



Enhanced HFC-134a Immediate Relief to Greenhouse Gas Emissions

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Why Reconsider HFC-134a?

- Significant HFC Greenhouse Gas Contribution
 - High leak rates in many markets
 - Global failure to enforce HFC recovery at service and disposal
 - Recharge without repair—even by amateurs
 - Vehicle AC penetrating global markets
- Limited Accountability for Fuel Efficiency
- European Agreement of +25% Fuel Efficiency by '08 (aiming at 140 g/km and further to 120 g/km)
- New Vehicle Platforms--DI, Fuel Cell, Hybrid
- EC, German, and other CO2 Leadership
- Enhanced and Future HFC-134a, HFC-152a, and HC
- Safety confidence for CO2 and flammable refrigerants

EPA Approach to Vehicle AC

- LCCP
 - Enhanced Containment
 - Enhanced Fuel Efficiency
 - Enhanced Service and End-of-Life Recovery
- Environmental Cost-Effectiveness
- Partnerships at the Speed of Business

MACs Brussels Summit 2003

- Hats Off to Minister Margot Wallström, Matti Vainio, Phil Callaghan, Peter Gammeltoft, and Colleagues
- Respected Global Experts
- Persuading Policymakers
 - “Performance, Not Prescription”
 - What, When and How
- Crafting a Message to Motivate Change

EPA Congratulates Mobile AC Community For Summit Success

- Working as Teams by Consensus
- Advocating Minimum HFC Emissions
- Investigating Alternative Refrigerants
- Honestly Presenting Potential and Challenge
- Earning Respect of Regulators and NGOs
- Seeking Partnerships and Cooperation

EC MAC Proposal

- Reflects Significance of European Market
 - 1/3 Sales Each: North America, Europe, Asia
- Crafted with Global Participation
- GWP Emissions Based, Not Nomenclature
- Incentives, Flexibility, & Trading
- Might be As Good As It Gets

EC Enhanced Containment

- Shorter, Less Permeable Hoses
- Better Shaft Seals
- Double O-Ring and Lip-Type Connectors
- New Technology Stimulated by Demand
- Improved Component Assembly and System Leak Testing
- Extended OEM Responsibility

Devil in the Details

- Certification of EC Enhanced HFC-134a
 - Third-Party Certification of AC System With SAE Component and Assembly Test Standards and Best Manufacturing Practices
 - Verification and Cooperation
 - Testing of Assembled and Charged Components in Chamber
 - Tracking of Warranty Repair
 - Technical Collaboration and Reporting
 - Continuous Improvement

Industry and Government Leadership

- EC & CA Enhanced
 - Containment Enhanced
 - ~40 grams/year maximum
 - ~Credit for < 20 grams/year
 - Refrigerant Enhanced
 - CO₂, HC, or HFC-152a
 - Recovery at Disposal
- Beyond the EC
 - Efficiency Enhanced
 - Heat Exchange
 - Smart Controls
 - Maintenance Enhanced
 - Certified Technicians
 - Recovery and Recycle
 - No Recharge w/o Repair
 - Incentive Enhanced
 - HFC Tax Assures Recovery

“Total Enhanced HFC-134a”

- OEMs and System Suppliers
 - Quality Parts, Optimized and Integrated with Design Clout and Intelligent Controls
- Service and After-Market Parts
 - Expert Diagnoses, Recovery and Repair Before Recharge Using OEM-Quality or Evolved Replacement Parts
- Governments, ENGOs, and Owners
 - Transformed Markets Reward Climate Performance

One Way Forward

- EC and California Beacons Show the Way
- Quality Parts and Professional Service for HFC-134a Vehicles Worldwide
- CO2 Aggressively Financed to Yield Mature Technology for Leadership Companies Enjoying Regulatory Incentives
- Enhanced HFC-134a Vehicles Immediately
- HFC-152a Pursued Until CO2 Outpaces Cost Effectiveness in Markets
- All Options Compete on LCCP, Cooling Performance, Cost, and Reliability

Priority Collaboration

- Support VDA and Phoenix Forum
- Finalize SAE Refrigerant Standards
- Complete Global Risk Assessment
- Recruit Developing Country Stakeholders
- Agree on Energy Performance Tracking
- Globalize Technician and Customer Support
- Speak the Truth with One Confident Voice

Pursue Economy of Scale

(Protect the CO2 Goose with the Golden Egg)

- Strategic First Commercialization
 - Satisfy Customers, NGOs, Vehicle OEMs, Suppliers, and Environmental Authorities
- Global Access to Intellectual Property
- Shared Infrastructure and Training
- Rewards and Gratitude

Refrigerant Peace, Not War

- Compete on Environmental Performance
- Enjoy Government and NGO Promotion
- Profit in Expanding Premium Markets
- Please Repeat the Mantra:
“Excellent engineering, training, and complementary regulations allow the safe use of alternative refrigerants to help protect the climate for future generations”