Environmental, Economic & Logistical Advantages of HFC-152a

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US EPA

- Proud of partnership success in refrigerant recycle, CFC-12 to HFC-134a transition, and improved system design and service
- Preferring voluntary action, guided by LCCP, with system and refrigerant choice by industry
- Working earnestly to remove inappropriate barriers to refrigerant choice and to assure mitigation of risks
- Telling it like it is

First, A Reality Check

- 30/50 Improved HFC-134a MAC would have offered greater immediate climate protection, worldwide, at lower cost, and with greater consumer savings
- Professional service and returnable containers are long overdue

Where We Are Today

- Brilliant industry/government cooperation
- Visionary SAE standards and expert networks
- Consensus LCCP methodology
- Award-winning technology
- Extraordinary EC and CARB regulatory leadership
- Natural & Designer Refrigerants for the taking

Why HFC-152a?

- Commercial, Competitive & Non-Toxic
- Green & Gold
- Familiar Technology Easily Applied
- Certain Secondary-Loop EPA SNAP Approval
- Secondary-Loop Co-Benefits
- Sustainable and global

Commercial, Competitive & Non-Toxic

- Commercial
  - Produced and distributed worldwide by companies currently supplying MAC refrigerants
- Competitive
  - Public domain intellectual property using feedstocks available worldwide
- Non-Toxic
  - Approved by respected environmental authorities for relatively high inhalation exposure (dust-off)

Green & Gold

- Green
  - 10X lower GWP
  - Up to 40% lower charge
  - Half the leak rate
  - Superior energy efficiency
- Gold
  - Low cost system
  - Low cost service

Familiar Technology, Easily Applied

- Standard components with confident reliability
- Precision leak testing & professional service
- Easy IMAC 30/50 upgrades & optimization
- Vibration-free more valuable than real estate

Certain Secondary-Loop EPA SNAP Approval

- EPA Snap listing of CO2 and HFC-152a conditioned on safety mitigation
- Secondary-loop specifically satisfies EPA's safety mitigation; likely satisfies all other safety authorities
- Safety critics would be hard pressed to argue HFC-152a is unsafe in engine compartments without damning the fuel itself (biofuels, CNG, gasoline, hydrogen, LPG…)

Secondary-Loop Co-Benefits

- Near-zero net fuel use when compressors run only on deceleration or at favorable engine conditions
- Empowered hybrid/non-hybrid hot weather idle-stop
  - 12% of fuel use at idle; What percent customer-defeated?
- Cool only where cool desired
  - Energy savings from selective and apparent comfort
- Lower cost for dual-evaporator systems
- Value added cool-down after brief stops (shopping)

Next Steps

- Ride-Tests will confirm whether slightly slower cool-down from soak is acceptable
- Engineers will further perfect system design, packaging, and controls for energy efficiency
- NREL will calculate potential fuel savings from undefeated idle stop
- Market forces will guide industry choice