

 **ATMO**
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“The lowest energy consumption when using propane LBP fixed speed compressors in a light commercial refrigeration freezer”

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Huayi Compressor Barcelona, S.L.

Under the umbrella of Huayi Group, Huayi Compressor Barcelona (HCB) is dedicated to design, manufacture, sell and distribution of compressors and condensing units for the **light commercial refrigeration market** worldwide with its brand Cubigel Compressors:

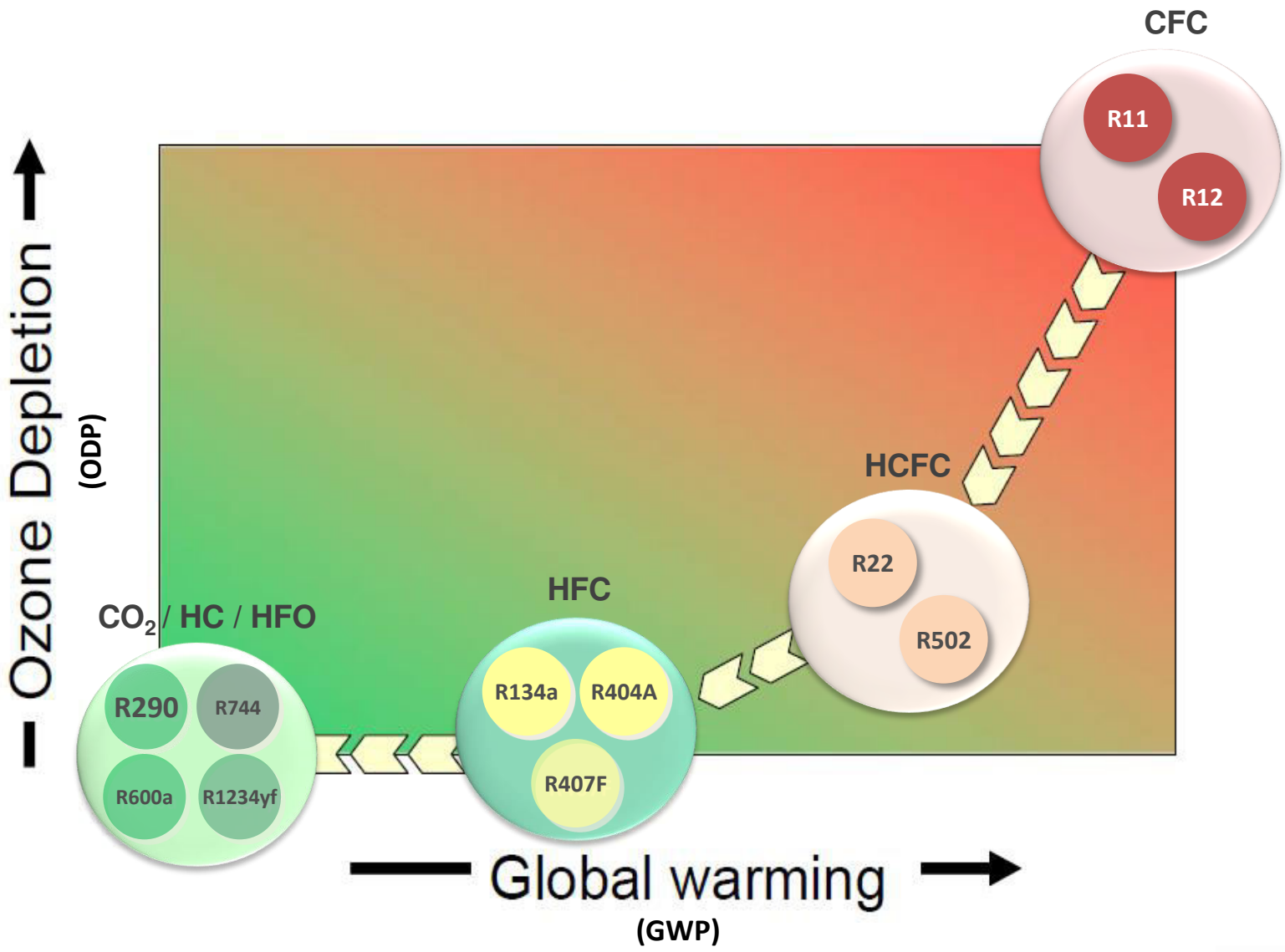


The company has consolidated as a leading manufacturer of commercial Refrigeration Compressors with more than 50 years of experience developing compressors and satisfying the market refrigeration needs in terms of:

- Advanced and efficient products
- Leading innovation
- Extensive and efficient product ranges
- Environmental friendly products
- Technical assistance
- Logistics Support

Cubigel Compressors are produced in Europe, with innovative R&D oriented to develop quality product design, focused to offer a wide range of products suitable to the market requirements.





▽ ENERGY CONSUMPTION

Past

Refrigerant		Efficiency Level				Remarks
		Standard	Medium	High	TOP	
			Capacitor Optional Range			
HFC	R134a	GL90TB CSIR 680 / 2,20	GLY80RAa CSIR 700 / 2,50	GLY80RA CSR (*) 700 / 2,71	GLT99FSN ECM 734 / 2,92	Cpr. model Motor type kcal/h W/W
	R404A	ML60TB CSIR 700 / 1,85	MLY60RAa CSIR 825 / 2,15	MLY60RAb CSR 825 / 2,36	MLT60FSN ECM Not developed	Cpr. model Motor type kcal/h W/W
HC	R600a		HPY14RAa CSIR 685 / 2,43	HPY14RAb CSR 685 / 2,66	HPT14FSN ECM 685 / 2,77	Cpr. model Motor type kcal/h W/W
	R290	NL60TB CSIR 620 / 2,40	NLY60RAa CSIR 720 / 2,59	NLY60RAb CSR 720 / 2,79	NLT60FSN ECM 683 / 3,07	Cpr. model Motor type kcal/h W/W

Current HMBP offer and development possibilities in the range of 680 kcal/h (AHSRAE)

▽ IMPACT ON ENVIRONMENT

Future

(*) Uses Intensity relay + NTC resistor

Objective of the Study

The objective of the study is to reduce the energy consumption of an ice cream conservator using the most efficient R290 LBP compressor solution.

Methodology

- The Compressor: New U range
- The appliance
- Test results
- Main advantages
- Conclusions

The most efficient Compact size Extremely silent Green Cooling

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.

Thanks to its new shell, more compact and rounded, the U range offers a very low noise level.

Nowadays, the U Ranges offers R290 models NUT55CA, NUT60CA, NUT70CA, to be extended in the future to other refrigerants and applications.

R290 LBP COMPRESSORS EVOLUTION

Model	Displacement (cm ³)	Capacity (kcal/h)	COP (W/W)	Motor	Voltage / Frequency
NL60FB	5,98	200	1,1	CSIR	220-240V 50Hz
NLY60LAa	5,98	230	1,33	CSIR	220-240V 50Hz
NLY60CAb	5,98	230	1,42	RSCR	220-240V 50Hz
NUT60CAb	6	261	1,8	RSCR	220-240V 50Hz
2nd best in the market	6,09	259	1,76	RSCR	220-240V 50Hz

ASHRAE LBP Conditions

Evaporating temp.	-23,3°C
Condensing temp.	55°C
Liquid temp.	32°C
Suction temp.	32°C
Ambient temp.	32°C



Completely
Silent



Minimum
size

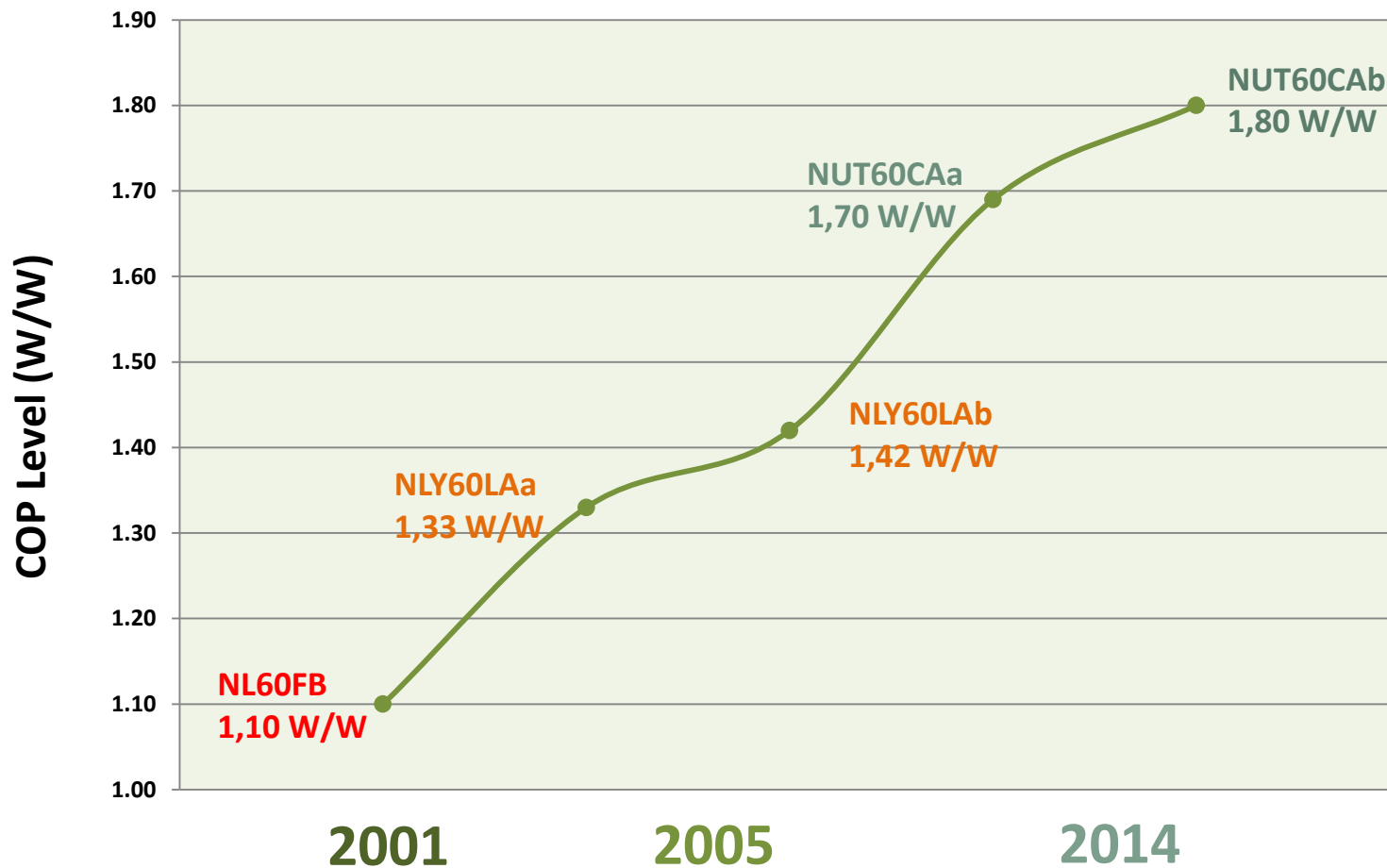


Maximum
Effi. ciency



green cooling

+64%
Since 2001



TESTED APPLIANCE MAIN CHARACTERISTICS

Application Characteristic and Test Conditions	
Application Type	Ice cream conservator
Internal Net Volume (l)	245
Power Supply (V/Hz)	230 / 50
Cabinet Load (kg)	165
Climatic Class	7
Ambient Temperature and Humidity (°C / %)	30 / 55
Average Internal Temperature (°C)	-18



TESTED COMPRESSORS MAIN PERFORMANCES

Compressor Data	NLY60CAb	2nd best in the market	NUT60CAb
Cooling Capacity (kcal/h)	230	259	261
COP (W/W)	1,42	1,76	1,80
COP increase (%)	-	24%	27%

ASHRAE LBP Conditions:

Evaporation Temperature = -23,3°C

Condensing Temperature = 54,4°C

Ambient Temperature = 32°C

Return gas = 32°C

Liquid Temperature = 32°C

APPLIANCE TEST RESULTS

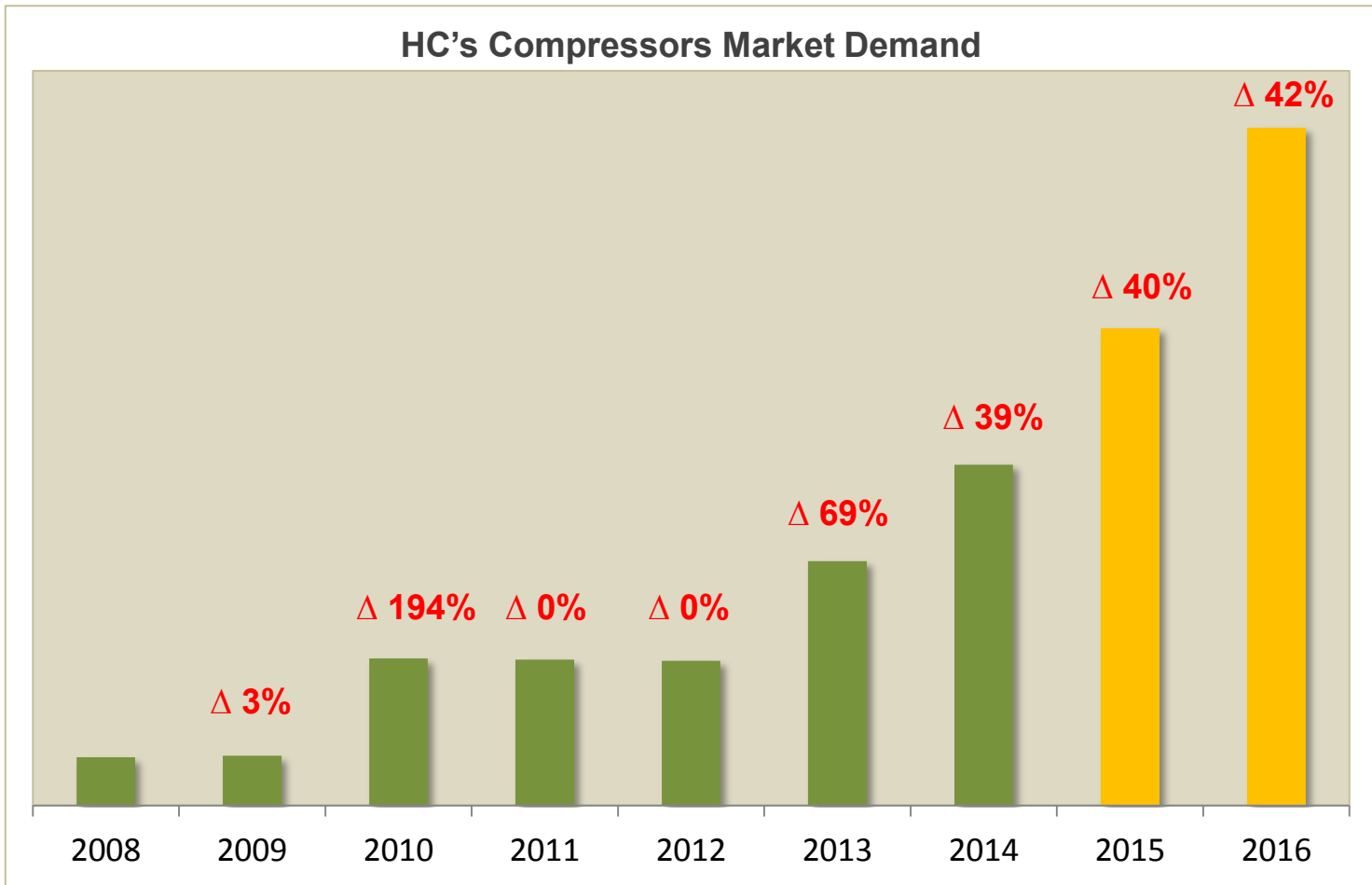
Data	NLY60CAb	2nd best in the market	NUT60CAb
Evaporating temperature (°C)	-34,3°C	-35,3°C	-35°C
Condensing temperature (°C)	39,8°C	39,6°C	39,4°C
Inlet cabinet temperature (°C)	-18,1°C	-18,2°C	-18,1°C
Duty cycle (%)	82,3%	75,2%	77,30%
Energy consumption (kWh/24h)	3,232 kWh/24h	2,711 kWh/24h	2,552 kWh/24h
Energy consumption difference vs cabinet with New U compressor	+ 26,64%	+ 6,23%	-

MAIN ADVANTAGES

Acumulated data in 5 years	NLY60CAb	Best Competitor Model	NUT60CAb
Total energy consumption (kWh)	5898	4948	4657
Total energy consumption savings vs std (kWh)	-	951	1241
Total energy cost savings (*)	-	93,18 €	121,62 €
CO2 emissions (kg CO2) (***)	2654	2226	2096
CO2 emissions reduction vs std (kg CO2)	-	428	558

(*) 0,098€/kWh average energy cost

(***) Supposing 0,45kg CO2 emissions for each kWh



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



- 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 middle term.



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Thank you very much!