and performance on greenhouse gas emissions may diverge. This problem goes beyond vehicle purchasing to the broader needs of the public to understand the causes of global warming and what measures are effective in combating it.

Natural gas vehicles demonstrate the fallacy of this approach. A CNG vehicle with fuel efficiency deserving of a 'B' receives an 'A-' due to the relatively low carbon content of its fuel. While it is appropriate to assign such a vehicle an 'A-' for GHG emissions, this should not be characterized as a fuel economy-based grade. At the same time, if all GHG emissions of vehicles were represented on the label, the CNG might well outscore all other vehicles, including the EVs scoring 'A+' under the proposal.

In the case of an EV, it is simply incorrect to associate fuel economy with a measure, like tailpipe emissions, that is unrelated to the energy efficiency of the vehicle. Under Label 1, an EV would receive an A+, corresponding to its zero in-use emissions, even if it were highly inefficient. A footnote observes that "given that electric drive trains are currently much more efficient than those for conventional vehicles, the relationship between those vehicles emitting zero CO_2 and having the highest energy efficiency holds true at the present time. This approach may need to be reassessed in the future if efficiencies of electric drive and conventional vehicles begin to approach each other, or if it is desired to differentiate between the efficiencies of electric-powered vehicles, but should not be a necessary consideration in the foreseeable future" (58093) Yet the relative efficiencies of plug-in vehicles will indeed be an important consideration as early models arrive in the market. The efficiencies of plug-in hybrids, in particular, may vary greatly based on multiple factors and effectively counting energy use at zero when the vehicle is operating in electric mode merely serves to confuse this issue.

The agencies state: "Utilizing CO2 as the controlling factor in the rating thresholds is a practical consideration and is not meant to imply that GHG emissions are more important than energy use; both are relevant considerations and are viewed by the agencies as equally important under the rating system." (58093) This does not make sense when, for purposes of the proposed rating, an EV is equivalent to a vehicle using no energy at all.

[3] Review of Site (Point-of-Use) and Full-Fuel-Cycle Measurement Approaches to DOE/EERE Building Appliance Energy-Efficiency Standards," NRC Letter Report, May 15, 2009

The agencies cite as a potential issue that the proposed CO2-based rating system would reduce the rating for diesels relative to a fuel consumption-based rating system. It is entirely appropriate that diesel vehicles' rating should be reduced in any representation of environmental or energy performance, given the high energy and carbon content of a gallon of diesel relative to a gallon of gasoline. In fact, EPA should take this opportunity to rationalize the definition of gasoline gallon equivalent for fuel economy compliance and other purposes by basing it for diesel, as for other fuels, on energy content, rather than volume. EPA elsewhere in the proposal characterizes the difference between the energy content of a gallon of gasoline and a gallon of diesel as "relatively small"(58113), but ACEEE does not agree that a difference on the order of 10 percent is small in this context.

Another issue raised by the agencies in their discussion of fuel economy and GHG rating systems is the inclusion of all vehicles in a single rating system. ACEEE strongly supports the principle that ratings should offer a basis for comparing vehicles across classes. A rating on an absolute scale meets the needs of both customers shopping across classes and those shopping within a class, while a rating based on comparisons only within class serves only those shopping within class. The agencies note that buyers shop across two to three vehicle classes on average. In recent years, the market has shifted toward crossover vehicles, and further evolution of the market is quite likely. Indeed the mix shift reflected in EPA's MY2012-2016 GHG rule for light-duty vehicles, which is based upon extensive consultant forecasts, suggests that vehicle buyers will be moving among segments in large numbers, supporting the need for cross-class comparisons.

Criteria Pollutants

Both separate and combined ratings for criteria pollutant emissions and greenhouse gas emissions have merit as elements of an environmental performance label. As the focus groups demonstrated, members of the public often express a preference for EPA or another knowledgeable party to combine all emissions into a single score in a fashion that reflects that party's judgment regarding the relative importance of the various pollutants. This could be done, for example, through the use of damage costs for each pollutant. That is not the approach suggested by EPA, however, either in the criteria pollutant rating system based on bins (Table II.A.5-2) or in the combined GHG and criteria pollutant emissions ratings (Table II.A.6-1), for which no quantitative basis is offered. We believe a separate rating for criteria pollutant emissions is preferable to this option.

In any case, an overall environmental rating of a vehicle should reflect both types of pollution, because both remain significant environmental problems.

Advanced Technology Vehicle Labels

EPA notes that "the issues associated with and the decisions that we make about labels will go a long way toward preparing us to address labels from other advanced technologies in the future." Knowing how decisions made in one context can carry forward, to bad effect, to entirely different circumstances, we strongly support this observation and urge the agencies to treat advanced technology vehicles in a way that makes sense not only for the vehicles appearing in the market today but also for those yet to arrive. ACEEE supports the principles the agencies set out for advanced technology labels, including objectivity, balance of accuracy and simplicity, equity across technologies, and ability to reduce confusion. We do not believe the agencies proposal is uniformly consistent with these principles, however.

Upstream emissions

ACEEE agrees with NHTSA's view that "it would also be reasonable to interpret the statutory language such that the required label information on GHG emissions would include additional information on the upstream GHG emissions associated with electricity or other fuel used by the vehicle. This additional information could provide a broader context for reflecting the automobile's performance with respect to GHG emissions" (58105).

The fact that conventional vehicles are assigned tailpipe-only GHG emissions does not pose a serious obstacle to including upstream emissions of plug-in vehicles. This could be resolved by showing full fuel cycle emissions for all vehicles. A frequently cited alternative approach is to subtract from the emissions associated with a plug-in vehicle the upstream emissions of a representative, comparably sized gasoline vehicle. Another option is to multiply plug-in emissions by a factor (of roughly 0.8), representing the ratio of tailpipe emissions to total emissions for a gasoline vehicle.

We recognize that criteria pollutant emissions levels are tailpipe only. However, as the agencies noted in the 2012-2016 light-duty rule, this practice is less problematic, "as upstream emissions associated with production and distribution of the fuel are addressed by comprehensive regulatory programs focused on the upstream sources of those emissions. At this time, however, there is no such comprehensive program addressing upstream emissions of GHGs, and the upstream GHG emissions associated with production and distribution of electricity are higher than the corresponding upstream GHG emissions of gasoline or other petroleum based fuels."[4]

The agencies' main rationale for the use of tailpipe emissions only appears to be that upstream emissions are difficult to capture with accuracy. They offer no argument that tailpipe emissions are in fact the appropriate metric by which a consumer should or would want to compare vehicles' GHG emissions performance.

The fact that "a single national value [for upstream factor] would generally not be accurate" leads to a much lesser problem of public understanding than would the proposed zero upstream approach. To show tailpipe emissions only is simply misleading and avoids precisely that aspect of cross-technology comparison on which consumers need guidance. We cannot see any respect in which this information gives the consumer a better basis for comparison than, for example, the fuel cost metric.

ACEEE recommends full fuel cycle emissions, perhaps based on a national average power mix, be used as the basis for a vehicle's GHG rating for the following reasons:

- The consumer needs information about the order of magnitude of emissions associated with plug-ins relative to those from a gasoline-powered vehicle
- One element in a consumer's decision to buy a plug-in, especially for a potential "early adopter", is whether the technology warrants support as a solution to a pressing environmental problem. In that case, the consumer may be interested in the performance of the technology on a national level as well as the performance of his or her particular vehicle.
- A zero upstream value discourages the consumer from comparing the energy efficiency of one advanced technology vehicle with that of another. While this may seem of secondary importance

[4] Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards; Final Rule, Fed. Reg. May 7, 2010, p. 25341

> at present, a proliferation of plug-ins in the near term will make it essential to compare technologies according to this crucial metric. Other information on the label may permit this comparison to be made, but conveying that two vehicles with greatly differing efficiencies are equivalent according to the primary metric on the label will be counterproductive.

If a marginal rate, i.e. one based on the generation mix from which the new load represented by the plug-in is most likely to draw, can be calculated, that will be preferable to an average mix. We acknowledge that the average emissions rate diverges from the marginal rate in many power pools and by time of day, and the divergence may be large. We also acknowledge the possibility that the rate may change over time, and this should be addressed whenever possible. EPA could cite the CO_2 emissions projections for electricity production in the Reference Case of the Energy Information Agency's latest Annual Energy Outlook (AEO). AEO provides projections based on policies in place that will affect future energy use. This approach will also help educate the public on the need for policies to curb utility emissions.

The agencies may believe that assigning zero emissions to plug-ins is important to signal the enormous potential benefits of these vehicles, and thereby promote sales. Yet a labeling system using proper GHG accounting could serve this purpose as well. EPA's examples of vehicle emissions with and without upstream components (58106) show an EV with emissions of 197 grams per mile. Applying a correction reflecting gasoline upstream emissions yields a score of 151 to 156 grams per mile, resulting in a grade of A or A- for the EV. Plug-in hybrids' scores would be affected by this adjustment as well, but an efficient plug-in would rate at least as high as the most efficient hybrids.

By 2016, label rating will have shifted to reflect the 2016 GHG standard of 250 grams per mile. Assuming that 250 gpm is an average emissions rate (and a grade of B-) and that equal increments of GHG values define the letter grades, the same EV would score a B+, assuming that the carbon-intensity of electricity generation had remained unchanged. This seems a reasonable outcome, and one that unlike the zero upstream approach would serve to promote increased plug-in efficiency as well as a cleaner grid over time.

EPA proposes to include information about upstream emissions and related issues on a web site, which could tailor results to the buyer. We strongly support this proposal, but disagree with the agencies view that "the web site is the better place, compared to the label, to address the complex issues associated with electricity generation and lifecycle emissions more generally" (58106). Such a site cannot counteract misleading information on the vehicle label, since many consumers will not take the next step of visiting the web site. The problem is aggravated for Label 1, which is dominated by the letter grade, because even those going to the web for additional information will not be able to adjust a vehicle's letter grade to reflect the information they find on the web.

The agencies also invite comment on including a separate value for upstream emissions on the label (58107), noting the "substantial number of assumptions" involved in doing this. The uncertainties associated with these assumptions relate closely to the very real question of what an EV's impact on the environment will be, and these are exactly the areas in which the public needs EPA's best information as guidance. Indeed, federal policies to promote certain advanced technologies must be based on a variety of assumptions, and the label should reflect those assumptions.

ACEEE supports the idea of including upstream information on the label. The agencies rightly note that this would allow consumers to compare EVs, which addresses a major flaw of the tailpipe-only proposal.

Unless the greenhouse gas rating on the label reflects upstream emissions, however, this is not a complete solution. The explanatory text "Does not include CO2 from electricity generation" does not address the problem.

Driving Range Information

The agencies propose to include vehicle range on the labels for alternative technology vehicles. For some vehicles, including EVs and CNG vehicles, the range is the distance the vehicle can travel between refuelings. The range of a PHEV, on the other hand, would be defined as the distance through which the battery is providing electricity from the grid to the vehicle. The meaning of range is thus very different for a PHEV, which will likely travel further than a comparable conventional before needing to be refueled. Thus while the proposed range information is an important characteristic of a PHEV, it would be confusing if used in this way on the label, and detrimental to PHEVs. In addition, we believe that determining the range of a PHEV is quite complicated, notwithstanding EPA's claim to the contrary. In particular, the range will vary by drive cycle. For both of these reasons, we recommend not including a range for PHEVs on the label.

ACEEE supports the proposal to cap the downward adjustment of miles per gallon (and therefore range) for EVs at 30% until more evidence is available. We are unclear however on why this cap on downward adjustment is mentioned in the discussion of range and not in the discussions of energy use, fuel economy, or GHG emissions.

Battery charging time depends heavily on the voltage at which the charging is done, so this must be specified if there is any requirement to display battery charging time on the label. Battery charging efficiency depends on charging voltage as well, with higher efficiencies occurring at lower voltage,[5] so the energy usage of plug-in vehicles should also specify a voltage assumption.

We also support merging gasoline and electricity performance of PHEVs for fuel economy ratings and for GHG ratings using a utility factor-based approach, assuming fuel economy and GHG emissions are properly defined.

Labels for Other Vehicle/Fuel Technologies

For FFVs, ACEEE does not support addition of the statement that "the use of E85 is typically slightly more energy efficient than the use of gasoline" on the label (58111). FFVs are required to operate at least as efficiently on E85 as on gasoline to be considered dual fueled vehicles, so it is possible that manufacturers tune their FFVs to operate slightly less efficiently on gasoline in order to meet this requirement. Optimization of vehicles running on ethanol may indeed lead to superior energy efficiency, but unless there is some real evidence that such efficiency gains have been realized, no claims of this kind are warranted for FFVs.

ACEEE supports the suggested approach to merged gasoline and biofuel values for fuel economy and GHG performance, in which the vehicle is assumed to run on 100 percent gasoline, except when the manufacturer can demonstrate that a certain percentage of its vehicles are in fact running on E85. We

[5] See, e.g. Elgowainy, A, J. Han, L. Poch, M. Wang, A. Vyas, M. Mahalik, and A. Rousseau. 2010 "Well-to-Wheels Analysis of Energy Use and Greenhouse Gas Emissions of Plug-In Hybrid Electric Vehicles." ANL/ESD/10-1. Chicago IL: Argonne National Laboratory.

note that this approach, consistent with that used for light-duty GHG standards for 2016 and after model year vehicles, could be adapted for plug-in vehicles. In that case, manufacturers might be required to use a national average electricity generation mix for the power used to charge their vehicles' batteries unless they were able to demonstrate the use of a lower-emissions generation mix for their vehicles.

Proposed Revisions to Label Appearance

Letter grade

A letter grade such as the one featured on Label 1 has some important advantages. Past label research has found that "categorical" ratings, i.e. discrete rather than continuous ratings, are most effective in communicating the most basic information to consumers.[6]

The letter grade as presented also has serious flaws, however. First and foremost, the "tailpipe-only" approach in EPA's proposal, discussed above, is all the more problematic when presented in this fashion. The clarity and simplicity of the letter grade becomes a liability when the information being presented is misleading, as in this case. Furthermore, the notion of a combined fuel economy and environmental comparison based solely on GHG emissions fundamentally invalid.

The resolution of the letter grade is also problematic. Petroleum-powered vehicles achieving an A- range from 40 to 58 mpg. This covers a huge swath of vehicle efficiencies at the high end, and for buyers interested in minimizing their environmental impact, this will not be helpful in choosing among vehicles they may be considering. Having the label dominated by a rating that cannot distinguish among high-performing conventional vehicles is problematic.

We understand that this stems from the idea of emphasizing consumption rather than MPG, and we do believe it is important do dispel the "mpg illusion". This is best accomplished by highlighting annual fuel cost or another parameter linear in consumption and reserving the letter grade for information less well understood and perhaps requiring some interpretation on the part of EPA. While fuel cost alone does not allow easy comparison with the universe of vehicles for sale, a slider bar showing an average value and/or the suggested approach showing dollars saved relative to the average vehicle could be used.

Treatment of criteria pollutant emissions

The low priority given to criteria pollutants on certain labels is problematic. Emissions of criteria pollutants are scored separately, leaving the consumer with no sense of how important these emissions may be to the overall environmental performance of the vehicle. Clearly, a case can be made that GHG emissions warrant greater emphasis than do criteria emissions at this juncture in vehicle regulation, especially as the two relate to consumer information. Yet criteria pollutants from vehicles remain a threat to public health, as evidenced by EPA's and ARB's deliberations on Tier 3 and LEVIII. In fact, we fear that EPA may be shooting itself in the foot by sending a strong signal that criteria emissions are a minor environmental problem shortly before a new round of rulemaking requires car buyers to foot the bill for vehicles cleaner than today's.

[6] Egan, C. and P. Waide. 2005. "A Multi-Country Comparative Evaluation of Labeling Research." In *ECEEE 2005 Summer Study—What Works & Who Delivers? 811–822.* Stockholm, Sweden: European Council for an Energy Efficient Economy.

This problem is especially severe in Label 1. This label gives minimal real estate to criteria pollutants, reflecting their absence from the primary scoring scheme. Reducing cars' fuel consumption and greenhouse gas emissions does need to be prioritized at this time, but criteria pollutants remain a significant environmental issue and should not be marginalized in the new label design. As EPA considers a new round of tailpipe criteria pollutant standards, it would be counterproductive as well as inaccurate to send a message to consumers and to manufacturers that vehicles' emissions of these pollutants are no longer a threat large enough to warrant serious attention on an environmental label for vehicles.

Units for Representing Greenhouse Gas Emissions

Greenhouse gas emissions should be represented as annualized tons of CO_2 equivalent rather than grams per mile. The most compelling reason for expressing emissions in annual tons rather than grams per mile is that consumers are likely more familiar with the former presentation than the latter. This is borne out in comments noted in the Federal Register (58135): participants reported understanding the environmental information in general, but did not understand the meaning of "grams of CO_2".

Providing emissions in annual tons may be familiar to consumers from other contexts, whereas a grams per mile (CO_2 g/mile) representation requires the consumer to perform more calculations to yield a familiar metric. Given the limited viewing time of vehicle labels, it is unlikely that the proposed grams per mile presentation will yield useful information for the consumer. Furthermore, expressing the environmental rating in units of grams of carbon dioxide per mile does not allow for easy comparison with carbon emissions reported in other contexts, and therefore does not allow consumers a quick, easy means of understanding the magnitude of their vehicles' carbon emissions.

While grams per mile might appear to have special relevance given that this is the unit in which GHG emissions from vehicles are now regulated, the gap ("shortfall") between grams per mile for purposes of compliance and real-world grams per mile would become a perennial source of confusion, as it has for fuel economy, if this is the unit used on the label.

The second reason for expressing emissions in annual tons is an issue of framing. Expressing emissions in "tons per year" has more impact than "grams per mile" because a ton *sounds* like so much more than a gram. This difference may influence consumers' perceptions of the importance of including the new environmental metrics in their purchase decisions: if grams are perceived as insignificant, then the entire metric may be ignored.

Lastly, just as expressing fuel savings over five years conveys a better sense of the value of this benefit than, say, cents saved per mile, expressing emissions as annual tons is a more meaningful framing of environmental impact.

Agency Research on Fuel Economy Labeling

Comprehension of slider bars

The agencies should conduct comprehension testing of the slider bars, especially when used with environmental metrics. While Focus Group III did conduct comprehension testing of the presentation of fuel economy on three proposed labels, no such testing was done on the presentation of environmental metrics. In light of the weight that consumers attach to MPG values after 30 years of seeing them on

vehicle labels, and in light of the fact that environmental metrics will feature prominently on vehicle labels for the foreseeable future, it is critical that the presentation be both useful and understandable.

As noted above, international research on label design as well as comments from focus group participants suggest that comprehension of continuous scales (such as slider bars) may be low compared to categorical scales (such as stars or leaves).[7] Specifically, research on vehicle labels done by ACEEE for EPA found that while consumers *perceived* the bar-type presentation of environmental metrics as easier to understand than an alternate presentation, this perception was not supported by comprehension tests.[8]

Furthermore, participants in Focus Group III expressed both dislike of and confusion about the meaning of environmental metrics presented as slider bars, depending upon the vehicle type. For gasoline and diesel vehicles, focus group participants reported not understanding the slider bar, instead preferring the leaf presentation of Option B (which was found to be most understandable overall). For electric vehicles, the slider bar was either disliked or was reported as providing little information. In contrast, for extended range vehicles, the slider bars used in Option C to express range/charge and vehicle comparison were found to be useful and understandable.

These differing responses suggest that: 1) perceived comprehension of slider bars depends on vehicle technology and 2) an alternate representation of environmental metrics may be more comprehensible or more pleasing.

Comprehension testing would likely clear up some of these questions, and allow for the design of more effective and comprehensible labels tailored to vehicle type.

Targeting Social Networks

Any marketing and educational effort that is concurrent with the release of the labels should include strategies for targeting entire social networks, especially those of people who may, for the first time, be paying attention to the environmental performance of their vehicles. As the agencies note, because of the marked changes in content and design of new vehicle labels, it is critical to launch a concurrent marketing campaign both online and offline (58138). Research done by ACEEE for the EPA on vehicle labels confirms this.[9] Moreover, it is important to take advantage of the operation of social influence by marketing to entire social networks rather than, or in addition to, individuals. Doing so may address two of the stated goals of the label redesign: understanding how label designs may nudge consumers towards both greater use of the fuel economy labels and towards the purchase of more fuel-efficient vehicles.[10]

Recent research suggests that individuals' values related to the environment can develop, and that social networks can influence vehicle purchase decisions amongst those who are "trying out" environmental

[7] Ibid.

[8] Amann, J., T. Langer and J. Kliesch. 2007. Environmental Performance Labels for Vehicles: Context and Findings of Market Research for the U.S. Environmental Protection Agency. Report T071. Washington, D.C.: American Council for an Energy-Efficient Economy.

[9] Ibid.

[10] Environmental Protection Agency. 2010a. Environmental Protection Agency Fuel Economy Label: Phase I Focus Groups. EPA-420-R-10-903. Washington, D.C.: Environmental Protection Agency; 2010b. Environmental Protection Agency Fuel Economy Label: Phase I Focus Groups. EPA-420-R-10-903. Washington, D.C.: Environmental Protection Agency.

values.[11] In the context of the new vehicle label, this influence can take two forms: 1) the diffusion of information about the new label from a trusted source, and 2) a reconsideration of self-identity related to the energy and environmental considerations of vehicles.

Therefore, in addition to disseminating relevant technical information about advanced vehicle technologies such as PHEVs, marketing efforts that target holders of these "transitional" values may result both in greater acceptance of, and in greater uptake of, vehicles with better environmental performance.

[11] See Axsen, J. 2010. "Social Influence Matters: How Environmental Values Develop within Social Networks." Presented at the 2010 Behavior, Energy and Climate Change conference, November 14-17, 2010, Sacramento, CA.