



“The lowest energy consumption when using R290 LBP fixed speed compressors in a plug in ice cream conservator”

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HUAYI COMPRESSOR BARCELONA, S.L

The Product

Hermetic Compressors and Condensing units for Light Commercial Refrigeration

- For all types of applications
- High Efficiency Compressors
- Variable Speed Compressors
- DC Compressors
- Green Cooling Ranges

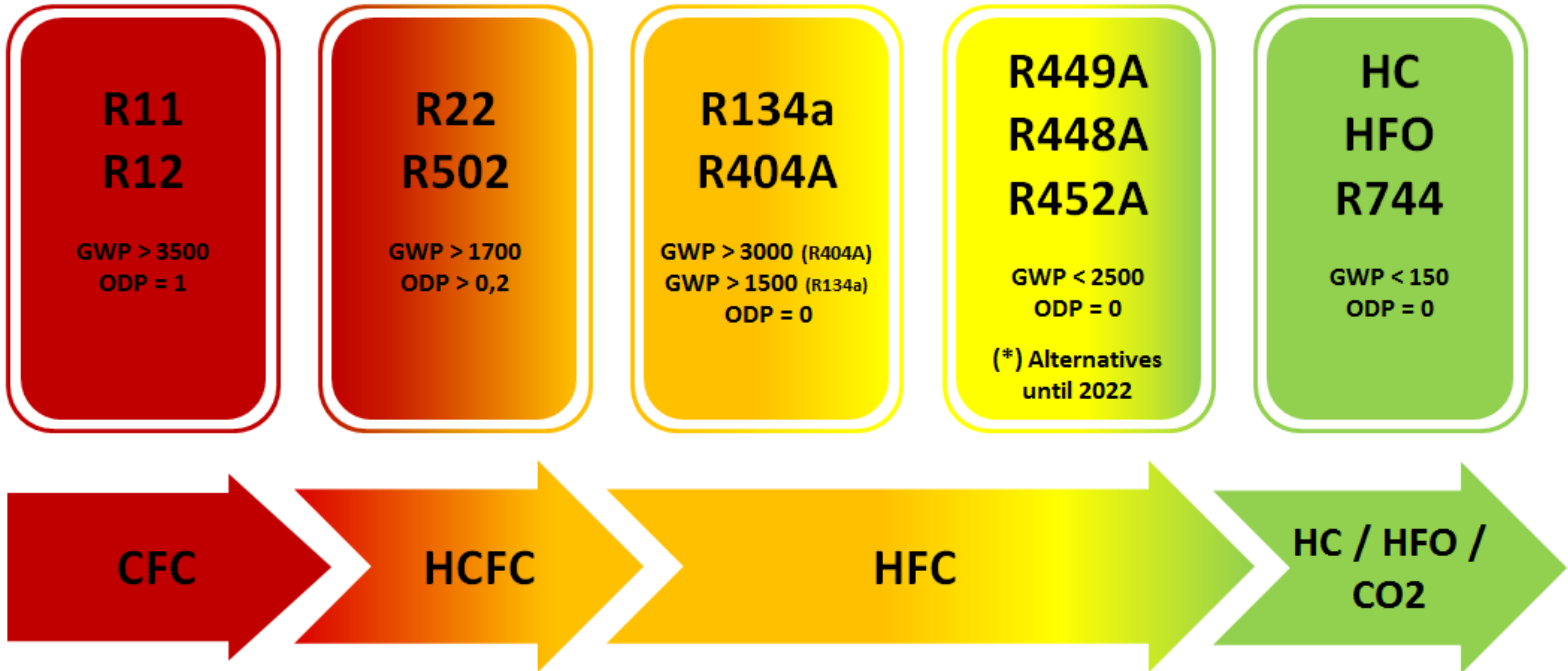
The advanced design of the Green Cooling Ranges allows:

- Efficiency improvement (up to 50% compared to standard versions).
- Lower CO2 emissions to the atmosphere.
- Use of natural refrigerants as R290 with no direct effect on global warming.
- Additional COP improvement because of moving from HFCs to HCs.



Efficiency
improvement
up to
50%





EPA SNAP Policy

From 2015, 4HC's approved:

- R600a and R441A
- R600a, R290 and R441A
- R290 and R441A
- R170
- R290

SNAP De-listing HFC's:

- High GWP HFC's
(R404A and R134a)

Stand alone commercial refrigerators and freezers.

Vending Machines

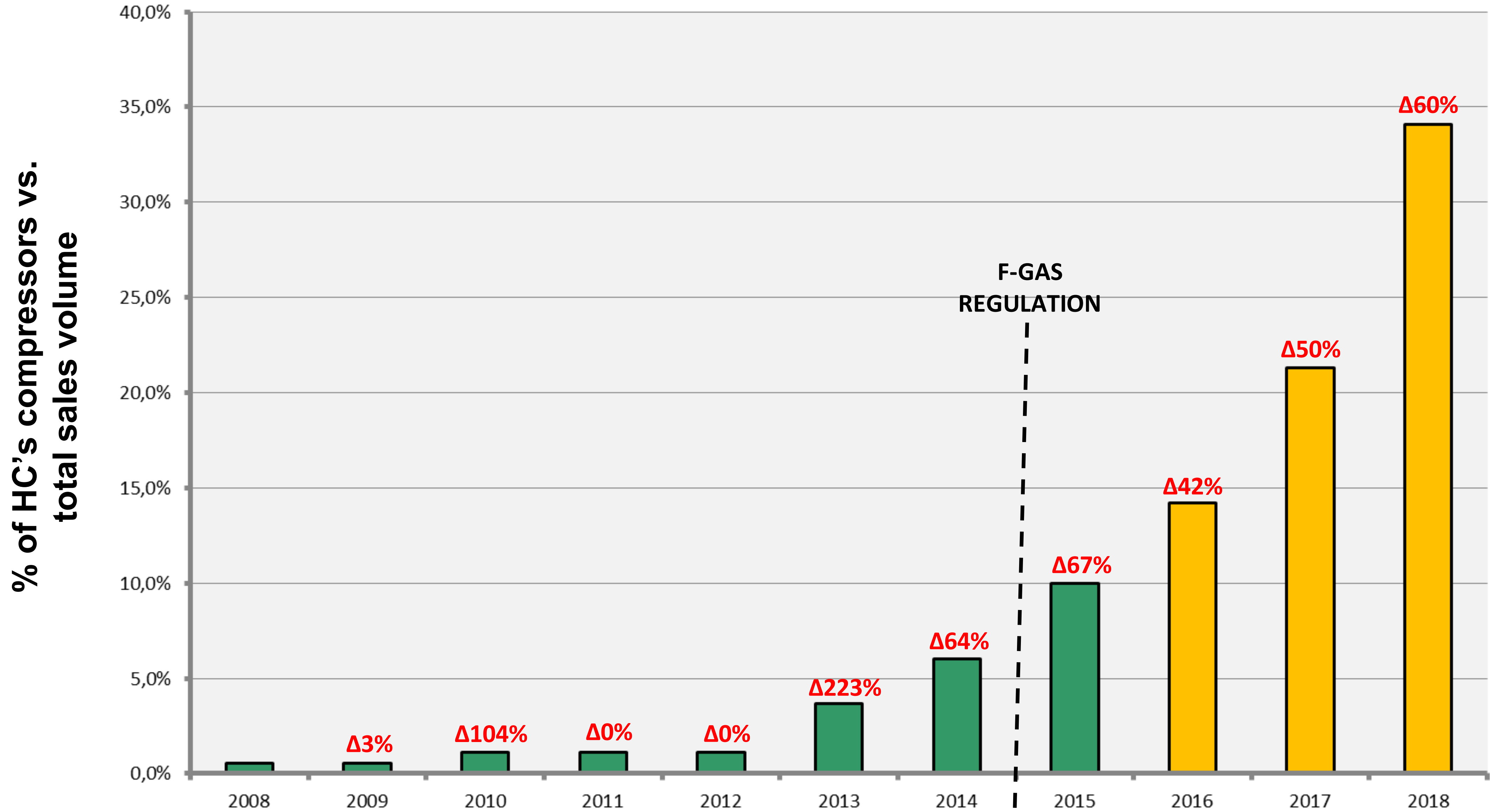
Residential and light commercial AC and Heat Pumps

Very low temperature and heat transfer

Household refrigeration

2019/2020 for stand-alone units





Objective of the Study

The objective of the study is to reduce the energy consumption on a ice cream conservator using a High efficiency R290 LBP fixed speed compressor.

Methodology

- *The Compressor: NUT60LR*
- *The appliance*
- *Test results*
- *Main advantages*
- *Conclusions*

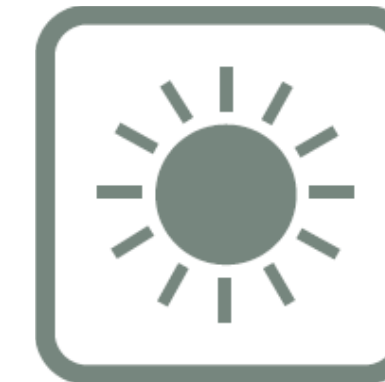
Why Propane?



SUSTAINABLE COOLING



NATURAL REFRIGERANT



LOW ENERGY CONSUMPTION

Top efficiency fixed speed compressor NUT60LRb

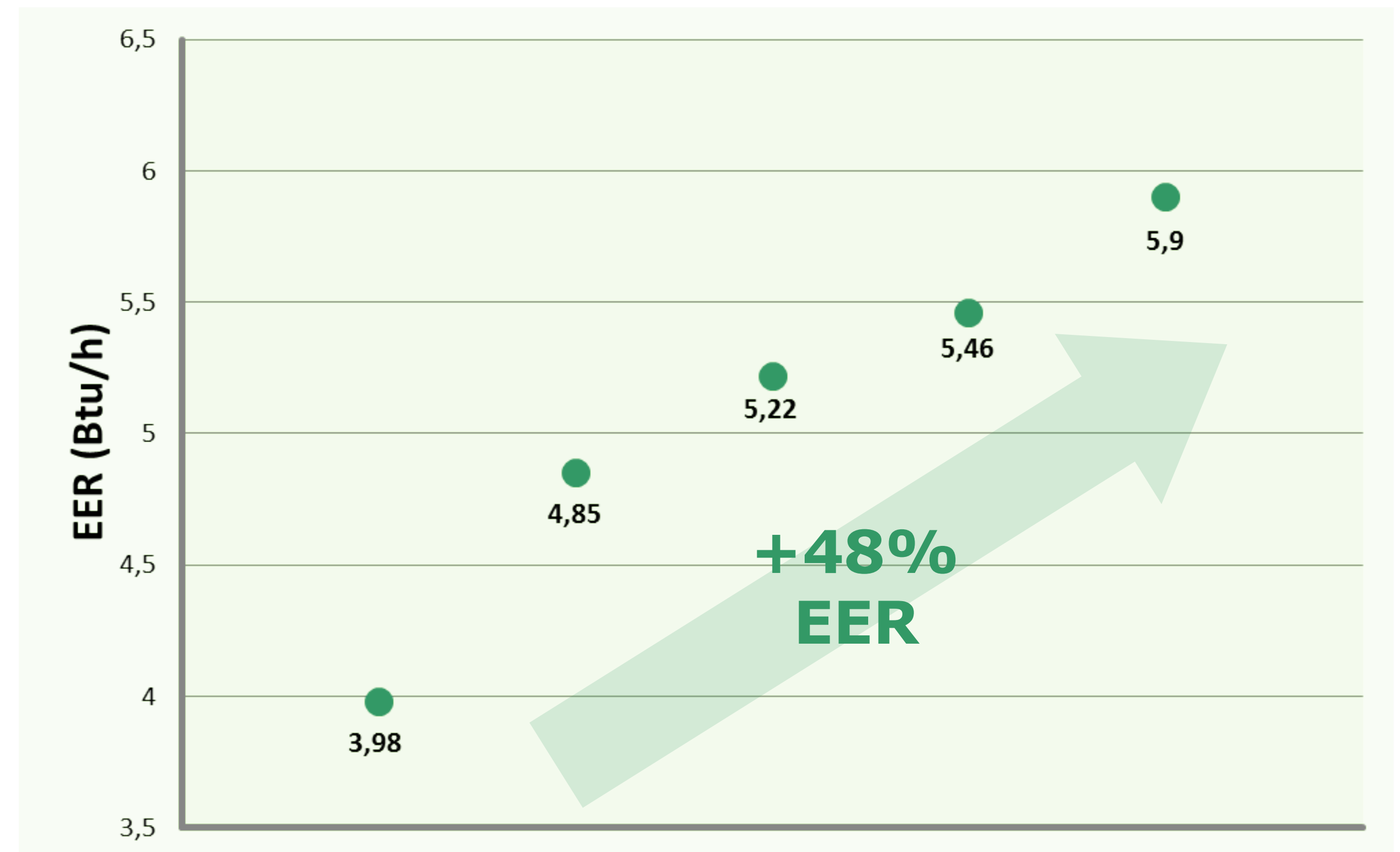
The new U Range offers to the market the most efficient compressors in its series.

This U Range has been designed using the most advanced technologies to minimize the energy consumption while offering a high cooling capacity.

Model	Displacement (inch ³)	Capacity (Btu/h)	EER (Btu/Wh)	Motor
NL60FR	0,359	933	3,89	CSIR
NLY60LRa	0,359	1190	4,85	CSIR
NLY60LRb	0,359	1190	5,22	CSR
NUT60LRa	0,366	1250	5,46	CSIR
NUT60LRb	0,366	1250	5,90	CSR

ASHRAE32 conditions

Voltage range: 115-127V 60Hz



Tested appliance main characteristics

Application Characteristics and Test Conditions	
Type of cabinet	Ice cream conservator
Refrigerant	R290
Internal net volume	245 Liters
Cabinet load	Fully loaded
Ambient temperature / RH	86°F / 55%
Average internal temperature	-0,4°F

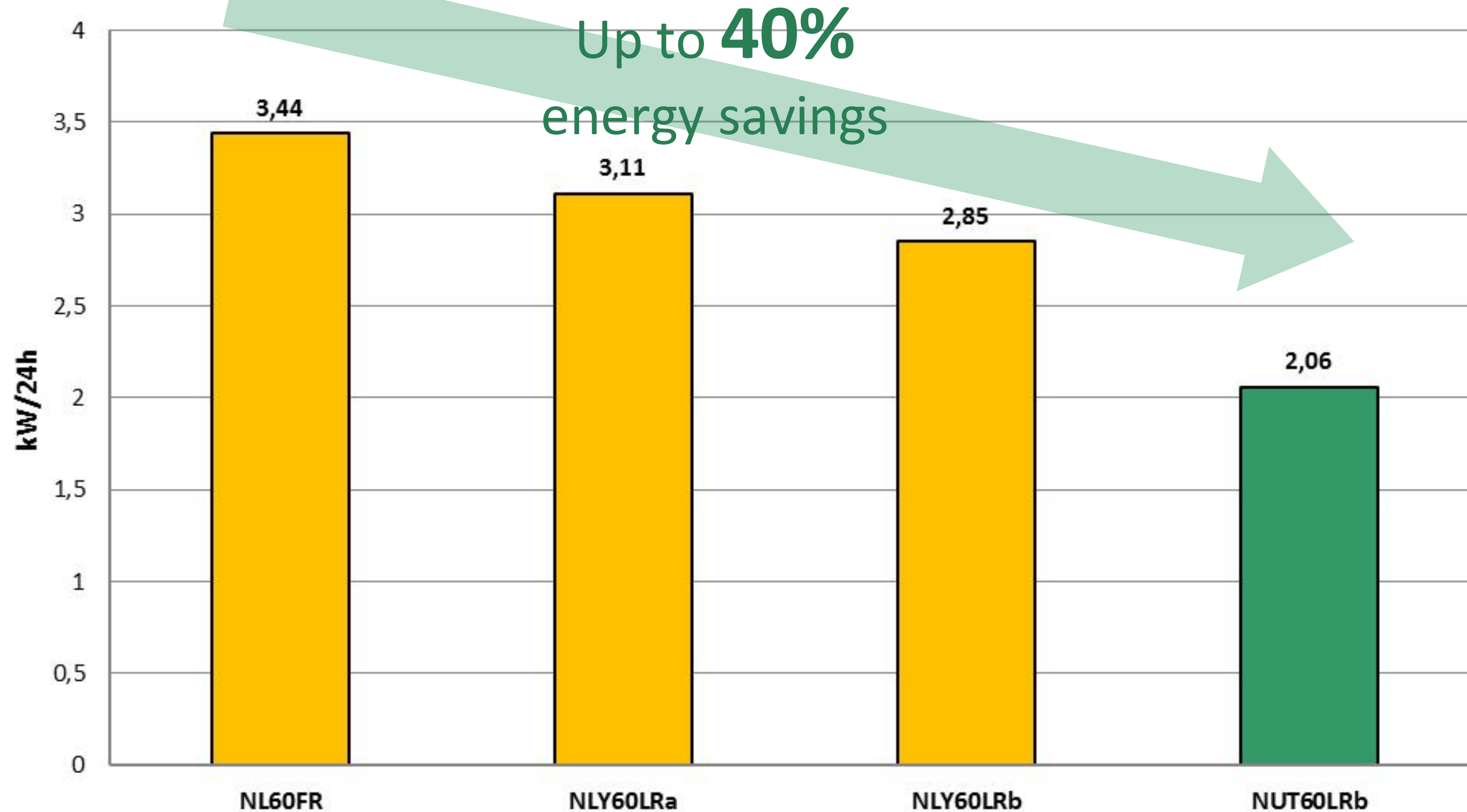


Test Results

Data	NL60FR	NLY60LRa	NLY60LRb	NUT60LRb
Evaporating temperature (°F)	-30,8	-30,4	-29,8	-31
Condensing temperature (°F)	102,2	103,1	103,6	102,9
Inlet cabinet temperature (°F)	-1,48	-1,31	-1,35	-1,32
Duty cycle (%)	82,3%	80,9%	81,1%	79,60%
Energy consumption (kW·h/24h)	3,44	3,11	2,85	2,06
Energy consumption difference vs cabinet with New U compressor	-	-9,75%	-17,20%	-40,04%

Up to **40%**
 energy savings

Tested Results



Accumulated in 5 years				
Data	NL60FR	NLY60LRa	NLY60LRb	NUT60LRb
Total energy consumption (kWh)	6278	5676	5201	3760
Total energy consumption savings vs std (kWh)	-	602	1077	2518
Total energy cost savings (US\$) (*)	-	-78,86	-141,09	-329,86
Savings per day vs std (US\$)	-	-0,04	-0,08	-0,18
CO2 emissions (kg CO2) (***)	2825	2554	2340	1692
CO2 emissions reduction vs std (kg CO2) (***)	-	-270,90	-484,65	-1.133,10
(*) 0,131 \$/kWh average energy cost in USA				
(***) Supposing 0,45kg CO2 emissions for each kWh				

R290 advantages vs other alternative gas refrigerants for light commercial Refrigeration:

- R290 one of the best environment friendly alternatives (excellent GWP).
- R290 already EPA SNAP approved: Global refrigerant solution.
- R290 applied in the most efficient appliances produced in Europe from last years with very positive results with million units running.
- R290 systems do not requires significant changes vs current HFC's and vs other ecological alternatives (CO₂) (Reasonable working pressures).
- R290 allows the use of lower displacement compressors vs R134a and R1234yf to get equivalent cooling capacity.
- Weak point of R290 is the limitation of 150 g charge per circuit (which cover most of light commercial appliances charge). Restriction under discussion to extend the maximum charge but estimated to short-middle term.



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by Vicente Guilabert - Huayi Compressor Barcelona

Thank you very much!