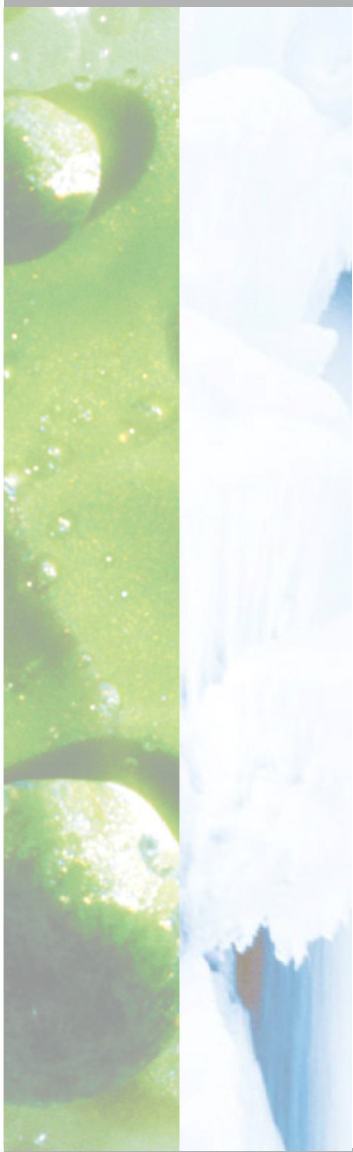


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Applications with Natural Refrigerants

– country situation and experiences –

by

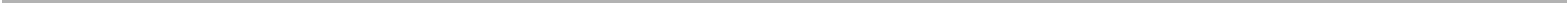
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Natural Refrigerants in North America

by

Bruce Badger, President IIAR



Ammonia, CO₂ and Propane

- Propane – used in chemical and oil refinery applications but not in the food and beverage industries (accepted by EPA Significant New Alternatives Policy SNAP)
- CO₂ -
 - Used in low temperature process food freezing, small charge vending machines and in ammonia / CO₂ cascade systems.
 - Not much progress in US commercial or supermarket applications except as a secondary coolant
- Ammonia –
 - >95% of industrial applications for food and beverage processing and storage
 - Some progress being made in roof mounted packaged systems for US super market applications using propylene glycol or CO₂ secondary coolants
 - Promoted by the EPA Green Chill Program for commercial usage
 - ASHRAE 34 passed the 2L refrigerant classification including ammonia
 - ASHRAE 15 considering expanding the occupancy class for ammonia based upon the 2L rating, with the use of gas detection and mandatory ventilation

Initiatives

- Energy Conservation –
 - Increased focus on ammonia and ammonia / CO₂ cascade systems to reduce energy
 - Refrigeration Load reduction initiatives including electric utility programs
 - Increased use of VF Drives, time of day operation and thermal storage
 - Leadership in Energy and Environmental Design (LEED) programs to use renewable materials and reduce energy consumption
- Regulation –
 - ICC approval of new IIAR standard for ventilation (UFC, UMC considering adoption)
 - Formation of an alliance with OSHA
 - Increased incidents of ammonia releases
 - New IIAR Standards (Definitions, Start Up, Operation, Maintenance)
 - Updated IIAR PSM / RM Program compliance documents
 - OSHA National Emphasis Program trial to increase facility compliance