



June 23, 2009

VIA ELECTRONIC MAIL

Mary D. Nichols  
Chairman  
Air Resources Board  
1001 I Street  
Sacramento, California 95814

**SUBJECT: Cool Car Standards and Test Procedures, Agenda Item 09-6-4**

Dear Ms. Nichols:

The Alliance of Automobile Manufacturers (Alliance) and Association of International Automobile Manufacturers (AIAM) together represent every major U.S. automobile manufacturer. This letter provides our comments on the California Air Resources Board (ARB) Cool Car Standards. Automakers support efforts to reduce greenhouse gas (GHG) emissions from their products and factories. On May 19, 2009, automakers joined with President Obama, California, federal agencies, governors, and environmental leaders to announce a commitment to establish a national program that will reduce carbon emissions and increase fuel economy. In line with this commitment, we support the efforts to reduce interior temperature of vehicles and the accompanying emissions associated with air conditioner (AC) use. Over the past year, we have worked closely with your staff to develop regulations that reduce interior vehicle temperature with minimal consumer inconvenience and cost.

The staff's proposal incorporates and addresses many of our concerns. However, there are still some outstanding concerns that we believe need to be considered and changes that would improve the regulations. Specifically, we request the following:

1. Review and revise the benefit calculations in light of the apparent miscalculation and reassess the cost-effectiveness and relative merits of the options for this rule.
2. Allow alternative compliance using a vehicle performance standard.
3. Allow solar absorbing glass (Tts < 60%) on the windshield instead of reflective glass to avoid interference issues for manufacturers and consumers.
4. If the current regulations are adopted, 1) provide a longer phase-in of the 50% Tts standards, a technology review of the 40% Tts standards, and a phase-in of the 40% Tts standard; 2) increase the rooflite threshold from 30% to 40%; and 3) provide an exemption for plastic windows and ZEVs.

5. Adopt the technical changes noted below.

### **Benefits**

We found what appears to be a significant mistake in the calculation of benefits. The Initial Statement of Reasons (ISOR) appears to have used the wrong adjustment factor to account for AC improvements associated with AB 1493. We discovered this mistake late in the rulemaking process and immediately notified staff, and they are reviewing it now. As of this writing, we have not received an updated benefit calculation by staff. Below is a quick summary of the issue. Appendix 1 provides more detail from the Staff Report Appendix B (Emissions Modeling), the ISOR for this rulemaking, and the applicable table from the 2004 AB 1493 ISOR.

First, the Cool Cars regulation is focused solely on reducing GHG emissions associated with AC operation. Put another way, if vehicles did not have AC systems this regulation would have no benefit. Thus, the starting point for determining the benefit of this regulation is to determine the total AC GHG emissions (i.e., those emissions specifically associated with AC use).

During the AB 1493 rulemaking, ARB determined that manufacturers could use various advanced technologies to reduce the AC GHG emissions by 52%. Since the AB 1493 regulations provide a *total vehicle* GHG benefit, the AB 1493 ISOR converts the 52% reduction in AC GHG emissions into *total vehicle* GHG emission reductions of about 2.2%.

The Cool Car ISOR starts with the correct base AC GHG emissions. The second step is to adjust AC GHG emissions for the expected AC improvements under AB 1493. However, in this second step, rather than using the 52% reduction associated with AC GHG emissions, the Cool Car ISOR appears to incorrectly use the 2.2% *total vehicle* GHG emissions.

This mistake cuts the benefits in half and changes the impact of the rule from a cost savings to a significant cost of about \$40 for each ton of CO<sub>2</sub> reduced. This is much higher than any other CARB rule being considered under AB 32, and it is much higher than the typical going rate for CO<sub>2</sub> cap and trade programs (around \$12 per ton). In light of this, the Board should delay consideration of this rule to allow staff to reassess the costs, benefits, and cost-effectiveness of options, and allow public review of any revisions.

### **Vehicle Performance Standard**

Regardless of the outcome of the benefit calculations, we recommend the Board adopt an optional compliance alternative using a vehicle performance standard. This change will have no impact on the emissions benefit of the regulation but could dramatically reduce the cost of compliance. It would allow manufacturers the flexibility to target different combinations of technologies and components to different vehicles in more cost-effective ways and possibly eliminate many of the wireless and manufacturing technology challenges currently associated with the regulation. Moreover, the burden to demonstrate the alternative compliance would be on the manufacturers.

The Cool Car regulations are designed to reduce interior temperatures of parked vehicles thereby reducing the AC use and reducing GHG emissions of the engine. Thus, from a GHG emissions standpoint, if the interior temperature is the same, it makes no difference what specific technologies, components, or methods were applied. However as written, the standards in the regulations require

a specific component—glazing—to perform at specified solar control levels, and, in the case of windshields, actually require a specific glazing technology – solar reflective glazing. Historically, ARB has avoided picking a specific component or technology to regulate and virtually always opted for vehicle performance standards that provide manufacturers the flexibility to develop the methods and technology to meet these standards. The use of vehicle performance standards has frequently resulted in vehicles that far exceed the original goal, at a lower cost compared to specific component and technology mandates. Some examples of performance standards include super-ultra low emission vehicles, partial zero emission vehicles, on-board diagnostic system monitors, and evaporative emission control systems. In the case of the current proposal, we simply request that the Board add a compliance option approved by the Executive Officer.

We recommend the following language that allows the Executive Officer to approve alternative compliance option provided the manufacturer demonstrates the same interior temperature benefit.

§95604 Manufacturer Compliance Options...

(c) The vehicle manufacturer may choose to pursue alternate compliance options. Manufacturers doing so must notify the Executive Officer of the alternative being utilized for the specified vehicle model in the initial certification application. Manufacturer must certify that the technology achieves the same interior temperature benefit as the specified glazing requirement. Test data must be supplied for the technology showing the same interior temperature result as achieved by the glazing specified in this regulation as part of a manufacturer certification application process.

**Allowance for a Solar Absorbing Standard**

We recommend the Board direct staff to adopt a standard that does not require reflective windshields (i.e., < 60% Tts). Such a regulation can be implemented with solar absorbing glass at a fraction of the cost and avoids potential wireless signal loss described below. The relative benefits from the staff proposal are shown below (see ISOR Appendix B, Table B-7, page B-14):

Proposal	2040 Benefits
Staff Proposal w/Phase in	1.12 MMT CO <sub>2</sub> e
Tts < 60% (i.e., no reflective Windshield)	0.90 MMT CO <sub>2</sub> e

As noted above, the standards proposed for windshields require a solar reflective metal oxide glazing, which reduces the wireless signal strength into and out of the vehicle. Some systems that currently use wireless technology that could be affected include the tire pressure monitoring system on every new vehicle, GPS receivers, cell phones, FasTrak<sup>®</sup> Toll Tags, XM Portable Satellite Radio, and cellular-based services such as OnStar<sup>®</sup>. There is no dispute that metal oxide reflective glass reduces wireless signal strength.

For example, the FasTrak<sup>®</sup> Toll Tags do not transmit through the metal oxide solar reflective windshield (see below from <https://www.bayareafastrak.org/vector/dynamic/accounts/metal.shtml>).

#### Vehicles with Metal Oxide Windshields

The vehicles listed below are equipped with special windshields that contain metal in the glass that prevents the FasTrak<sup>®</sup> tag from being read properly. Customers with these windshields must obtain exterior tags. There may be other vehicles that have specialized windshields as an option that may prevent an FasTrak<sup>®</sup> tag from being read properly. If you are unsure about whether your vehicle has one of these windshields, contact the dealer where you purchased your car.

#### Standard Equipment

Make	Model	Year
<b>Buick</b>	Roadmaster	All
<b>Cadillac</b>	Catera	99-01
<b>Chevrolet</b>	Lumina Van	Prior to 2002
	Venture	Prior to 2002
<b>Ford</b>	Crown Victoria*	1987-1994
	Taurus*	Prior to 1995
<b>Oldsmobile</b>	Silhouette	Prior to 2002
<b>Pontiac</b>	Trans Sport	Prior to 2002
	Montana	Prior to 2002
<b>Subaru</b>	SVX	All

\* Vehicles with heated windshield only

[Close Window](#)

GPS Devices are another example. Below is an excerpt from the TomTom<sup>®</sup> website giving direction to the consumer on what to do when they experience problems in acquiring a signal in a vehicle with a heat reflective windshield:<sup>1</sup>

#### ***“Clear View***

*Your TomTom device must be outdoors to locate your current position.*

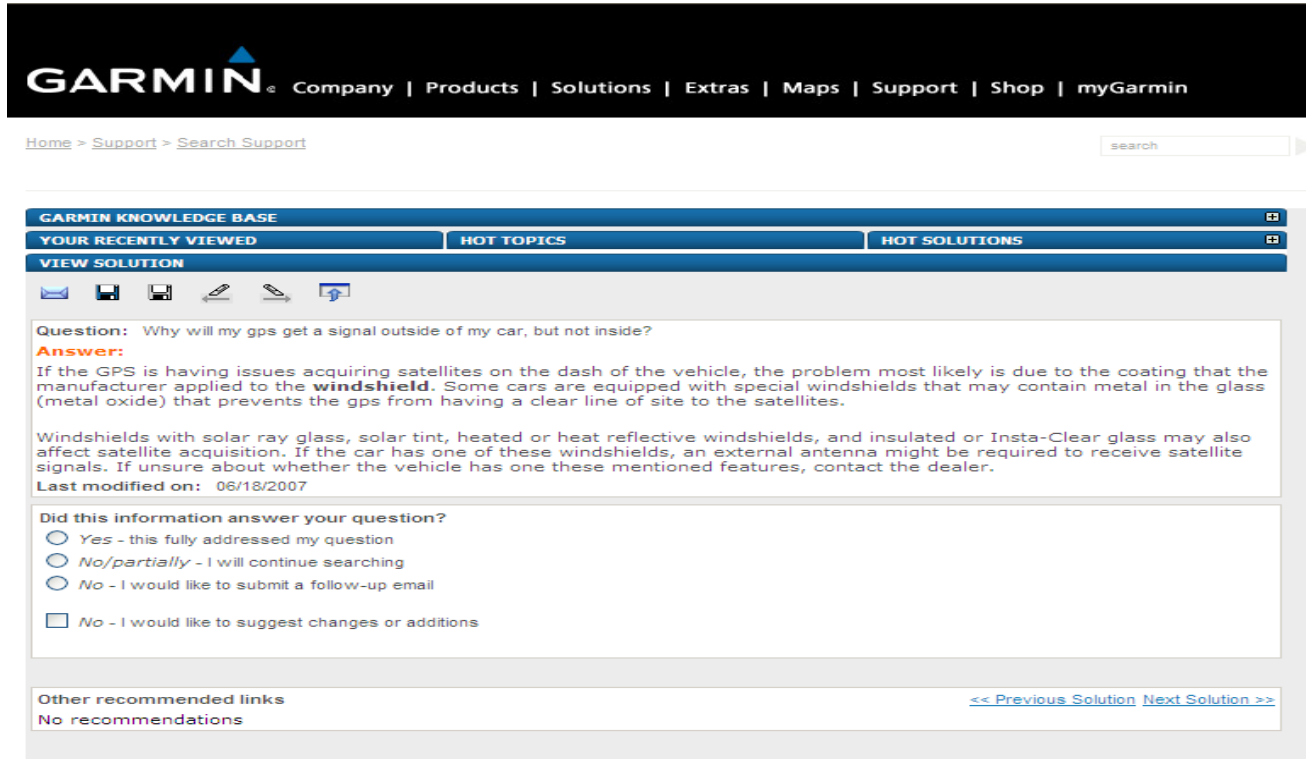
*Try repositioning your device in your car; ideally, try to position it at the lowest possible point directly on the windscreen.*

*Some vehicles have a heat reflective shield embedded in the windscreen, which may prevent your device from locating your current position. If this is the case in your vehicle, use the TomTom External Antenna Kit (available as an [accessory](#)).*

***Tip:*** *As a reference, place your device outside your parked car to see if it can find your current position.”*

<sup>1</sup> See the TomTom<sup>®</sup> site: [http://uk.support.tomtom.com/cgi-bin/tomtom\\_uk.cfg/php/enduser/std\\_adp.php?p\\_faqid=386&p\\_created=1060659120&p\\_sid=s2uB9LAj&prod\\_lv11=&p\\_rod\\_lv12=&cat\\_lv11=&p\\_accessibility=0&p\\_redirect=&p\\_lva=&p\\_sp=cF9zcmNoPTEmcF9zb3J0X2J5PSZwX2dyaWRzb3J0PSZwX3Jvd19jbnQ9Niw2JnBfcHJvZHM9JnBfY2F0cz0mcF9wdj0mcF9jdj0mcF9wYWdlPTEmcF9zZWZyY2hf dGV4dD13aW5kc2hpZWxk&p\\_li=&p\\_topview=1](http://uk.support.tomtom.com/cgi-bin/tomtom_uk.cfg/php/enduser/std_adp.php?p_faqid=386&p_created=1060659120&p_sid=s2uB9LAj&prod_lv11=&p_rod_lv12=&cat_lv11=&p_accessibility=0&p_redirect=&p_lva=&p_sp=cF9zcmNoPTEmcF9zb3J0X2J5PSZwX2dyaWRzb3J0PSZwX3Jvd19jbnQ9Niw2JnBfcHJvZHM9JnBfY2F0cz0mcF9wdj0mcF9jdj0mcF9wYWdlPTEmcF9zZWZyY2hf dGV4dD13aW5kc2hpZWxk&p_li=&p_topview=1)

Garmin GPS has a similar warning regarding solar reflective coatings.

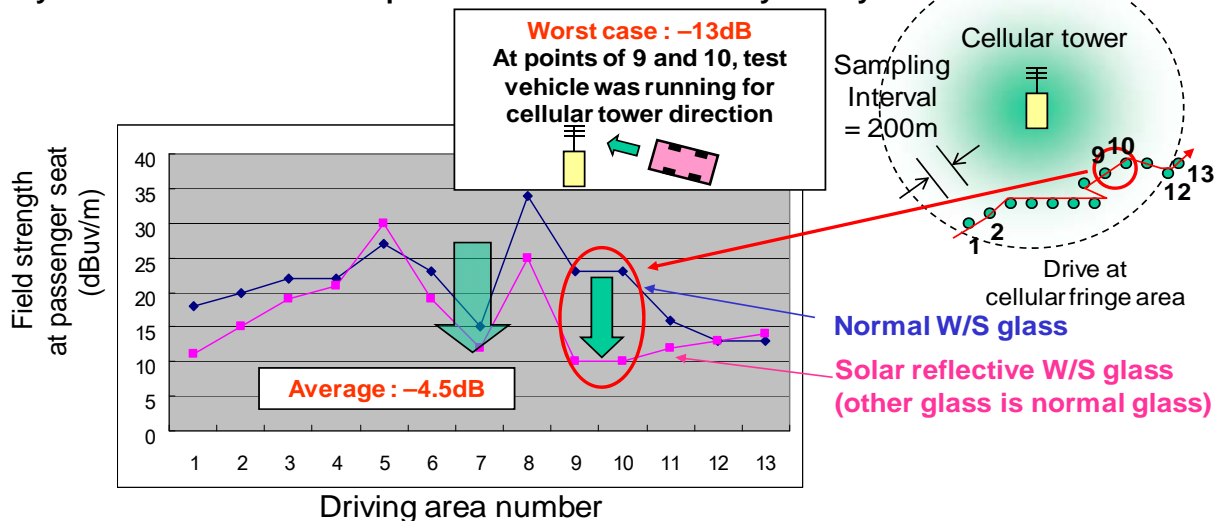


The screenshot displays the Garmin Knowledge Base interface. At the top, the Garmin logo is followed by navigation links: Company | Products | Solutions | Extras | Maps | Support | Shop | myGarmin. Below this is a breadcrumb trail: Home > Support > Search Support, and a search input field. The main content area is titled "GARMIN KNOWLEDGE BASE" and includes tabs for "YOUR RECENTLY VIEWED", "HOT TOPICS", and "HOT SOLUTIONS". A "VIEW SOLUTION" button is visible. The question being addressed is "Why will my gps get a signal outside of my car, but not inside?". The answer explains that solar reflective coatings on windshields, which contain metal oxides, can block GPS signals. It also mentions that solar ray glass, solar tint, heated windshields, and Insta-Clear glass can also affect signal acquisition. A feedback section asks if the information answered the question, with options for "Yes", "No/partially", "No - I would like to submit a follow-up email", and "No - I would like to suggest changes or additions". At the bottom, there are "Other recommended links" and a "No recommendations" message, along with navigation links for "Previous Solution" and "Next Solution".

Cell phones are also likely experience weaker signals and more dropped calls as a result of the reflective coatings – this is particularly true as the vehicle travels toward the cell phone tower (i.e., with the reflective windshield toward the cell phone tower). The slide below shows data from testing Toyota conducted to determine cell phone signal strength as a vehicle drives through different cell phone areas.

## Mobile Phone Interference

Mobile phone is one of the example of aftermarket radio wave products. Toyota measured the mobile phone interference in the Toyota city.



**Radio wave intensity is decreased by 13dB (worst case), 4,5db(average).  
 Connective area is shrunk by 2/3(average)  
 Connective area is shrunk by 1/3(worst case)**

Other wireless devices can and will be affected by the Solar Reflective Glazing standards proposed. The Tire Pressure Monitoring System (a safety system required on all new vehicles) uses wireless communications and again the signal is likely to degrade with the use of solar absorbing windows.

While the proposed regulation allows for a deletion zone area on the windshield, unless these wireless devices are specifically directed through the engineered deletion zones, they will not work effectively and will result in consumer inconvenience. In addition, the future of wireless technology will continue to exponentially grow, further complicating this issue.

As noted above, the benefit calculations in the ISOR show a small benefit for the reflective versus absorbing standard. Considering the complications and the potential impact on future ITS applications with reflective requirements, we recommend setting the requirements to allow solar absorbing glass.

### Phase-Ins and Exemptions

If the rule is adopted as written, manufacturers have a tremendous amount of work prior to implementation just to verify the reliable performance of wireless equipment. Since the regulation calls for 75% of the vehicles to meet the standard in 2012 and the remainder by 2013, this would mean verifying and validating every wireless system on every vehicle model offered in California. Automakers are already selling 2010 model year vehicles, and designs for many 2011 and some 2012 model year are already in place. This allows less than one year for manufacturers to conduct all of the testing and validation on all systems and leaves no room for error and no time for any

changes. This increases costs for everyone and essentially assures there will be problems in the field.

1. To prevent these issues, we recommend the following phase-ins:

- a. Tts < 50% Phase-in requirement over four years starting in 2012 (25/50/75/100%): Because of potential wireless interference, manufacturers expect to conduct testing, possibly relocate antennas, add repeaters, or develop deletion window specifications for glass manufacturers to implement. To prevent potential problems, we recommend spacing this development work over four years.
  - b. Technology Review: Allowing 4 years to phase in the 50% Tts requirement also provides time for all glass manufacturers to develop the necessary technology to meet a 40% Tts standard. Currently, few manufacturers claim to have glass meeting the 40% Tts Standard, and that glass is not commercially available. Even if another glass supplier becomes available as alluded to in ARB's ISOR, there will still remain a significant concern with having an adequate supply for all the OEMs and sufficient time to prove the product out for safety, durability, etc. To monitor the glass manufacturers' progress, ARB should schedule a technology review of the 40% Tts standard in 2012.
  - c. Tts < 40% Phase-in Requirement over 4 years starting in 2016 (25/50/75/100%): ARB can adjust this phase in during the technology review. For example, a shorter phase in would be appropriate if it appears that glass meeting the 40% requirement is readily available, meets all of the safety and durability material specifications, and is a direct replacement for the glass meeting the 50% requirement. However, even in this case, changing any component in all vehicles in a single model year is both difficult and costly and we recommend a limited phase in.
2. Exemption for plastics: The proposed regulation makes no allowance for plastic window technologies, such as polycarbonate or PCVs. While not widely used today, they have been an active area of research due to the large potential weight savings. However, thus far the developments in this area have been incompatible with solar reflective technology, and have demonstrated only limited solar absorbing capability. These technologies are important as we pursue higher fuel economy in our vehicle fleet.

Of immediate concern, is that the regulation as proposed will result in a product restriction for such vehicles as the soft-top Jeep® Wranglers and the electric GEM® vehicles, both of which utilize plastics. These vehicles will not be able to be sold in the state of California unless there is an exemption for plastics (e.g., non-glass glazings). This has been communicated in prior discussions with ARB staff. ARB should exempt plastic windows from this regulation in order to allow continued development of this technology, which ultimately offers greater energy saving potential than the small thermal load benefits from this regulation. At a minimum, ARB should allow a manufacturer to request EO approval of a higher Tts for plastic or other weight reducing technology windows if the manufacturers can demonstrate equivalent or greater CO2 reductions due to weight reductions of the vehicle.

3. Rooflite Tts threshold: The proposed threshold of 30% Tts would require manufacturers to either darken existing tempered glass to approximately 5% visible light transmissibility, in

which case we can expect customer complaints that the rooflite is too dark, or to use IR reflective laminated glazing, which would substantially increase the weight and cost of the rooflite and is not strong enough for moveable roof systems. Neither option is reasonable or justified by the negligible difference in benefits that would result from increasing the rooflite standard to a level that preserves glazing material options for this component. We therefore recommend that the threshold be raised to 40% Tts.

4. Zero Emission Vehicle (ZEV) Exemption: Since ZEVs have no direct CO<sub>2</sub> emissions either from the AC or propulsion system, we recommend exempting these vehicles from this regulation. ZEVs are a good example of a vehicle that might utilize plastic glazing to reduce weight and extend range.

For the benefit of our customers, if ARB decides to go forward with the proposed standards, we strongly recommend providing a longer phase-in and the above mentioned exemptions to prevent potential problems.

### **Technical Changes**

We recommend streamlining the reporting requirements in the regulations as follows:

- a. Owner's Manual Information: Section (d)(1) (Notification of Glazing Requirements) and (d)(2) (Deletion Window Location) requires manufacturers to submit vehicle Owner's Manual information in order to obtain an Executive Order (EO). The Owner's Manuals are produced and printed months prior to requesting an EO. Thus, if ARB required changes to the Owner's Manual after the EO was submitted, the changes would be very expensive.

We recommend ARB allow manufacturers to submit a single template to be used for all vehicles. Once ARB approves the template, the approval would be valid for all future vehicles unless and until the manufacturer changed the format of the information. Note that information might change (e.g., the location of the deletion window) but the format would be the same. Manufacturers would not need to resubmit Owner's Manual information for an EO unless the template changed. ARB could verify compliance with the approved template by electronic access (via the Internet) to Owner's Manual for all vehicles. This is consistent with other information requirements such as the California Environmental Performance label.

- b. For simplicity, manufacturers should not be a requirement to submit all the glazing information with each initial application for certification. Because test groups (and therefore, initial applications for certification) are generally based on engine/emission control system combinations and not glazing configurations, the manufacturers would be forced to submit redundant information (i.e., when one model exists in two or more different test groups, the same glazing information will have to be submitted multiple times). Instead, we suggest that the manufacturers provide a statement in the application for certification that attests to the fact that the vehicles meet the emission-related glazing requirements. Manufacturers would be allowed to determine the best method for grouping and retaining the required information. The manufacturers would still be required to supply additional data upon request.



- c. The proposed regulation is "referenced to a glazing of 4 mm thickness." The Alliance recommended this to recognize that thinner, lighter-weight glass might not meet the same standard as 4 mm glass. We want to clarify that the "reference to 4 mm" applies only to glass that is thinner than 4 mm – i.e., glass must meet the Tts requirement as specified, or for glass thinner than 4 mm, it must meet the Tts referenced to 4 mm. We recommend the following change to the definition:

“(8) “Referenced to a glazing of 4 mm thickness” means that the glass component will either meet the required standard, or meet the required standard when it is produced in a 4 millimeter thickness. Glazing ~~greater than or~~ less than this thickness may have a different Tts value than that of the 4 millimeter thick glazing.”

### Summary

To summarize, we recommend that ARB:

1. Review and revise the benefit calculations in light of the apparent miscalculation and reassess the cost-effectiveness and relative merits of the options for this rule.
2. Adopt a vehicle performance standard.
3. Allow solar absorbing glass (Tts < 60%) on the windshield instead of reflective glass to avoid interference issues for manufacturers and consumers.
4. If the current regulations are adopted, 1) provide a longer phase-in of the 50% Tts standards, a technology review of the 40% Tts standards, and a phase-in of the Tier II standards; 2) increase the rooflite threshold from 30% to 40%, and 3) provide an exemption for plastic windows and ZEVs.
5. Adopt the technical changes noted above.

Sincerely,



Steve Douglas  
Director, Environmental Affairs  
Alliance



John Cabaniss  
Director, Environment & Energy  
AIAM

cc: Tom Cackette  
Robert Cross  
Michael Carter  
Sharon Lemieux  
Marijke Bekken

In summary, the ISOR appears to have used the wrong adjustment factor to account for AC improvements resulting from AB 1493. It correctly assumes that all vehicles would take advantage of the AC credits (direct and indirect). To determine the benefit from AB 1493, the ISOR adjusts the fuel use associated with A/C usage. However, AB 1493 assumes a 52% increase in efficiency of the A/C. The Cool Car ISOR benefit calculation assumes a 2.2% increase in A/C efficiency rather than a 52% increase in A/C efficiency.

To retrace the issue in detail:

**See Cool Glass ISOR App B, page B-4:**

A study completed for the AB 1493 regulation estimated the effect of advances in air conditioning systems, including a move to externally controlled variable displacement compressors from pneumatically controlled fixed displacement compressors (NSCCAF, 2004). As reported in the Staff Report for AB 1493,<sup>8</sup> such a change in compressor type, coupled with improved air recirculation and a change in refrigerant to HFC-152a, would reduce the fuel used for air conditioning by around 2.3 percent for cars and minivans, and just over two percent for trucks and sport utility vehicles (ARB, 2004). To estimate the benefits of this proposal, staff conservatively assumed that all manufacturers would choose to generate these credits. This assumption ensures that the benefit from switching to better air conditioners is not inappropriately double counted in the projected benefit from this regulation. Based on EMFAC's projected VMT split between cars and trucks in the inventory, staff reduced the estimated fuel used for air conditioning in the projected baseline inventories by 2.2 percent. The effect of staff's proposal was layered onto this adjusted projected baseline inventory.

<sup>8</sup> Staff directs the reader to the Staff Report for the AB 1493 regulation (ARB, 2004), specifically the discussion surrounding Table 5.1-12 (page 75).

**See Cool Glass ISOR App B, page B-4, Table B-3:**

F13	a/c contribution to fuel use	0.799 billion gal/yr	$F7 * F8 * F9$
F14	Adjusted for AB 1493	0.781 billion gal/yr	$F13 * .978$

Here the ISOR reduces the A/C contribution to fuel use by 2.2% rather than 52%.

However, looking at the AB 1493 Table that they reference Table 5.1-12:

**Table 5.2-12: Indirect CO<sub>2</sub> Emissions from Baseline and Improved Mobile Air Conditioning Systems**

		Vehicle class				
		Small Car	Large Car	Minivan	Small Truck	Large Truck
Emissions (g/mi)	With no A/C system operation	277.9	329.2	376.4	425.7	492.6
	With baseline A/C system <sup>1</sup>	291.4	344.6	395.4	444.7	511.6
	Due to baseline air conditioning	13.5	15.4	19.0	19.0	19.0
	With improved A/C system <sup>2</sup>	284.4	336.6	385.6	434.9	501.8
<b>Reductions Due To Improved A/C System</b>	(g/mi)	7.1	8.1	10.0	10.0	10.0
	<b>In A/C emissions</b>	<b>52%</b>	<b>52%</b>	<b>52%</b>	<b>52%</b>	<b>52%</b>
	<b>From baseline A/C system</b>	<b>2.4%</b>	<b>2.3%</b>	<b>2.5%</b>	<b>2.2%</b>	<b>1.9%</b>

<sup>1</sup> Utilizes fixed displacement compressor

<sup>2</sup> Equipped with a variable displacement compressor, air recirculation, and HFC-152a as the refrigerant

As you can see, the reduction in A/C emissions is 52% rather than 2.4%. 2.4% is the expected reduction in the VEHICLE GHG Emissions associated with the A/C improvements. Thus, in the Cool Car ISOR, the value in F14 above, should have been "0.384 F13\*.48", cutting the benefit roughly in half.