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18 – 21 FEBRUARY 2023

RIYADH FRONT EXHIBITION AND
CONFERENCE CENTER (RFECC)

Sustainability: The Future shaper of HVACR industry

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Honeywell Advanced Materials

www.thebig5saudi.com



NET ZERO COMMITMENT

GCC countries have declared net zero pledges, including Saudi Arabia

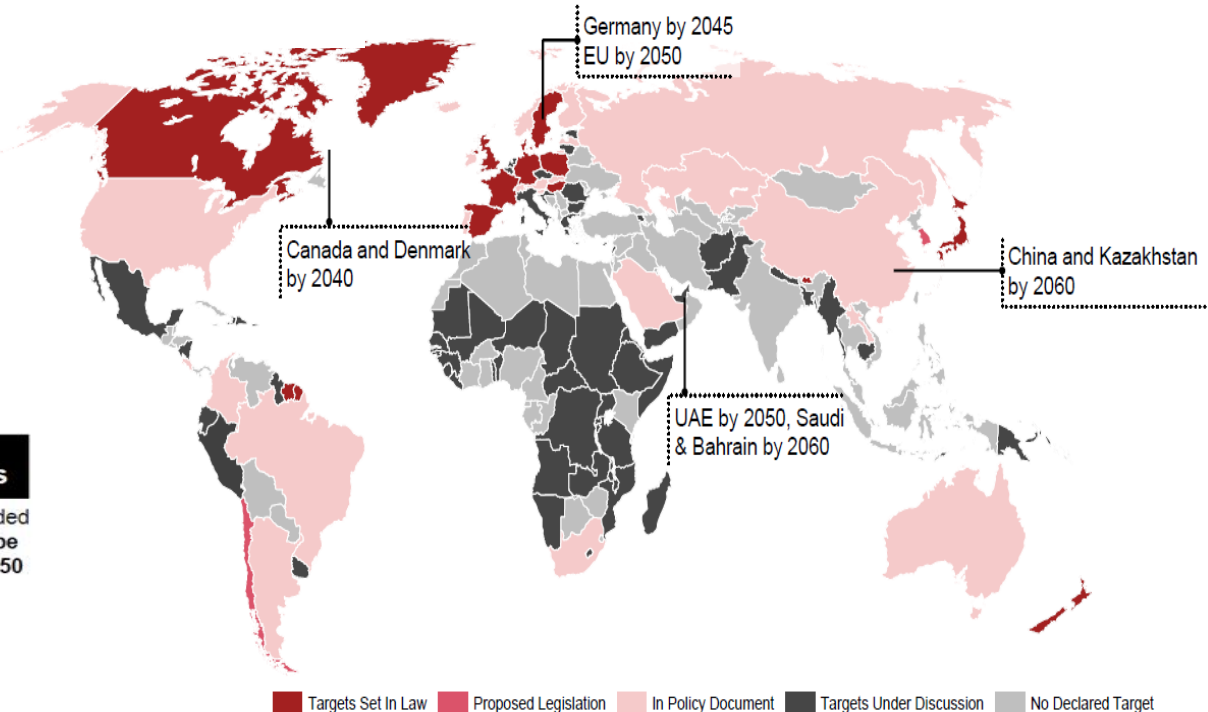


Net Zero commitment means that any CO₂ (or equivalent greenhouse gas) released into the atmosphere from a country's all activities is balanced by an equivalent amount of CO₂ being removed from the atmosphere.



162 nations

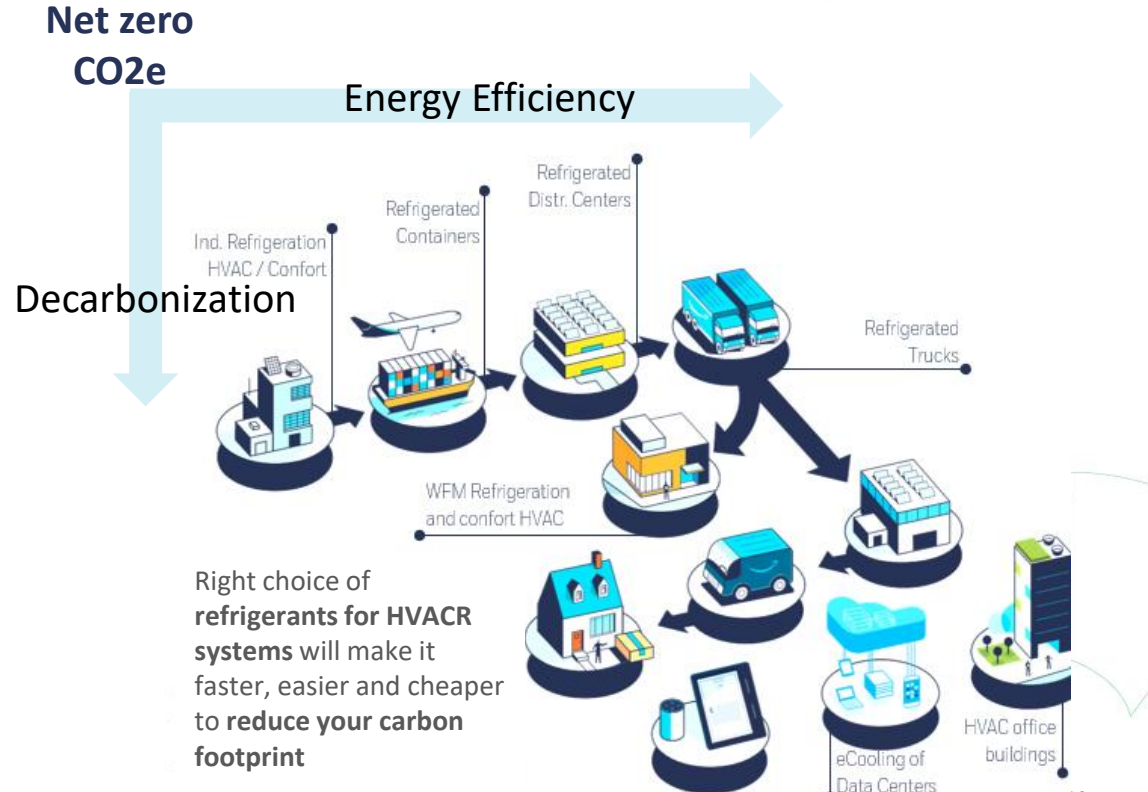
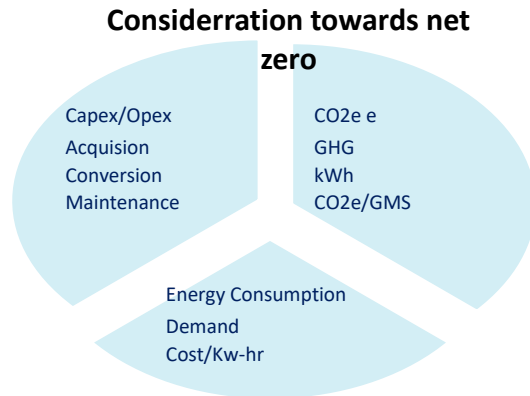
have actual or intended
Net Zero targets to be
achieved before 2050



Refrigerants & CO2e



A carbon dioxide equivalent or **CO2 equivalent (CO2e)** is a measure used to compare the emissions from various **greenhouse gases** based on their **global-warming potential (GWP)**, by converting their GWP to the equivalent amount of carbon dioxide.



Choice of Right Refrigerant is key to Decarbonization & Renewable Roadmap!

Kigali Phase-down Schedule



Oct. 2016, the parties to the Montreal Protocol amended the treaty to add a schedule for global phasedown of HFCs called the Kigali Amendment (b/c it was agreed to in Kigali, Rwanda)

The Kigali Amendment does not automatically take effect in party countries.

Party countries must “ratify” the amendment by following their own domestic approval processes.

Already ratified by
85+ countries!

	A5 Group 1	A5 Group 2	A2	EU F-gas Regulation
Baseline	2020-2022	2024-2026	2011-2013	2009-2012
Formula	Average HFC consumption	Average HFC consumption	Average HFC consumption	EU average HFC consumption
HCFC	65% baseline	65% baseline	15% baseline*	
Freeze	2024	2028	-	2015
1 st step	2029 – 10%	2032 – 10%	2019 – 10%	2018 -2020 – 37%
2 nd step	2035 – 30%	2037 – 20%	2024 – 40%	2021 -2023 –55%
3 rd step	2040 – 50%	2042 – 30%	2029 – 70%	2024-2026 – 69%
4 th step			2034 – 80%	2027-2029 – 76%
Plateau	2045 – 80%	2047 – 85%	2036 – 85%	2030 – 79%

Saudi Arabia, UAE and other GCC countries are grouped under **A5 Group2**

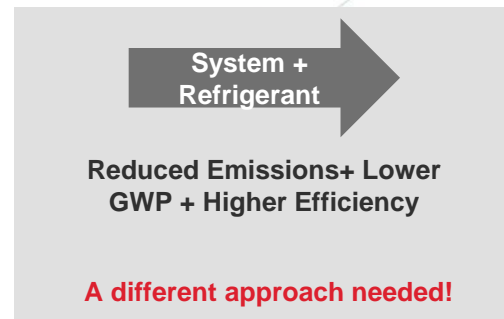
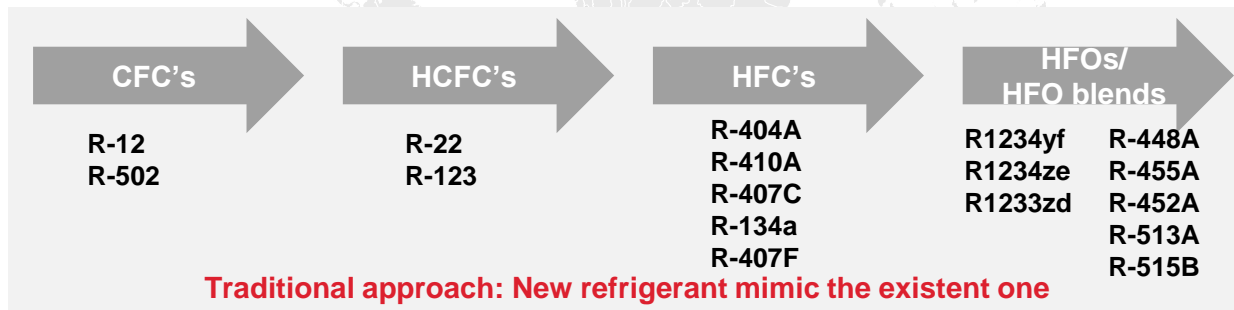
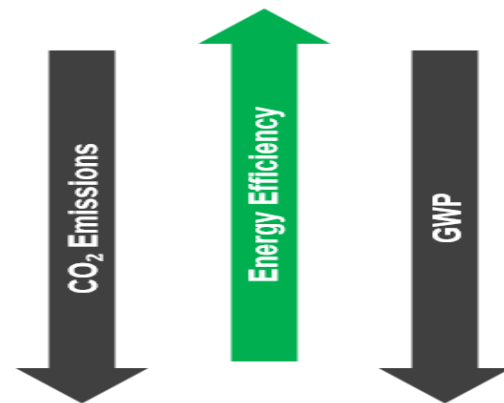
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A5 Group2 countries to set up HFC consumption baseline in 2024-26. Freeze from 2028

GLOBAL DRIVERS FOR REFRIGERANT CHANGE



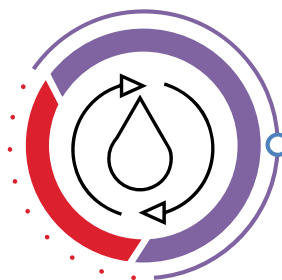
- **Regulations** → Driven by Environmental Demand. Net zero commitments
- **Economics** → Driven by End-Users / Competition
- **Next Best Thing** → Driven by Industry / Progress / Technology
- **Market Dynamics** → Driven by changing consumer buying habits
- **Safety** → Driven by need to Maintain / Improve workplace



UDI

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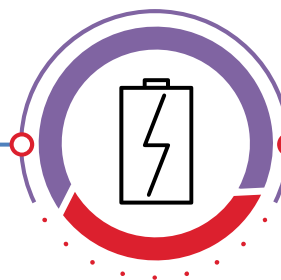
HONEYWELL SUSTAINABLE TECHNOLOGY SOLUTIONS



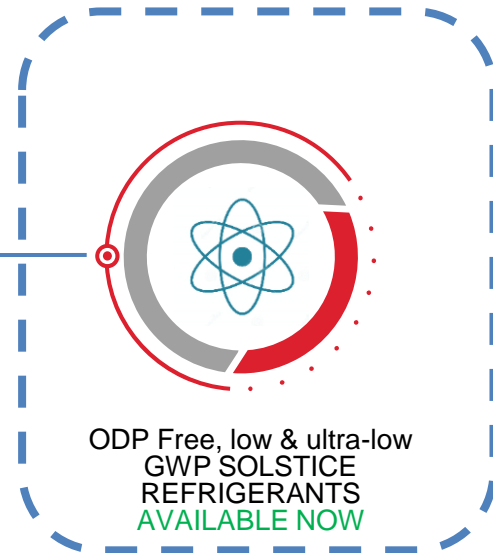
RENEWABLES
FUEL
AVAILABLE NOW



PLASTICS
CIRCULARITY
TECHNOLOGIES
AVAILABLE NOW



Building Energy
Management Systems
(e.g., Data Centers)
AVAILABLE NOW



ODP Free, low & ultra-low
GWP SOLSTICE
REFRIGERANTS
AVAILABLE NOW

COMMITTED TO COMMERCIALIZATION OF SUSTAINABLE TECHNOLOGIES

HFO Molecules



Solstice[®] yf
(R1234yf)



- GWP = 1
- Lifetime: 11 days
- Mildly flammable
- A2L
- Commercially available



Solstice[®] ze
(R1234ze)



- GWP = 1
- Lifetime: 18 days
- Mildly flammable (>30°C)
- A2L
- Commercially available



Solstice[®] zd
(R1233zd)



- GWP = 1
- Lifetime: 40 days
- Non-flammable
- A1
- Commercially available








The building block for reduced CO₂e HVACR systems

Honeywell's Climate Friendly Refrigerants

Solstice® for various applications



	Segments	Honeywell offering	Efficiency	GWP	Flammability	High Ambt performance
	Commercial buildings using chillers, rooftops	Solstice® 1234ze	●	●	●	●
		Solstice® N15 (R-515B)	●	●	●	●
		Solstice® 1233zd	●	●	●	●
	Industrial	Solstice® 1234ze Solstice® N15 (R-515B)	●	●	●	●
	Retail, Supermarkets	Solstice® N40 (R-448A)	●	●	●	●
		Solstice® L40X (R-455A)	●	●	●	●
	Datacenters (Rack/Chip cooling)	Solstice® EC 11 (R-1233zd) Solstice® EC 40 (R-515B)	●	●	●	●
		Solstice® EC 21 (R-1234ze)	●	●	●	●
		Solstice® N40 (R-448A) Solstice® N15 (R-515B)	●	●	●	●
	Transport	Solstice® L40X (R-455A) Solstice® 1234ze	●	●	●	●

Honeywell refrigerants are an integral part of Sustainable Technologies

Direct emissions: GWP (Scope 1)

Environmental Impact



Scope 1: Direct Emission



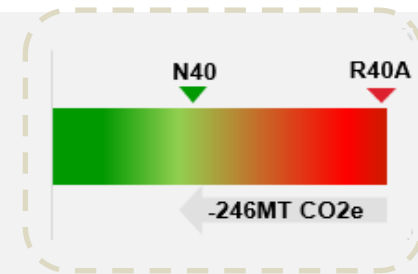
Area of Hypermarket	7000m2
Life of equipment	10yrs
System Charge	700kg
Leak Rate	10%

Annual Leakage	70kg
R404A GWP	10yrs
N40 GWP	700kg
Annual Emission avoided	Annual Leakage * GWP (R404A -N40)
	=70*(3922-1387)
	=246MT CO2eq

CO2eqv Saving
Scope 1

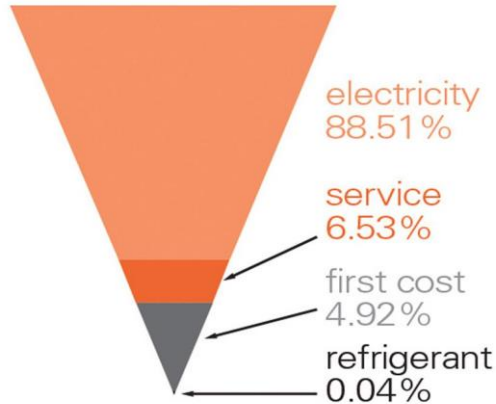


■ ~246MT CO2 abatement due to leak



indirect emissions: Performance Efficiency (Scope 2)

Chiller in High Ambient – Solstice 1234ze vs. R134a

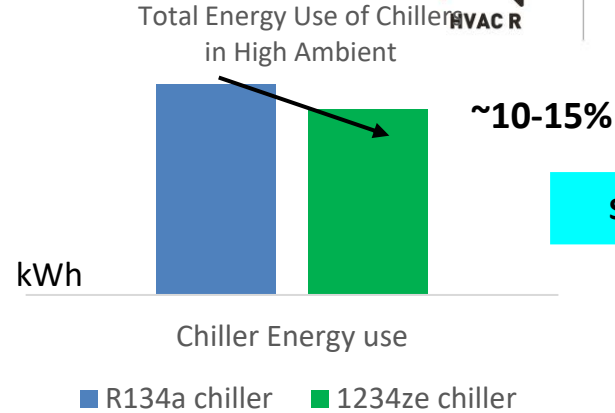


Operational Costs

95.04%

Equipment Costs

4.96%



Scope2 Emissions

Value Proposition of Solstice for UAE

- R1234ze provides 10-15% higher efficiency vs. R134a in high ambient conditions.
- In Saudi, about 70% of energy consumption in residential and Commercial & Public Services is AC related

Source: Trane website; DEWA Annual Statistics

Assumptions: Chiller Lifecycle: 15 years, Cost of Electricity/kWh: €0.13, Annual chiller operation: 6132 hours, Extra investment for ze chiller vs 134a chiller: +20%, 1 MW = 3.41MM BTU

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ENERGY SAVINGS IN A SUPERMARKET

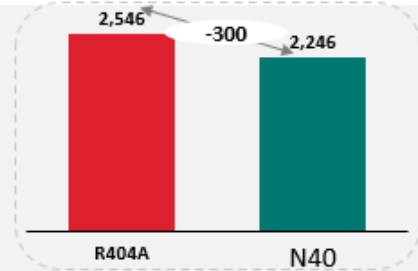


Area of Hypermarket	7000m2
Life of equipment	10yrs
System Charge	700kg
Leak Rate	10%
MT system	
Capacity	400KW
Tevap/subcooling/superheat	-10C/0C/10K
LT system	
Capacity	65KW
Tevap/subcooling/superheat	-35C/5C/10K

Energy Saving
(MWhr/yr)



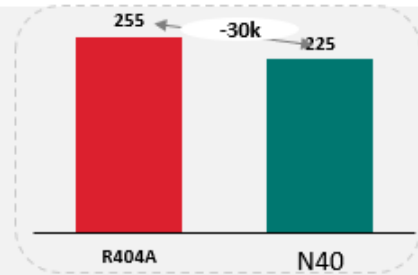
- **300MWhr/year** of energy saving at the grid
- Equivalent barrels of oil saved per year



Operating Cost Reduction
(\$K/yr)



- **\$30K/ year** of Electricity Bill Saving
- Bottomline enhancement

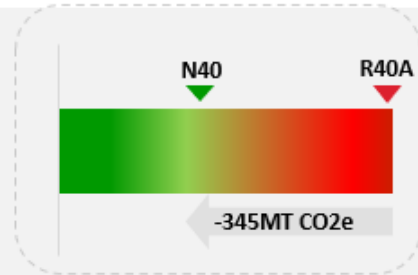


	R404A	N40	Savings
Energy Consumed kWh/year	2547627	2246794	300,833 (11%)

CO2eqv Saving
(Scope 2)



- **~160MT of CO2 removed from Grid (Scope 2)**



Value Investment: Decision Tools



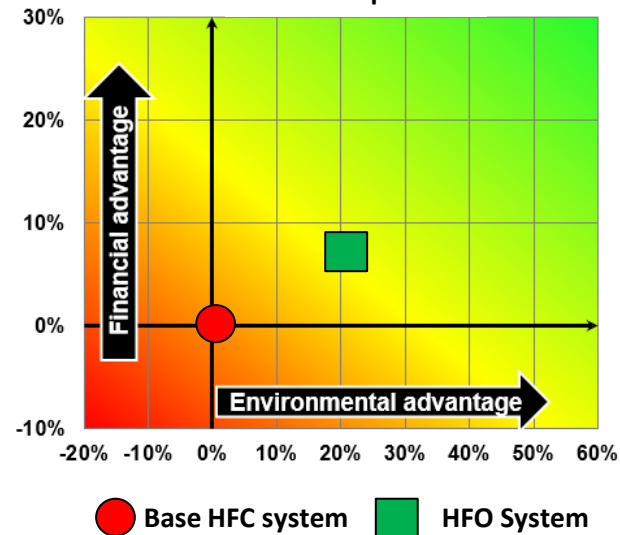
The Eco-Efficiency Decision-Making Model

- The Eco-Efficiency concept allows to compare refrigeration systems in terms of environmental impact, and in terms of Total Cost of Ownership (TCO).
- Honeywell's Eco-Efficiency model: Powerful decision-making tool, validated by the independent institute Cemafruid.
- It shows which type of solution offers the lowest environmental impact at the lowest possible TCO and highlights the sensitivity of the results w.r.t. The development of specific parameters

The Sustainability Calculator

- It uses the results of Eco-Efficiency simulations to evaluate the total accumulated costs, emissions and electricity consumption of a complete asset portfolio over a certain time period.
- The objective is to show how retail chains can reach their sustainability goals faster and at lower cost by transitioning their assets to Solstice® retrofit & new build solutions.

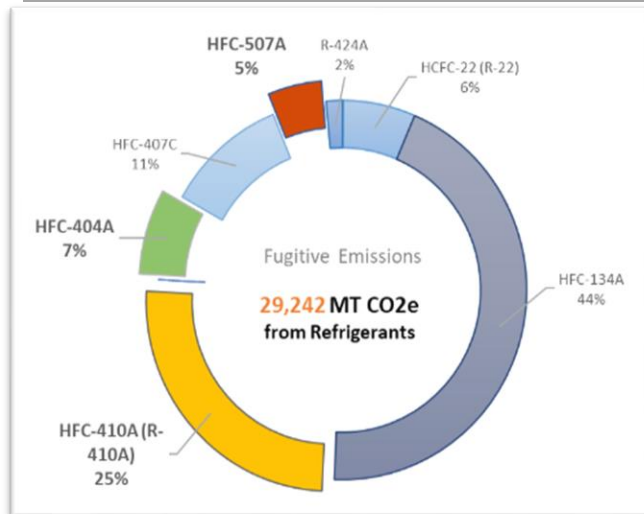
Example



Example: A Global digital infrastructure provider



Carbon footprint of customer's HVACR operation



Refrigerant	Share	Emission	GWP	Leakage (kg)
R424A	2%	585	2,440	240
R507A	5%	1,462	3,985	367
R22	6%	1,755	1,760	997
R404A	7%	2,047	3,943	519
R407C	11%	3,217	1,774	1,813
R410A	25%	7,311	1,924	3,800
R134a	44%	12,866	1,300	9,897
Total	100%	29,242 Mt CO ₂ e		

Potential To Reduce 99% of CO2e

by adopting Solstice® refrigerants



Refrigerant	Share	Emission (Mt CO2e)	GWP	Leakage (kg)	RETROFITS			NEW EQUIP.		
					Solution	GWP	CO2e	Solution	GWP	CO2e
R424A	2%	585	2,440	240	R448A ¹	1,273	305	R455A	146	35
R507A	5%	1,462	3,985	367	R448A ¹	1,273	467	R455A	146	54
R22	6%	1,755	1,760	997	R448A ¹	1,273	1,269	R455A	146	146
R404A	7%	2,047	3,943	519	R448A ¹	1,273	661	R455A	146	76
R407C	11%	3,217	1,774	1,813	R448A ¹	1,273	2,308	R1234ze	1	2
R410A	25%	7,311	1,924	3,800	R410A ²	1,924	7,934	N41/R466 ³ R1234ze	1	4
R134a	44%	12,866	1,300	9,897	R513A ¹	573	5,671	R1234ze	1	10
Total	100%	29,242			18,615Mt CO2e (-36%)			325Mt CO2e(-99%)		

1. Check system specifications

2. N41/R466A is under field trials with Trane (Starbucks, UHaul)

3. N41/R466A is under OEM approvals

Installed amount of each refrigerant?

Diesel+Gas heating system > R1234ze based Heat Pump + Renewable Energy = 0 Mt CO2e

CO2e Credit Value: ~\$50/Mt

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HFO Environmental benefits



Global Warming Potential



**67%
Reduction**

- N40 has <1/3 GWP than R404A
- Existing HFC refrigerants have 1400-4000 GWP

Energy Efficiency



**5-15%
Higher**

- 5-15% lesser electricity consumption
- Reduced operational costs

Total Emission Reduction



**Reduction in
all 3 scopes**

Scope 1

Refrigerant
Leaks

Company
Vehicles

Scope 2

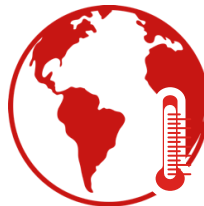
Electricity
consumption:
Emissions
at grid

Scope 3

Investment

Logistics and
distribution

Impact of HFO to-date



- The use of Solstice® HFO helped avoid the release of **263 Million tons of CO₂e**
- That's equivalent to:



Carbon sequestered by 343 Million acres forest.



The CO₂ emissions 610 Million barrels of Oil



Removing 57.0 Million cars from the road



Removing emissions from 30.3 Million homes

Honeywell HFO Projects in Region



Emaar Creek Harbor



National Food Production –
KIZAD



Deira Night Market



Pal Technology – Shams



Tiara Towers



Emaar Nshama Town



Empower Various Projects



Empower Business Bay



Empower Tecom



Empower IMPZ



Wafi Mall Extension



MAF- Carrefour



Organic
Supermarket



Pure Harvest

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Summary



- Plan your business's transition towards sustainable operations
- Reduced emissions can be achieved together with reducing the cost of operation through energy efficiency of HVACR systems
- Sustainable Low GWP Refrigerant solutions are available from Honeywell for your HVACR systems

MEET US AT BIG5

Meet Honeywell's Experts at Booth #4A71
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THANK YOU

