ATMOsphere AMERICA

business case

natural refrigerants

June 16 & 17, 2016 – Chicago

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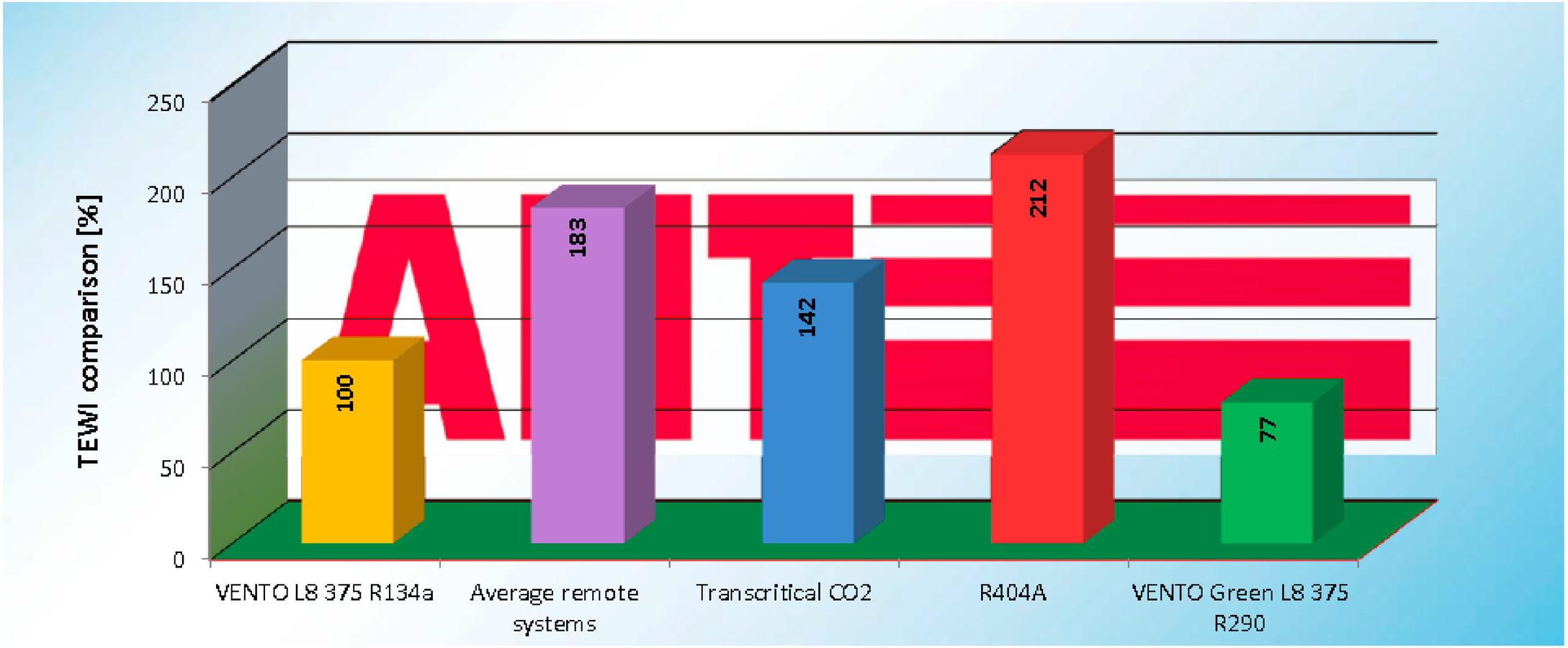
HYDROCARBONS

ENERGY SAVINGS, UTILITY INCENTIVES, & VAST APPLICATIONS

AHT
green . freshness . worldwide

- A GLOBAL LEADER IN PLUG-IN MODULAR HC REFRIGERATION
- 1997 FIRST TEST INSTALL
- 2002 BEGAN SERIAL PRODUCTION
- OVER 500,000 INSTALLATIONS GLOBALLY
- THOUSANDS INSTALLED ALL OVER NORTH AMERICA

WHY HYDROCARBON



FIGURES BASED ON AVERAGE AMBIENT TEMPERATURES IN GERMANY

Operating Cost Example

- R290 CASES APPROXIMATELY 10% PREMIUM TO HFC CASES
- UTILITY REBATES TO OFFSET INITIAL PREMIUM

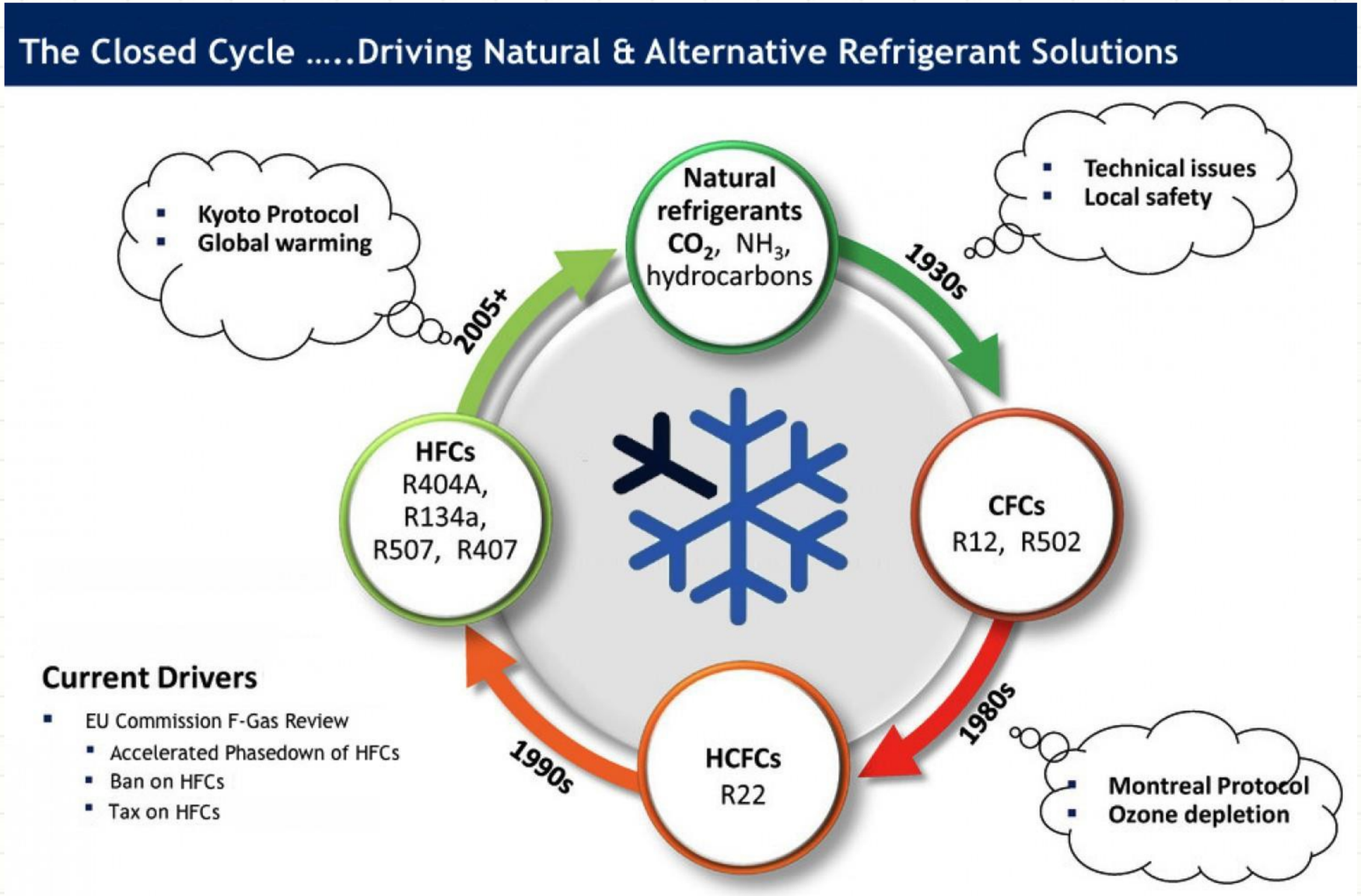
	REMOTE 12‘	SELF CONTAINED 10‘	13' R290
ANNUAL KWH	7,640	10,741	**4,672**
ANNUAL KWH / LN FT	636.7	1,074.1	**359.4**
Annual Cost / LN FT	$95.51	$161.12	**$53.91**

- BASED ON ICE CREAM SETTING, USING SPEC SHEET DATA, & AHRI EER -20 FOR INCUMBENTS w/404A
- BASED ON USING $0.15 / KWH

Initial Barriers and Solutions

- 120V / 60Hz COMPONENTS
- CERTIFIED FIELD TECH'S
- LOCAL AUTHORITIES
- SHORT TERM COST DIFFERENCE

Phasing Out Ozone Depleting Refrigerants



Accelerate America January 2016 issue…

With the help of natural refrigerants, the California Air Resources Board plans to roll back emissions of HFCs in the state by 40% of 2013 levels by 2030, setting a standard for the rest of the U.S. and much of the world

— by Michael Gillry

California, the most populous state in the U.S. with more than 38 million people, has the world's eighth largest economy. Due in part to its reliance on cars, the state emitted more greenhouse gas (11 metric tons) per capita in 2012 than every other leading world economy except the U.S. itself (18.6 metric tons), according to the World Resources Institute.

But California, known as the Golden State, is also among the world's most aggressive economies when it comes to crafting policy to reduce greenhouse gas emissions. In 2006, the state passed its landmark California Global Warming Solutions Act, AB 32, which calls for greenhouse gas emissions to be cut to 1990 levels by 2020

Customer Impacts

- End-users will need choose new equipment/technologies to meet their refrigeration requirements
  - Mfrs have and are developing more solutions now…
- Typical end-users are commercial and industrial customers:
  - Refrigerated warehouses
  - Supermarkets
  - Food service
  - Hospitality
  - Food processing/manufacturing
  - Office buildings…

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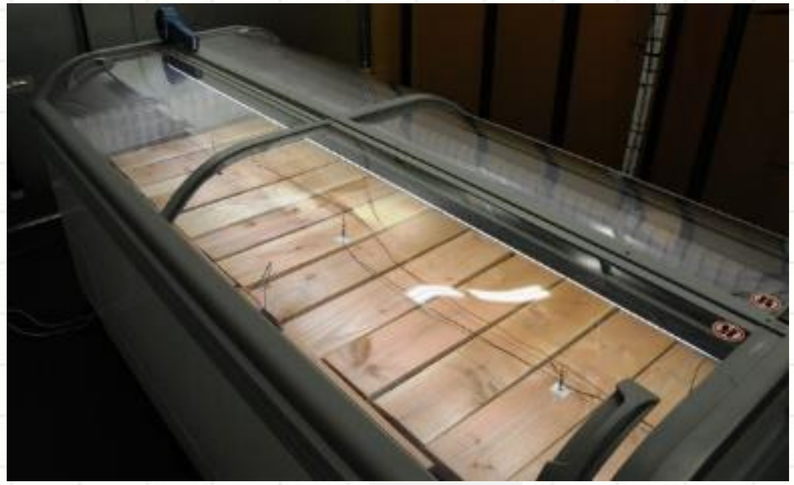
STRATEGIES THAT DRIVE ADOPTION

Lab & Field Testing

Engaging Industry

Partnering with Our Customers

Developing Solutions



ASHRAE

EPRI

iiar®

Low Charge Ammonia

New Alternative Refrigerants

Customer Engagement for Refrigerant Options

Ultra Low Temp Freezer

Self Contained Display Cases

High Efficiency R-22 Refrigerant Replacement

Refrigerated Display Case Work Program Update

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20% Energy Savings

Efficiency Analysis

	R404A Case -- Test 1	R404A Case -- Test 2	Propane Case -- Test 1	Propane Case -- Test 2
Control Parameters				
Average room DB Temp (°F)	75.2	75.3	75.2	75.2
Average room DP Temp (°F)	58.6	58.7	58.6	58.6
Test Duration and Compressor Run Time (hours)				
Test Duration	24.0	24.0	24.0	24.0
Compressor Run Time	15.3	15.3	20.8	20.8
Power (W)				
Compressor	505.3	505.7	286.6	285.5
Lighting	37.0	37.0	36.9	36.9
Total(W)	542.3	542.7	323.5	322.4
Energy (kWh)				
Compressor	7.7	7.7	6.0	5.9
Lighting	0.9	0.9	0.9	0.9
Total	8.6	8.6	6.8	6.8
Temperatures				
Interior Case Temperature (°F)	11.0	11.0	10.7	10.4
Average Product Temperatures (°F)	1.3	1.3	1.3	1.0

ACTUAL RESULTS FROM SCE TEST LAB TO ASHRAE / AHRI STANDARDS

Currently

Work with utilities to:

- Share findings / papers with other utilities to offer rebate
- Test other product ranges and offer rebates

North America:

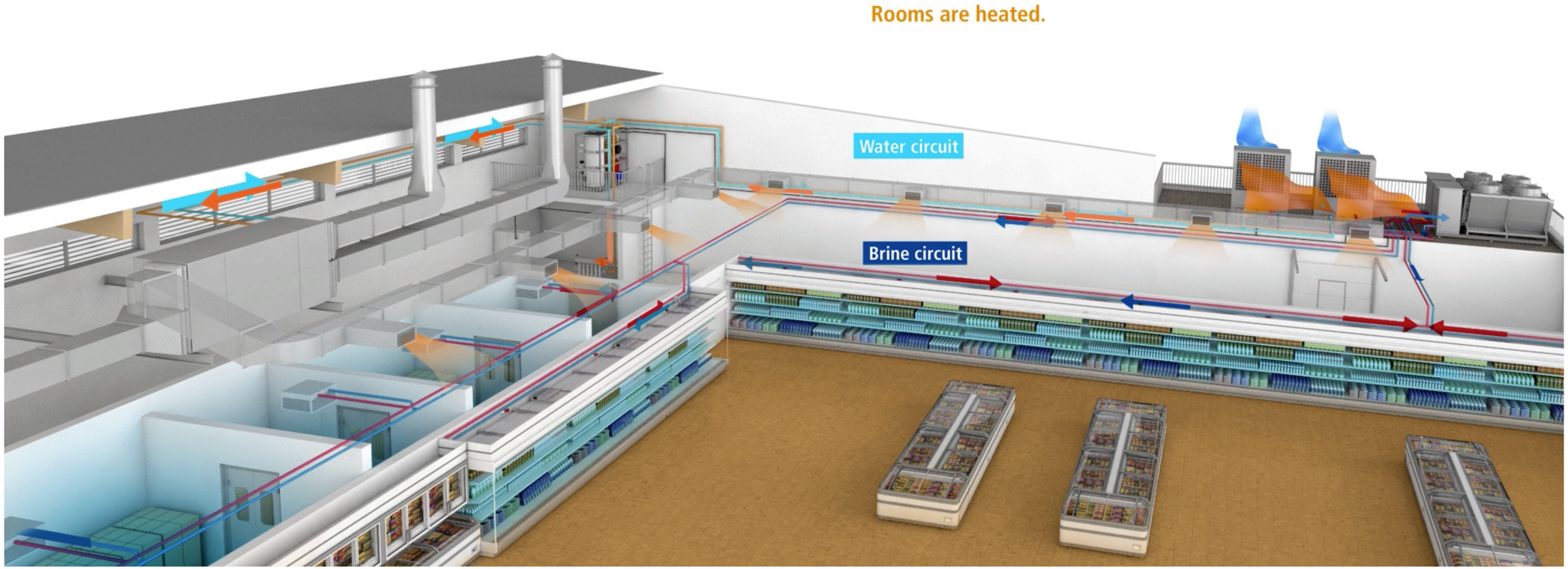
- Expand case options with HC's
- Continue ensuring field tech's are being trained & certified
- Work with regulators to raise charge limitation per circuit

MODE OF OPERATION IN HEATING OPERATION WITH VERY LOW OUTDOOR TEMPERATURE.

Re-cooling circuits with heat reclamation.

Waste heat usage with additional heating.

AHT green.freshness.worldwide



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Thank you very much!