



APRIL 24-26  
THE LAS VEGAS  
CONVENTION CENTER



## Preparing for the Transition to Green Refrigerants

Doug Drenten  
Crane Merchandising Systems

Where People, Products & Possibilities Meet

# Going Green: What the Transition to Green Refrigerants Means for your Business

*This session will provide an overview of the factors driving the change to green refrigerants, and the operational impact the transition will have on the convenience services industry.*

*You should come away with an understanding of the impacts to the industry in order to allow for a smooth and seamless transition.*

# Disclaimer

The opinions expressed in this presentation and on the following slides are solely those of the presenter and not necessarily those of Crane Co. and/or its affiliates and subsidiaries (collectively, “Crane”). Crane does not guarantee the accuracy or reliability of the information provided herein.

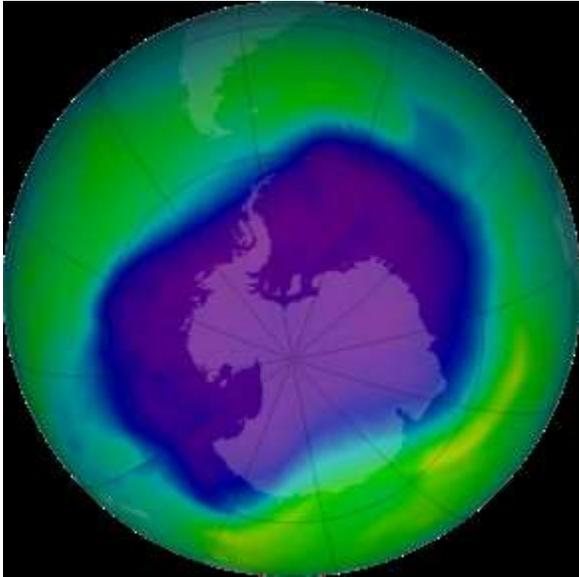
# What are you going to get from this today?

- What is changing? What's driving the change?
- Who will it impact? When and where?
- Our collective role in making you successful
- Operational changes you need to make
- How to make lemonade from all of this!



# What's driving the change?

Ozone Depletion



Global Warming Concerns



# Regulatory drivers



- 2015 EPA SNAP Rules 20 & 21 prohibit high-GWP HFCs by end use banned R-134a as a refrigerant in refrigerated vending machines as of January 1, 2019.
- Ruling allowed for indefinite use for service or replacement.
- **Current Status:** Suspended pending additional regulatory actions

# Regulatory drivers



- New DOE energy standards represent a very significant reduction in energy consumption when compared to the current Energy Star standards.
- **Current Status:** Implemented in in US 1/1/19.
- Energy Star promotes premium efficiency product (However, it's optional)
- **Current Status:** NAMA and its members are currently working with the EPA on the development of this new standard.

# Regulatory drivers



California Air Resources Board (CARB) has adopted their own set of state regulations mirroring SNAP that became effective on Jan 1, 2019.  
**Status: Implemented**



Canada law restricts use of R134a after January 1, 2020.



F-Gas regulation in Europe phases down the quantity of HFC which can be placed on the EU market by producers and importers. Total ban of R134a as of 2022.

# What are the alternatives?

	R134a	R290	R1234yf	R513A	R450A
Type	HFC	HC	HFC	HFC Blend	HFC Blend
Safety Class*	A1	A3	A2L	A1	A1
Capacity	Reference	Higher	Lower	Same	Lower
Efficiency	Reference	Higher	Lower	Same	Same
GWP	1,430	3	4	631	600
EU GWP Limit**	No	Yes	Yes	No	No
Meet 150g Limit	N/A	Yes	No	No	No
Drop-In***	Reference	No	No	Yes	Undetermined
Refrigerant Cost	Reference	Lower	Very High	Very High	Very High

Natural refrigerants or blends:

- Synthetic blends of hydrocarbon and other materials
- Proprietary products
- Lower flammability and toxicity
- Generally will not meet the GWP requirement for the EU in 2022 (<150 GWP).

Hydrocarbons...

\* A1 – Non Flammable/Low Toxicity; A2L - Mildly Flammable/Low Toxicity; A3 – Highly Flammable/Low Toxicity

\*\* GWP requirement for the EU in 2022 (<150 GWP)

\*\*\* R290 & R600a: no because of safety aspects of electrical components; R513A & R450A determined based on reliability as true drop-in replacement

# What 'Going Green' means in practical terms

A transition to R290 or 'Propane'



- R290, is refrigerant grade propane >99.7% pure
- It is natural refrigerant suitable for use in a wide range of refrigeration and air conditioning applications.
- The use of R290 is increasing due to its low environmental impact and excellent thermodynamic properties.

At this point the 'jury is in', globally R290 is the only viable, long-term global solution. it is the 'winning refrigerant of the future'

# Why Hydrocarbon?

- Hydrocarbons are naturally occurring substances
  - They are non-toxic
  - Low environmental impact:
    - Zero ozone depletion
    - Global warming potential : <3
- Hydrocarbon is widely used across the globe in commercial, industrial, and household refrigeration applications
  - In 2014, over 120 million domestic refrigerators were produced in Europe alone.
  - Today more than a one-third of the new domestic refrigerators use hydrocarbon.
  - It is estimated that there are well over 600k HC coolers or other immediate consumption devices in the global market with bottlers alone.



# Government, Regulation & Compliance

UL 541 covers Refrigerated Vending Machines  
UL 471 covers Commercial Refrigerators and Freezers



**Underwriters  
Laboratories**

UL 541; SA6.2.3.c states:

*“A vending machine having a flammable refrigerant shall not be intended for use in lobbies or locations of egress, such as a hallway or public corridor.”*

This is based on ASHRAE 15-2013, which UL adopted when making the standard

## Placement Blocker:

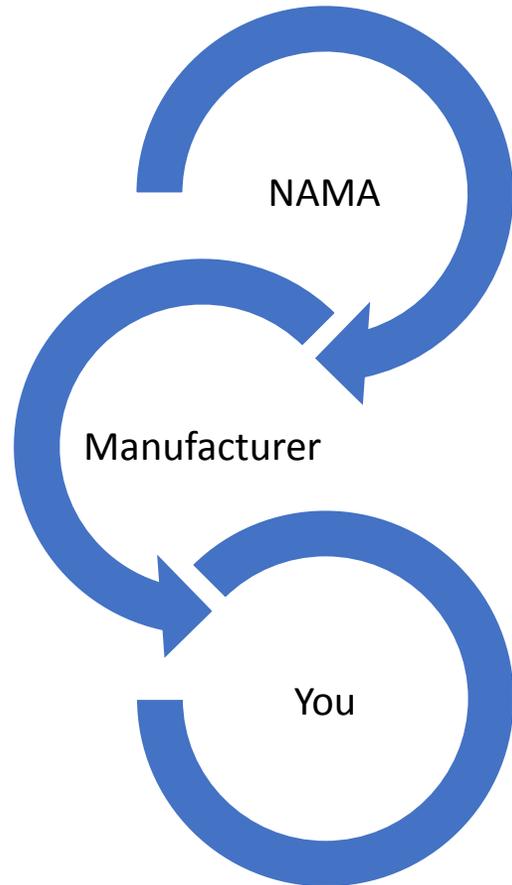
While no restrictions exist for coolers, the nature of ASHRAE 15-2013 is a practical blocker for the widespread usage of R290 in vending at this time in the North America.

# What concerns are there?

- Hydrocarbon is also a colorless, odorless, highly flammable gas
- Vending's 'unattended application' combined with moving parts (delivery mechanisms, motors etc.) provide special challenges and required changes in design as well as operational procedures



# Transitioning to Green will be a team effort



- Convenience Services Industry supports a transition away from high GWP refrigerants – but must have a viable alternative.
- Petitioned EPA July of 2017 to seek additional time to transition from R-134a to R-290
- Successful in bringing together both DOE and EPA last fall to express the challenges facing our industry
- Working on the behalf of industry through an ASHRAE 15 working group to collect data and develop alternative solutions.
- Working at the state level in Washington to fight restrictions similar to those that California has put in place. May also be an issue in Maryland in the future.

# Your operations will need to change

Warehousing



Transportation



Contracts



Training



Repair Processes



# What are the risks?

- Technology has been in use since the early 1900's and have been in widespread use in Japan and Europe for over twenty years.
- More than 1.5 billion HC refrigerators and freezers are being used in homes worldwide.
- Today more than a one-third of the new domestic refrigerators entering the market use hydrocarbon.
- A quantitative risk assessment of ice cream freezers published in the International Journal of Refrigeration in 2013, measured the risk of a fire posed by the use of R290. The study found that the chance of ignition is less than 0.001 percent.<sup>1</sup>
- Another study conducted by the CSA Group in 2016 concluded: ““A rapid release of 150 grams of flammable refrigerant (A3) within and average size kitchen space does not pose a significant risk of ignition.”<sup>2</sup>

1 – Colbourne, D. and L. Espersen. International Journal of Refrigeration. Volume 36, Issue 4, June 2013, pages 1208-1219, Quantitative risk assessment of R290 in ice cream cabinets

2 – CSA Group, November 14, 2016, Probability of Ignition As a Result Of Flammable Refrigerant Leak from a Household Refrigerator Appliance

# How to make lemonade...



- Green technology and the green movement has and will continue to present a myriad of challenges to our industry.
- Learning to adapt in the face of endless change is challenging and problems will surface along the way.
- However, how you respond to, leverage and embrace these changes is a choice!
- Consumers care deeply about their environmental impact and many prefer to do business with companies that also care about the environment.
- Green marketing refers to the process of communicating with consumers about your efforts and selling based on environmental benefits.

# Tips for marketing your lemonade



- A business Going Green makes customers feel that it is a trustworthy business.
- Make it cultural; develop a vision and communicate, train, and practice your values. Demonstrate that sustainability is part of your mission and company culture.
- Make your program multi-dimensional – and select a few key elements of your program to emphasize.
- Every company is managing through transitions. Be authentic and make sure your actions and intentions are real.
- Communicate your journey and then share!!!

# In summary...

- When it comes down to the choice of Going Green, the direction is clear – this industry along with many others is on a path to a Green future.
  - The introduction of Green refrigerants can be managed with training and technology. This has been proven with other refrigerated appliances.
  - Continued global pressure to protect our environment will not subside – getting ahead of the curve will pay off in the long run.
  - The market will reward those that Go Green - consumers prefer eco-friendly products and solutions, employees are more committed to companies that promote a healthy environment and many governmental policies insist on using Green businesses as their suppliers.

**THANK  
YOU**

---

# Frequently Asked Questions

- Is there a maximum charge amount for commercial applications with R290?
  - Yes, the allowable, maximum charge is 150 grams (5.3 ounces) for vending.
- How will I be able to tell if the system I'm working on contains R290?
  - The serial number tag on the product will indicate the type of refrigerant.
  - The compressor will have a label indicating "Flammable Refrigerant"
  - The unit will have multiple warning labels required by UL stating that it contains an R290 refrigerant.
  - The unit will also have the process tubes colored red.
- What is the difference between R290 and standard propane that you can purchase from a hardware store?
  - R290 has a much higher purity level - greater than 97.5%.
  - R290 has a very low moisture content. Moisture will damage the refrigeration system and components.
  - Also, there is no scent or odor added to R290, which is something that is added to standard propane.

# Frequently Asked Questions

- Can I retrofit any existing cabinet to R290 refrigerant?
  - No, the EPA has ruled that the retrofitting of any existing equipment is prohibited by law.
- Can the same parts that are used to service a R134a machine be used on a hydrocarbon machine?
  - No, our UL Listing requires that only specially selected OEM parts are used on hydrocarbon machines. These parts must meet these unique requirements for non-sparking parts.