

ET Summit 2024

Presented by



R-32: Low GWP Alternative

To R-410A



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Market Activity

Opteon™ XL41 (R-454B) Refrigerant Selected by Johnson Controls for Air Cooled Scroll Chiller Platform in Europe

XL41 (R-454B) provides excellent performance and long term sustainability with a 78% reduction in GWP compared to R-410A

Carrier picks R454B for ducted ac

Trane to conduct field trials on R466A

29 JUN 2021



Carrier has selected Chemours refrigerant R454B as its primary lower GWP replacement for R410A in ducted commercial air conditioners sold in North America.

Carrier is also selecting Opteon XL41, but to be commercially renamed by Carrier as Puron Advance, the new refrigerant for ductless units from 2023.

Lennox backs R32 as optimum replacement

25 APR 2021

THIS ARTICLE



global chemistry
solutions, announced
replacement for R-410A, has

Daikin Adopts R-32 For Key HVAC Products In North America To Reduce Greenhouse Gas Emissions And Climate Impacts



NEWS PROVIDED BY
Daikin →
Sep 26, 2019, 09:00 ET

WASHINGTON, Sept. 26, 2019 /PRNewswire/ -- Daikin Company, a leading global HVAC manufacturer, has announced that it is adopting R-32 refrigerant for its key HVAC products in North America. The adoption of R-32 is part of Daikin's commitment to reducing greenhouse gas emissions and climate impacts. R-32 is a low global warming potential (GWP) refrigerant that offers high energy efficiency and low environmental impact. Daikin is currently testing R-32 in its ducted and ductless residential, light-commercial and commercial HVAC products.

Carrier Chooses R-32 Refrigerant for Commercial Scroll Chillers

CHARLOTTE, N.C. - Apr. 22, 2020

As part of its commitment to provide customers with solutions that use the right refrigerant for each application, Carrier has selected R-32 refrigerant to replace R-410A refrigerant, a high global warming potential (GWP) refrigerant, in commercial chillers using scroll technology. R-32 was chosen for its lower environmental impact, high energy efficiency, wide availability and ease of use. In Europe, the refrigerant will be offered in some scroll chillers beginning in the first half of 2020. Introductions will follow in other regions.



Lennox products, like its new eComfort range of inverter scroll chillers, are using lower GWP refrigerant R32

FRANCE: Lennox is extolling the virtues of R32 over R454B as the optimum lower GWP replacement for R410A in chillers and rooftop units.

R32

Why is R-32 the Right Choice to Replace R-410A?

PROVEN

in over **280 million**
units installed around
the world

EASY

top off and recharge
R-32 in the field

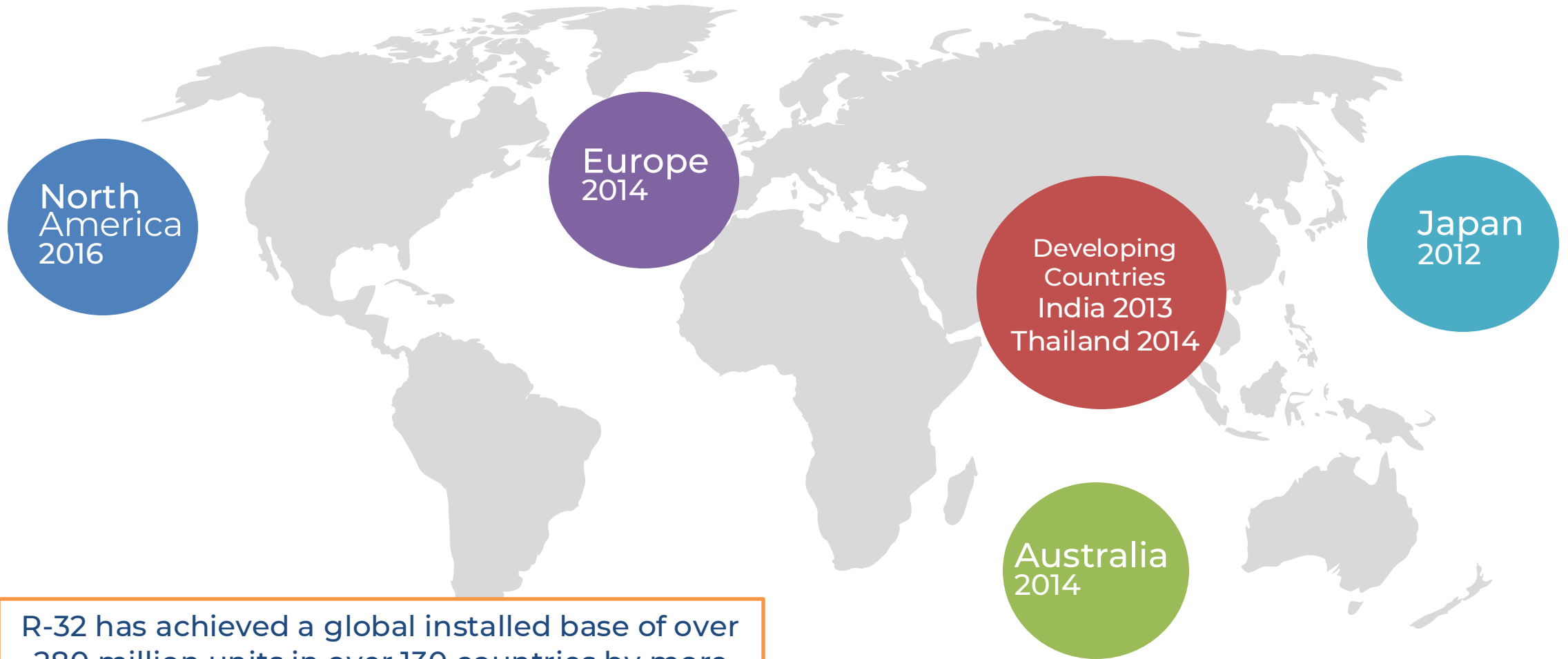
EFFICIENT

up to 12% more
efficient than
comparable R-410A
systems

AVAILABLE

a commodity with
no active patents on
the refrigerant

R-32 IS A PROVEN COMMODITY USED GLOBALLY



R-32 has achieved a global installed base of over 280 million units in over 130 countries by more than 60 OEMs

PROVEN

UNLIKE BLENDS, R-32 IS A PURE, SINGLE-COMPONENT REFRIGERANT, MAKING IT EASY TO REUSE, RECLAIM, AND RECYCLE



- Reuse and clean on site, without changing the composition
- Reclaim and recycle offsite in a simple cleaning process
- Blends such as R-454B do not share these benefits!

EASY

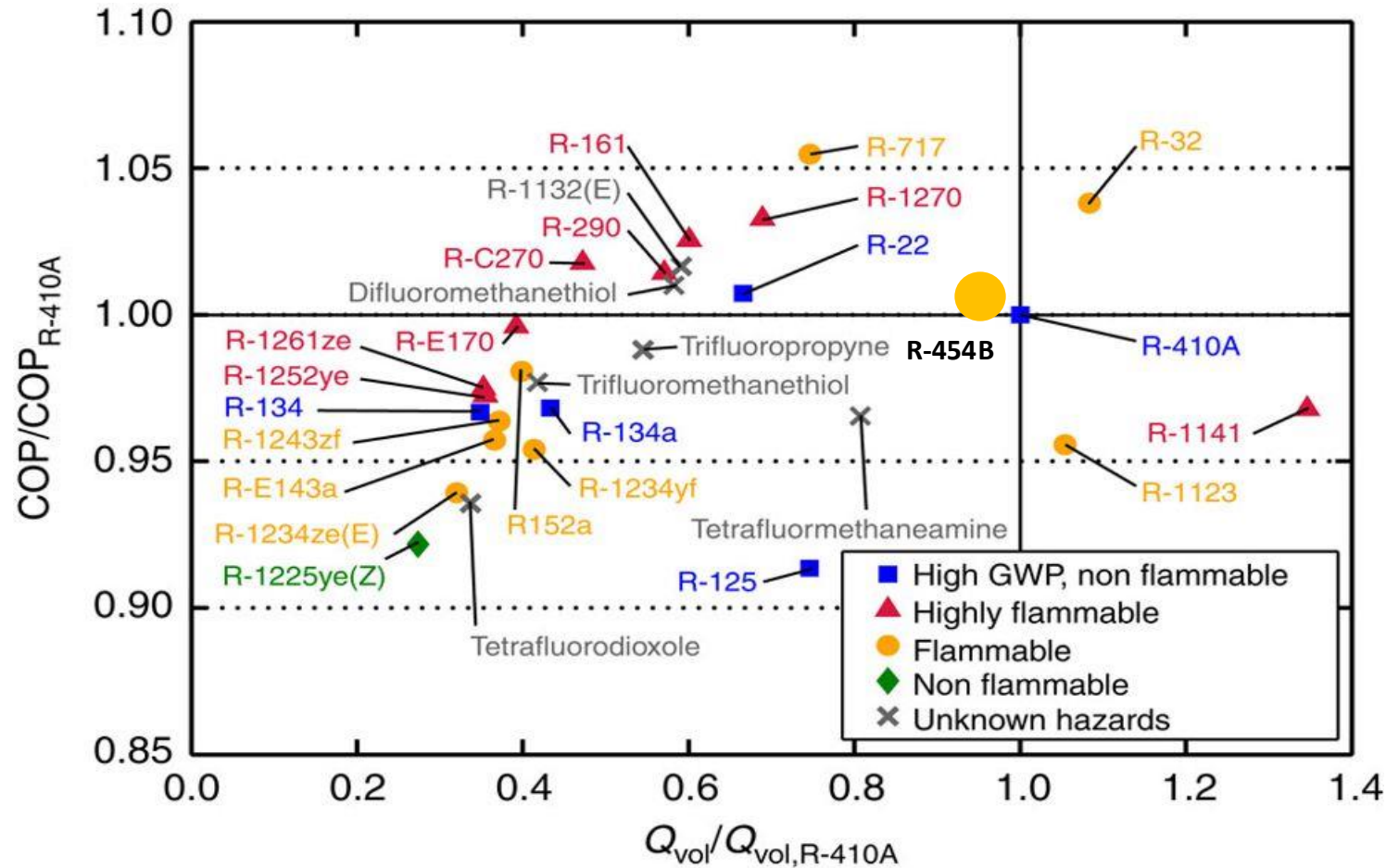
UNLIKE BLENDS, R-32 IS A PURE, SINGLE-COMPONENT REFRIGERANT, MAKING IT EASY TO SERVICE



- R-32 can be charged in both liquid and gas phase
- Blends like R-454B, should be charged in liquid phase as composition can change otherwise
- R-32 can be topped up and recharged easily whereas blends can't
- All of this means easier and faster service on site

EASY

R-32 HAS EXCELLENT EFFICIENCY AND CAPACITY; BETTER THAN R-410A

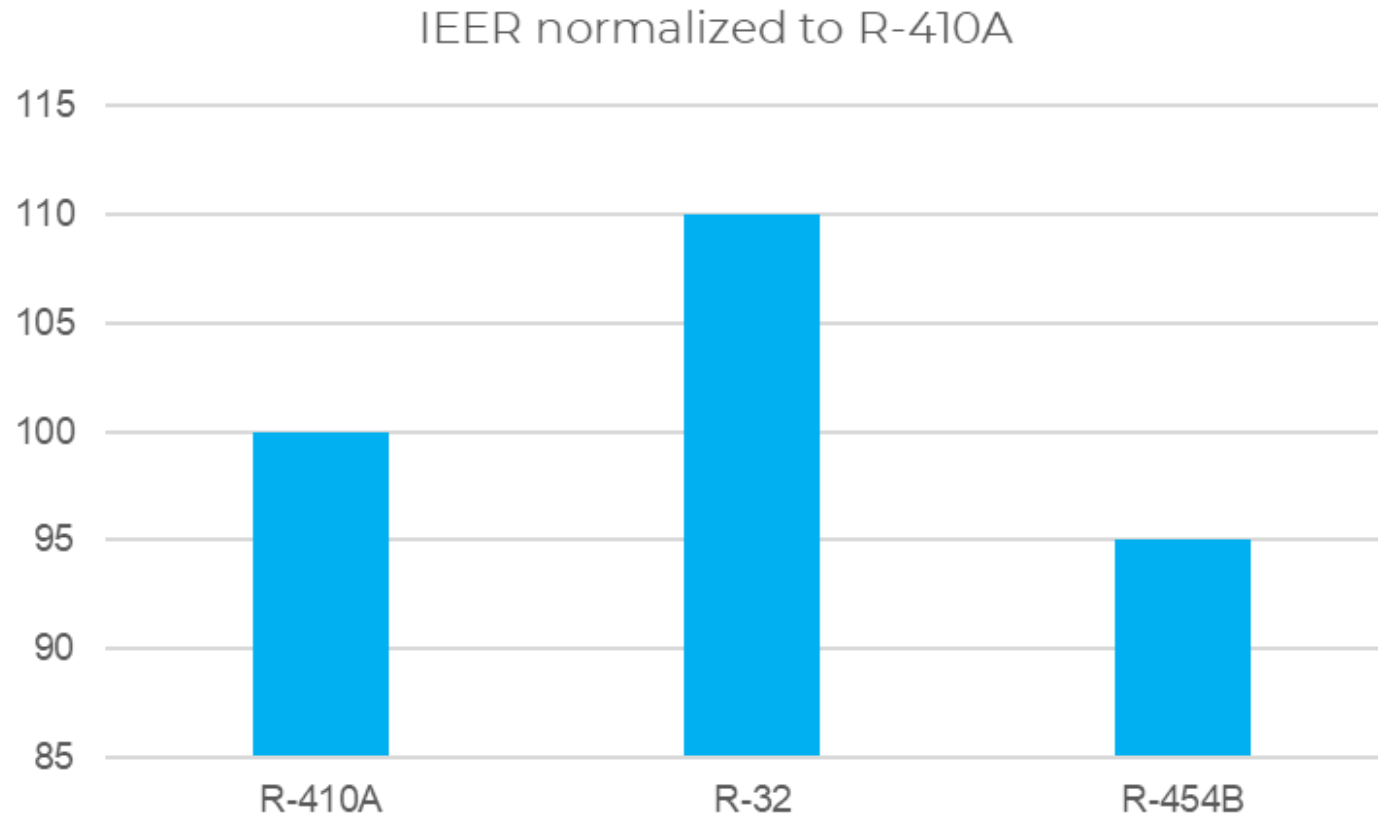


EFFICIENT

Figure shows COP comparisons based on simulation of a basic vapor compression cycle for an air-conditioner employing a typical forced-convection, air-to-refrigerant heat exchanger, maintaining the same heat flux in the evaporator for a fair comparison.

McLinden, M.O., Brown, J.S., Brignoli, R., Kazakov, A.F., Domanski, P.A., 2017. Limited options for low-global-warming-potential refrigerants. Nat. Comm. 8, 14476

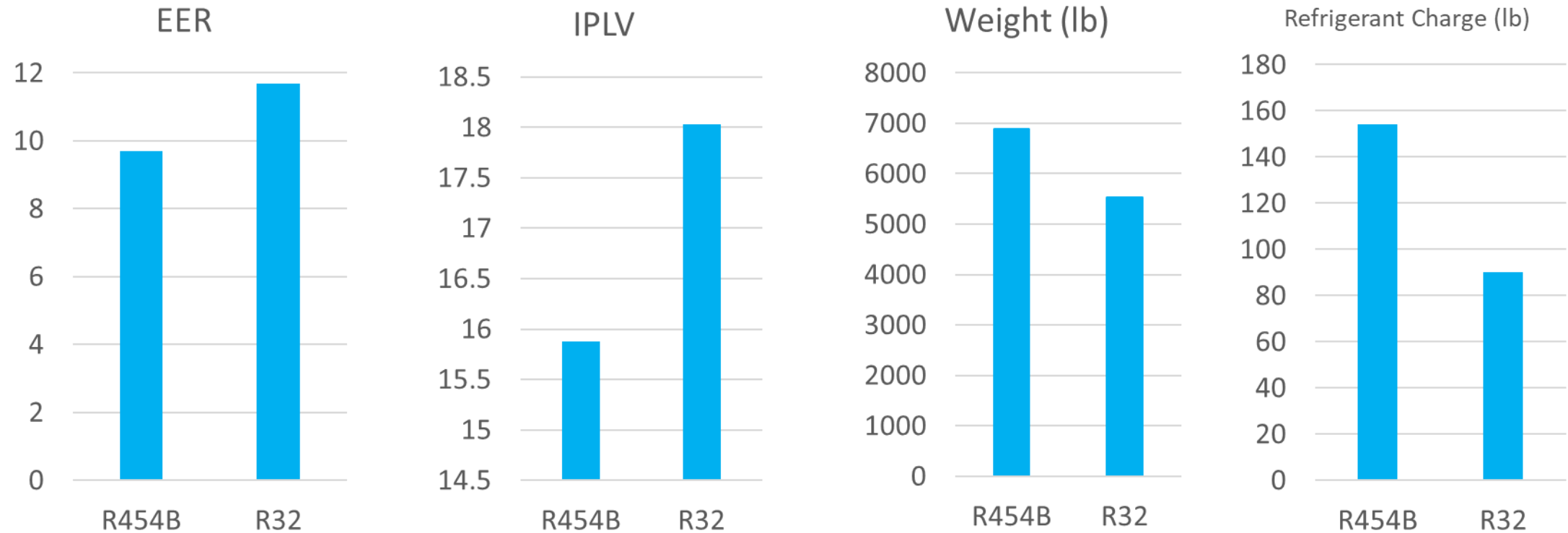
R-32 EXCELLENT EFFICIENCY AND CAPACITY; BETTER THAN R-410A AND R-454B



R-410A, R-32 and R-454B test results in an inverter compressor packaged rooftop

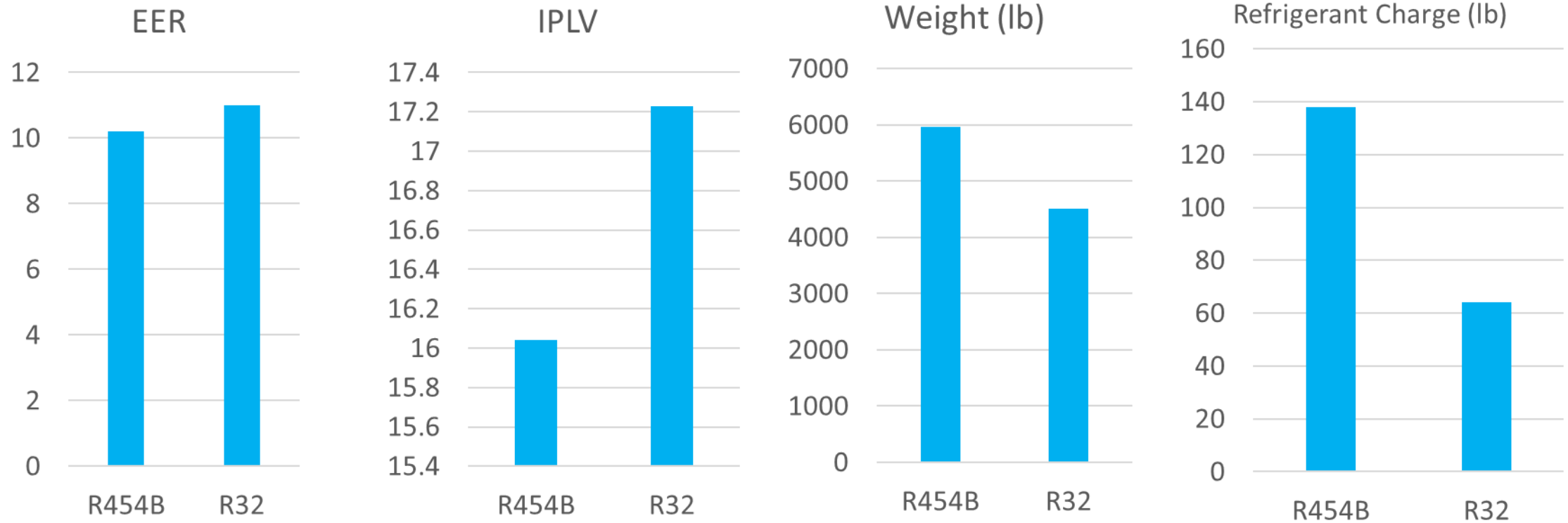
EFFICIENT

R-32 EXCELLENT EFFICIENCY, WEIGHT, REFRIGERANT CHARGE; BETTER THAN R-454B



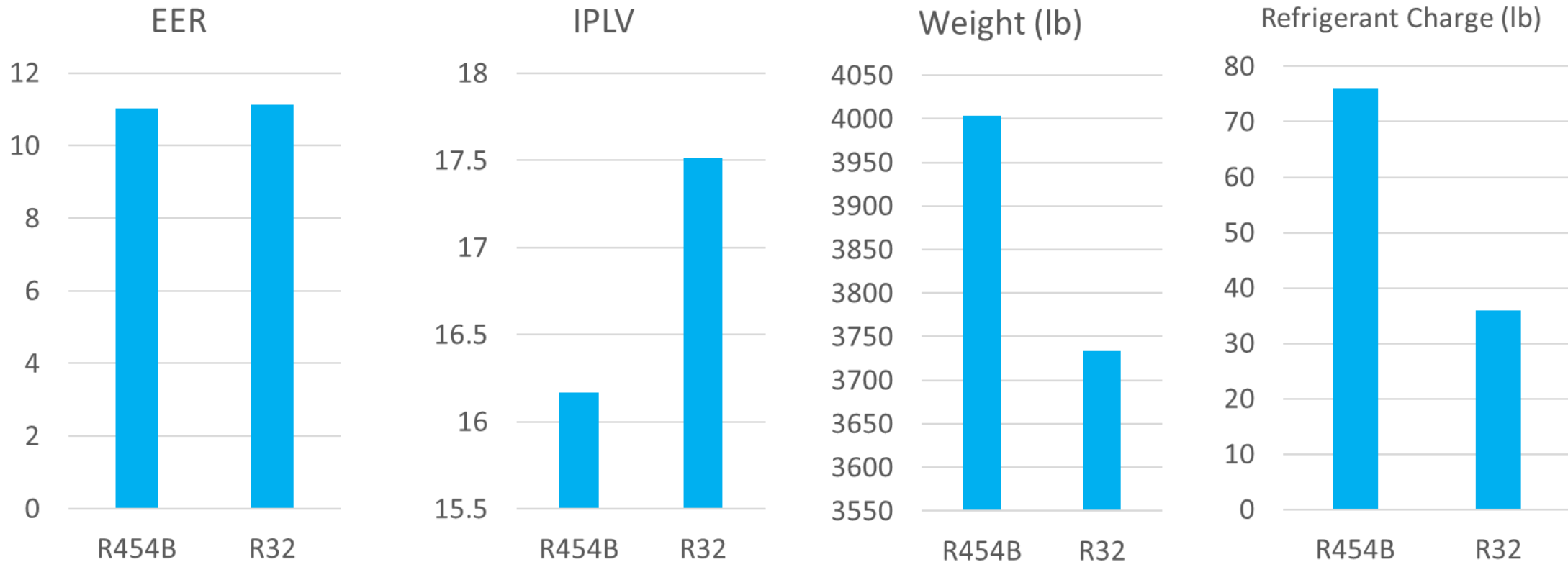
Fixed Speed Scroll Chillers - Nominal 105 tons cooling

R-32 EXCELLENT EFFICIENCY, WEIGHT, REFRIGERANT CHARGE; BETTER THAN R-454B



Fixed Speed Scroll Chillers - Nominal 90 tons cooling

R-32 EXCELLENT EFFICIENCY, WEIGHT, REFRIGERANT CHARGE; BETTER THAN R-454B



Fixed Speed Scroll Chillers - Nominal 50 tons cooling

GWP IS NOT THE FULL MEASURE OF EMISSIONS

Direct Effects from Refrigerant

- › Refrigerant GWP
- › Atmospheric reaction products
- › End-of-Life Impact



Indirect Effects from Lifetime Use

- › Construction materials
- › Energy generation and use



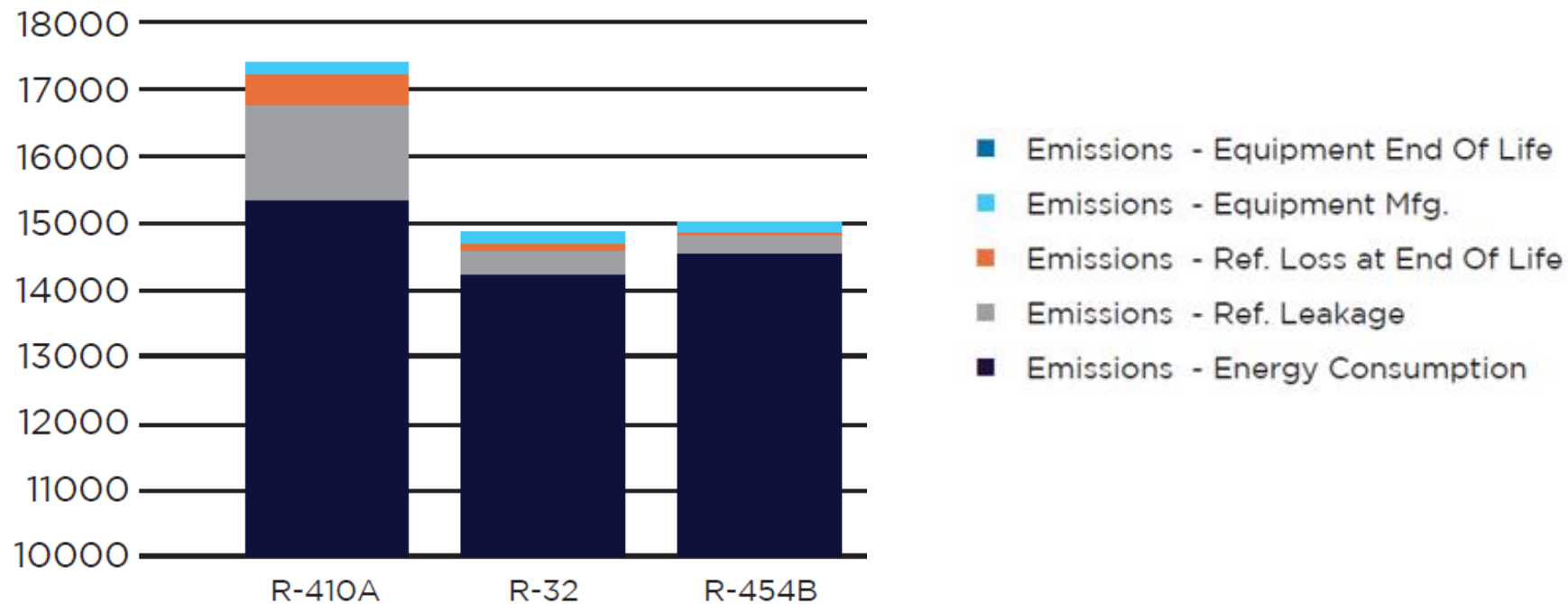
Life Cycle Climate Performance (LCCP)

- › The majority of climate impact from HVAC is power generation for electricity used over equipment's lifetime
- › In effect, a lower GWP refrigerant with lower efficiency could actually create more global warming

R-32 HAS LOWER LIFETIME CO₂ eq. EMISSIONS

Lifetime Emissions from an HVAC System*

R-410A vs R-32 vs R-454B



*Comparison is made using the Life Cycle Climate Performance (LCCP) metric, measured in kg-CO₂ eq. LCCP analysis was performed using a high efficiency HP (24+ SEER), using performance gains claimed by respective refrigerant manufacturer, for a residential sized (9000 Btu/h cooling capacity), installed in Houston, TX climate zone, with an assumed annual leakage rate of 4% and end of life refrigerant leakage of 15% with a 15 year lifetime. The heating COP and SEER were adjusted based on refrigerant characteristics and performance. The physical system size, trim charge requirements and capacity were kept consistent to ensure a like-to-like comparison.

LOWER EMISSIONS

BETTER PERFORMANCE NO PATENTS



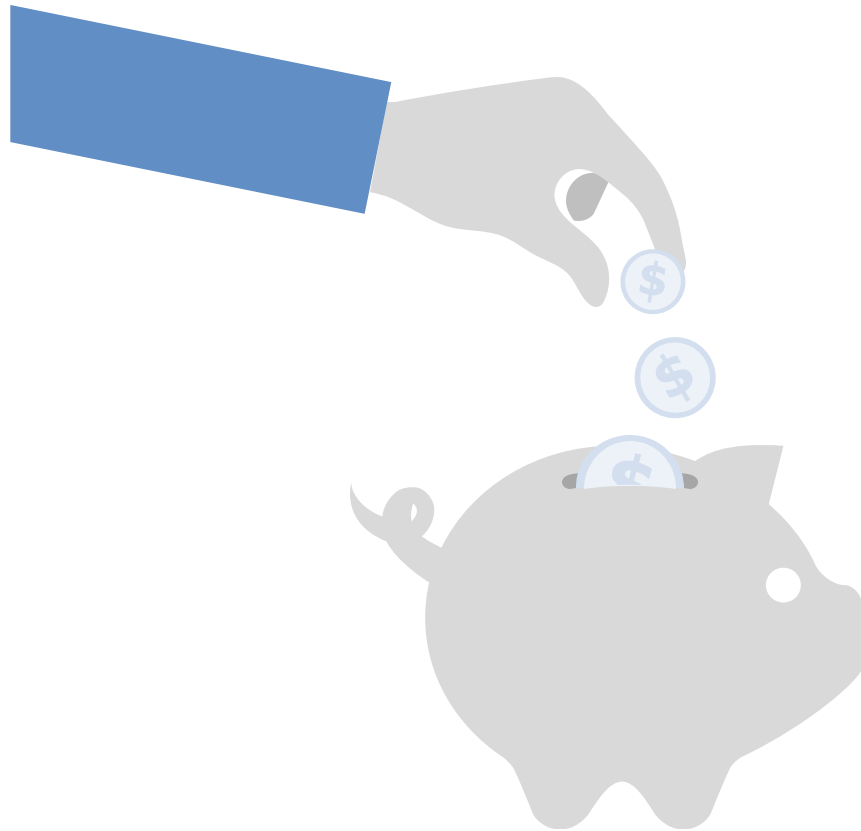
PATENT FREE

R-32 is a commodity manufactured by numerous refrigerant producers and distributed globally.

There are no active patents on the basic molecule.

AVAILABLE

A PURE, SINGLE-COMPONENT REFRIGERANT, R-32 CAN HELP SAVE VALUABLE TIME, MONEY AND EFFORT



COST

Less expensive than many blends to install and maintain during servicing, saving technicians valuable time and effort on site



ACCESSIBILITY

R-32 is used globally and is the base of many blends, for several decades

R-410A REPLACEMENTS: R-32 AND R-454B

Refrigerant	Composition	ASHRAE 34 Classification	RCL (g/m ³)	GWP ₁₀₀ (AR4)	Glide (K)	Efficiency	Capacity	Value	LCCP
R-410A	50% R-32 / 50% R-125	A1	420	2088	< 0.5				
R-32	Pure 100% R-32	A2L	77	675	0				
R-454B	68.9% R-32 / 31.1% R-1234yf	A2L	76	466	1.5				

Handwritten blue circle around '675' with '475' written next to it.

R-32 is the superior long-term choice:

- › Best in class for efficiency, capacity, environmental impact and value, and equal on safety to the other blend

	Superior to R-410A
	Similar to R-410A
	Inferior to R-410A

R-32: AN IDEAL SOLUTION TO REPLACE R-410A



Proven, Easy, Efficient, Available,
can result in lower lifetime cost
and emissions

Thank You for Your Time

For more information visit

R32REASONS.COM

[R-32: Daikin's Evolution to Low GWP - HVAC Fundamentals and General Training Videos \(wistia.com\)](#)

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