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Cool Paint and Solar Reflective Glazing

Public Workshop
May 15, 2008
1-4 PM

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Agenda

- Introductions
- AB 32 background
- Technologies to reduce solar load
- ARB's current proposal
- Alternate approaches
- Identified issues
- Upcoming activities
- Discussion & public comment

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AB 32 Background

- AB 32 is California's Climate Change Reduction law, signed in 2006
- Requires CA to reduce CO₂ emissions to 1990 levels by 2020 (25%) and a further 80% by 2050
- All sectors are addressed, from agriculture to waste/recycling
- Cool paints was identified as an early action approach to reduce motor vehicle air conditioner use

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MVAC Refrigerant Items

- HFC-134a reduction from DIY MVAC servicing (small can ban)
- MVAC leak tightness test
- HFC release ban from MVAC servicing
- Low GWP GHGs for new MVACs
- More info on these and other items:
<http://www.arb.ca.gov/cc/ghgsectors/ghgsectors.htm>

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Cool Paints Measure

- Proposes to reduce CO₂ by reducing interior temperatures of parked vehicles
- Reduced interior temperatures reduce likelihood of a/c use
- Less a/c operation results in less fuel used
- Less fuel used results in less CO₂ emissions

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Identified Solar Load Reduction Technologies

- Solar reflective paints and coatings
- Solar reflective window glazing
- Electrochromic windows
- Window shades
- Active or passive ventilation
- Insulation improvements
- Other approaches

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Additional Expert Input

- John Rugh, NREL
 - Thermal comfort model
 - A decade of soak temperature reduction work
- Hashem Akbari, LBL
 - Cool communities expert

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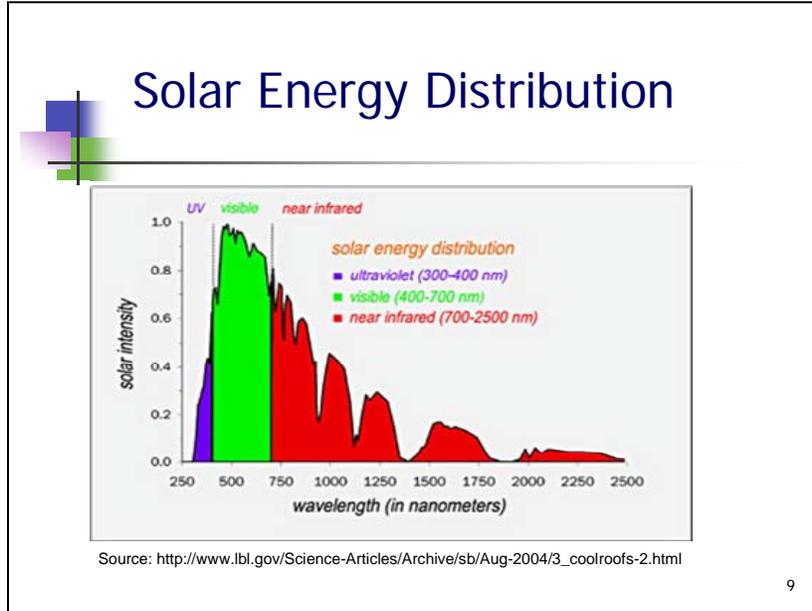


Current Proposal

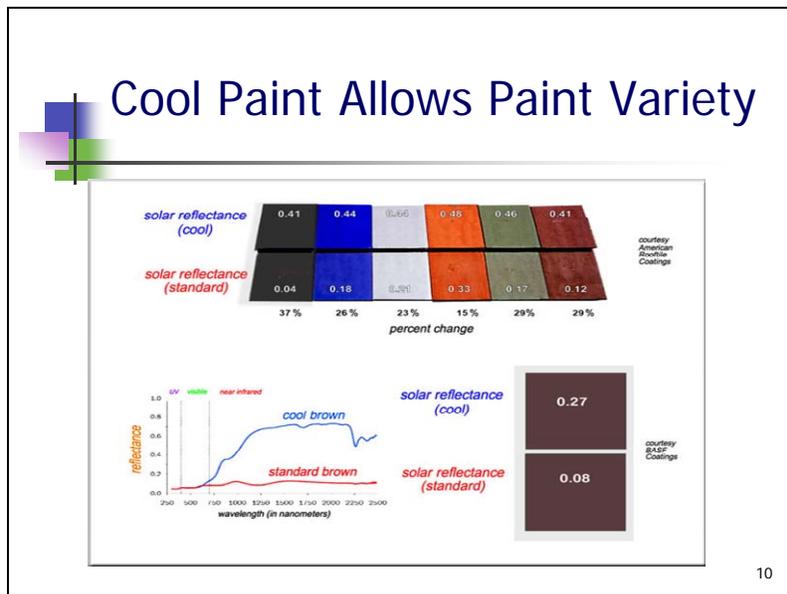
- Two components:
 - Paint and coating reflectivity requirements
 - Window glazing transmittance requirements
- Population:
 - LDV and MDV \leq 10,000 lbs
 - Beginning with 2012 MY

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Paints and Coatings

- Paints/coatings on LDV & MDV to reflect at least 65% of impinging IR solar energy
- Test methodology
 - ASTM E903 – most frequently used currently withdrawn
 - ASTM 1918-06
 - ASTM 1549-05
 - Alternate suggestions

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Why 65% ?

- Solar spectrum 5% UV light, 43% visible light, 52% infrared light.
- Color determined by visible light
- Black paints available with 30+% total reflectivity. Assuming ~ all UV and visible light is absorbed, ~ 65% of IR must be rejected to achieve measured results.

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Window Glazing

- Window glazings transmit no more than 40% of the total solar spectrum at 4.4 m/s (maintaining 70% visible transmittance requirements)
- Test methodology
 - ISO 13837
 - Alternate methodologies

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Why $\leq 40\%$?

- Current standard automotive glass is approx. 58% total solar transmittance at 4.4 m/s
- Currently available options for glass approx 49%
- Indications that additional 15% reduction feasible in the near-term, resulting in approx 40% total transmittance

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Window Replacement

- All windows replaced on affected MY 2012+ vehicles must comply with the solar reflective glazing standard, and should meet original OEM specs to maintain designed thermal comfort
- Recommend Solar Reflective option to other customers replacing windshields for improved thermal comfort

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Recoating Operations

- Collision repair must use solar reflective paint
 - Compliance verification?
- Auto paint shops should use solar reflective paint when the entire vehicle is being repainted for MY 2012+ vehicles, to maintain designed thermal comfort. Recommend to customers solar reflective paints for all recoating operations to improve comfort.

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Alternate Proposals

- Different prescriptive standards
 - Same technologies, different endpoints
 - Different technologies
- Performance standards
 - Reduce interior soak temperature by xx °C; or
 - Reduce MVAC use by yy%; or
 - Downsize MVAC needs by zz%

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Identified Issues

- Toxicity (pigment composition)
- Safety (positives and negatives)
- Window defrost issues
- Electronics reception issues
- Cost (offset with fuel savings or with MVAC compressor downsizing)
- Manufacturer leadtime

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Upcoming Activities

- Today's Public Workshop
- Investigating issues raised at today's workshop and other public/private meetings
- Individual meetings
- Additional workshops as needed
- March 2009 Board Hearing

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- <http://www.arb.ca.gov/cc/cool-paints/cool-paints.htm>
- Please sign up for the listserv at <http://www.arb.ca.gov/listserv/listserv.php>

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