



Transforming Global MAC Markets

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What a Long Hard Trip It's Been

- U.S. Leadership in CFC-12 Recycling
- Global Cooperation HFC-134a Introduction
- European Re-Invention of Natural Refrigerants
- German Genius in Pioneering CO₂ MAC
- SAE Discipline in Testing and System Perfection
- Austrian and Danish Call for Action
- EC F-Gas Strategy and Final Regulations
- CARB Beacon Guiding LCCP and Rewards
- Personal Dedication Beyond the Call of Duty

thank you

for putting the environment in the driver's seat.

AC Delco
ACC Climate Control
Airsept
Alliance of Automobile
Manufacturers
Association of International
Automobile Manufacturers
Arkema
Audi
Australian Department of
Environment and Heritage
Australian Federated Chamber
of Automotive Industries
Australian Federation of Automotive
Parts Manufacturers
Australian Fluorocarbon Council
Australian Greenhouse Office
Automotive Aftermarket
Industry Association
Behr
Bergstrom
BMW
California Air Resources Board
CalsonicKansei
Centro Ricerche Fiat
Clore Automotive
DaimlerChrysler
Delphi Corporation
DENSO
DuPont Fluoroproducts
Eaton
Ecole des Mines de Paris
Edith Cowan University (Australia)
Environment Directorate-General
of the European Commission

Four Seasons
Friends of the Earth
General Motors
Goodyear
Honda
Honeywell
Hutchinson FTS
Indian Institute of
Technology Delhi
INEOS Fluor
International Organization
of Standardization
Institute for Governance and
Sustainable Development
Isuzu
Japan Automobile
Manufacturers Association
Japan Fluorocarbon
Manufacturers Association
Japan Industrial Conference for
Ozone Layer and Climate Protection
Japan Ministry of Economy,
Trade and Industry
Japan Ministry of Environment
Johnson Controls
Konvekta
MAC Partners Europe
Mitsubishi Motors
Mobile Air Conditioning Society
Modine
Natural Resources Defense Council
Neutronics
Nissan
Parker-Hannifin

Red Dot
Refrigerant Reclaim Australia
Sanden
Snap-On Diagnostics
Society of Automotive
Engineers
Solvay Fluorochemicals
SPX-Robinair
Subaru
Skye International Holdings
Sun Test
Texas Instruments
Toyota
Tracer Products
Transpro
TYC Genera
Underwriters Laboratories
United Nations Environment
Program DTIE
U.S. Department of Energy's National
Renewable Energy Laboratory
U.S. Army
University of Braunschweig (Germany)
University of Illinois
University of Maryland
UView Ultraviolet Systems
Valeo
Vehicle Airconditioning
Specialists of Australia
Visteon Corporation
Volkswagen
Volvo Car Corporation
World Resources Institute
ZEXEL-Valeo

Congratulations to Mobile Air Conditioning Climate Protection Partners for helping us all drive a little cleaner. A growing team of corporate, government, and environmental leaders is working together to rapidly improve the energy efficiency of your vehicle air conditioning system by at least 30% and reduce refrigerant emissions by at least 50%. New vehicles with improved air conditioning will ultimately avoid millions of tons of greenhouse gas emissions each year. Join the cause. Visit our website at www.epa.gov/cppd/mac and help put the environment in the driver's seat.



I-MAC 30/50 on Schedule!

- Immediate Relief to Greenhouse Gases
- Raising the Bar On MAC Climate Performance
- Increasing Profits for Premium Components
- Encouraging R&D for Alternative Systems and Field-testing Actual Component Performance
- Implemented Globally for Enormous Benefit
- Setting the Stage For Global Refrigerant Choice
 - Based on Environmental Performance
 - For Vehicles as Driven

EPA/EC/CARB MAC Agreement!

- Remove Barriers to Refrigerants Allowed in EC
 - Consensus safety standards in design, operation, manufacture, and service
- Evolve SAE-2727 into Global Leak Standard
 - Denis Clodic will co-chair SAE EC Coordination
 - Integrate and track SAE scores and mini-chamber tests
 - Translate score into grams/year at manufacture & beyond

Join Partnership to Remove Barriers to Refrigerants Allowed by EC: Kristen Taddonio Leadership

- EPA/EC/CARB Agree to Remove Barriers to Refrigerants Allowed by the EC F-Gas Regulation
- Implementing Consensus Safety Guidelines in Design, Manufacture, Operation and Service
- Modeled After Rules Implemented in Sectors Safely Using the Same or Similar Chemicals
- Consensus Packaged for Prompt Acceptance by Authorities Worldwide
- Process Intended to Resolve Ambiguity

Illustrated US Barriers to CO₂ Believed to be Indicative

- 12 States ban “toxic” refrigerants without defining toxic
 - The US Hazardous Substances Act defines toxic as “...any substance...which has the capacity to produce personal injury or illness...”
 - Statutory amendments requires State legislative votes
- Federal regulations limit workplace CO₂ exposure
 - <30,000ppm short term; <5000 ppm 8-hour exposure
 - Mitigation likely similar to beverage & fire protection
- Other regulations concern accumulator burst pressure, pressure relief devices, labeling, storage, training, protective gear, hydrostatic testing, work practices, emergency procedures...

Illustrated Barriers to HFC-152a and New Blends

- 17 States and DC ban “flammable” refrigerants
 - HFC-152a is listed flammable by ASHRAE (NGO)
- U.S. EPA SNAP approval is the de facto world standard of alternative refrigerant environmental acceptability
- U.S. EPA SNAP approval pending for CO₂ and HFC-152a
- DuPont and Honeywell blends will require SNAP approval
- Other regulations concern labeling, service fittings, training, protective gear, service equipment, inspection, work practices, emergency procedures...

SAE Guides Testing & Certification!

HFC-134a Standards

- SAE J-2727 2006 HFC-134a Certification at 3.0!
- SAE Recover/Recycle & Charging Standard!
- SAE Energy Efficiency Certification Soon!
- SAE Cooperative Research Program!

CO₂ Standards

- SAE CO₂ Alternative Refrigerant Component Safety! Engineering and Systems Standards!
- SAE Service Equipment and Service Technician Standards!
- SAE Cooperative Research Program!

Global Efforts

- EC B-Cool CO₂ and I-MAC B-Class HFC-134a
 - Best CO₂ experts build optimized prototypes for testing at all ambient conditions
- India I-MAC & alternative refrigerant project
 - TERI guided by automotive stakeholders analyzes Indian fleet, climate, and cooling preference
- Asia MAC Summit
 - Cosponsored by EC, EPA, CARB, SAE, JAMA, VDA...
 - Technical program, facility tours, and collaboration
- Global Collaboration on EC Refrigerants
 - Organized under the U.S. Cooperative Research Act?

Way Forward

- Remove Barriers to Refrigerants Allowed in EC
- SAE-2727 I-MAC Leak Certification Immediately
- SAE Energy Efficiency Certification in 2006-07
- Global Community Pursues CO₂, HFC-152a, and Blends When and Where Outperforming HFC-134a
- Welcome & Assist CO₂ Commercial Introductions
- B-Cool and IMAC Projects Resolve Fuel Use
- EC & California ARB Regulatory Path Finders
- MAC Summit 2006 Renews Consensus

Summit Press Release

- EC, EPA, and CARB agree to:
 - Collaborate in Removal of Barriers to Refrigerants Allowed by the EC F-Gas Directive
 - Mutually Recognize SAE-2727 as a Global Leak Standard and Translate the SAE Score into Grams/Year Using the Latest Test Results from the EC and Elsewhere
 - Hold the Next MAC Summit in Asia

Backup Slides

Climate Change

Transforms Vehicle Markets

- 70% of New Vehicles Are Sold in Kyoto Countries
 - 7% More Must Satisfy Stringent California Standards
 - 85-95%+ of Global Sales have AC Standard
- Green Vehicles Require Improved AC Performance
- EC Caps Refrigerant GWP at 150
- IMAC Partnership will Transform Other Markets
- Fuel Savings Offset Cost of Improved MACs
- Clean Air and New Jobs Are Welcome Co-benefits

EC Caps MAC Refrigerant GWP at 150!

- Carbon Dioxide
- HFC-152a
- DuPont & Honeywell Blends
- Hydrocarbons

Funding for European Transition

- Technical Centers of Excellence
 - Centro Ricerche Fiat
 - Ecole des Mines Paris
- Cooperation Centers of Excellence
 - United Nations Environment Programme Paris
- Standards and Training Centers of Excellence
 - Society of Automotive Engineers
 - Mobile Air Conditioning Society
 - MAC Partners Europe