



NEMOX®
PROFESSIONAL CLASS

Nemox welcomes you and thanks you for attending this workshop. We hope that the topics discussed will meet everyone's interest.
We will do our best not to bore you!





WHERE IS NEMOX

Nemox International s.r.l. is located in Pontevico, Brescia. The factory is as close as 400 m. to the exit Pontevico on the A21 highway.

WHO IS NEMOX:

- 30 employees
- Turnover range 4 and 6 million euros
- 90% export to over 60 countries
- The company is certified ISO 9001: 2015 since 1994
- Nemox is the only company left to produce home ice cream machines in Europe.
- Nemox is specialized in manufacturing gelato, ice cream machines and compact show cases for the Ho.Re.Ca. market.



SINCE 1986 NEMOX MANUFACTURED OVER 6,5 MILION GELATO, ICE CREAM MACHINES.

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PROGETTO LIFE 18 CCM IT 001106 ICEGREEN

The gas used in refrigeration systems contribute extensively to global warming and climate change.

**Global warming
is responsible for
climate change.**



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Global warming - Climate changes

Source.

The Intergovernmental Study
Group on Climate Change

**How Global warming changed
over the last 100 years**

Since 1860

CO2	+ 40%
TEMPERATURE	+ 0,6 °C
SEAS LEVEL	+ 10 - 25 cm

EXPECTED IN 2100

- CO2 concentration will double
- Temperature: to increase up to +4,8 °C
- Seas level to increase 15 to 95cm
- use of fossil fuels.
- Deforestation.
- Agriculture.
- industry, transport, electricity production

**In which way is man
responsible for climate change**



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Global warming - Climate changes

Causes of Global Warming

1. Ozone hole

The Earth is protected, 30 kilometers from its surface, by a layer of ozone that absorbs high energy ultraviolet radiation, dangerous for the health of living organisms and not because it is able to modify DNA.

Some industrial chemical compounds such as chlorofluorocarbons (CFCs), freed from refrigerators, spray cans and industrial plants, have affected this protective layer causing a real hole at the Antarctic. Ozone thus loses its ability to absorb and reflect ultraviolet radiation which, in this way they manage to cross the stratosphere and in addition to being dangerous to human health, also cause global warming.

2. Greenhouse gas

The greenhouse effect indicates the natural phenomenon that ensures the heating of the earth thanks to the gases present in the atmosphere such as carbon dioxide, ozone, nitrogen peroxide, water vapor and methane. Without the greenhouse effect, the planet's temperature could be 30°C. colder.

However, in recent years, human activities have increased greenhouse gases, causing global warming.



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Global warming - Climate changes

Which are the greenhouse gases

- Water vapor product of various combustions.
- Carbon dioxide released when solid waste, fossil fuels (oil, petrol, natural gas and coal), wood are burned.
- Methane it is emitted during the production and transport of coal, natural gas and mineral oil; from the decomposition of organic matter in landfills and the normal biological activity of the nearly 2 billion cattle present on earth).
- Nitrogen dioxide is produced during agricultural and industrial activities, during the combustion of waste and fossil fuels.
- Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulfur hexafluoride (SF₆) are generated by different industrial processes, chlorofluorocarbons (CFCs) now banned.

How long do greenhouse gases last in the atmosphere?

Carbon dioxide persists for more than a century. The average life of methane is 11 years. Nitrogen peroxide (NO₂) and some CFCs can stay in the air for more than 100 years.

GWP is the specific global warming potential that corresponds to the ability to retain heat compared to the carbon dioxide to which the value 1 has been assigned.

20 times - methane

310 times - nitrous oxide

from 140 to 11,700 hydrofluorocarbons depending on the type;

from 4,000 to 12,000 CFCs

6300-12500 perfluorocarbons

23,900 sulfur hexafluoride

GWP
Ability to retain heat
from different
greenhouse gases.



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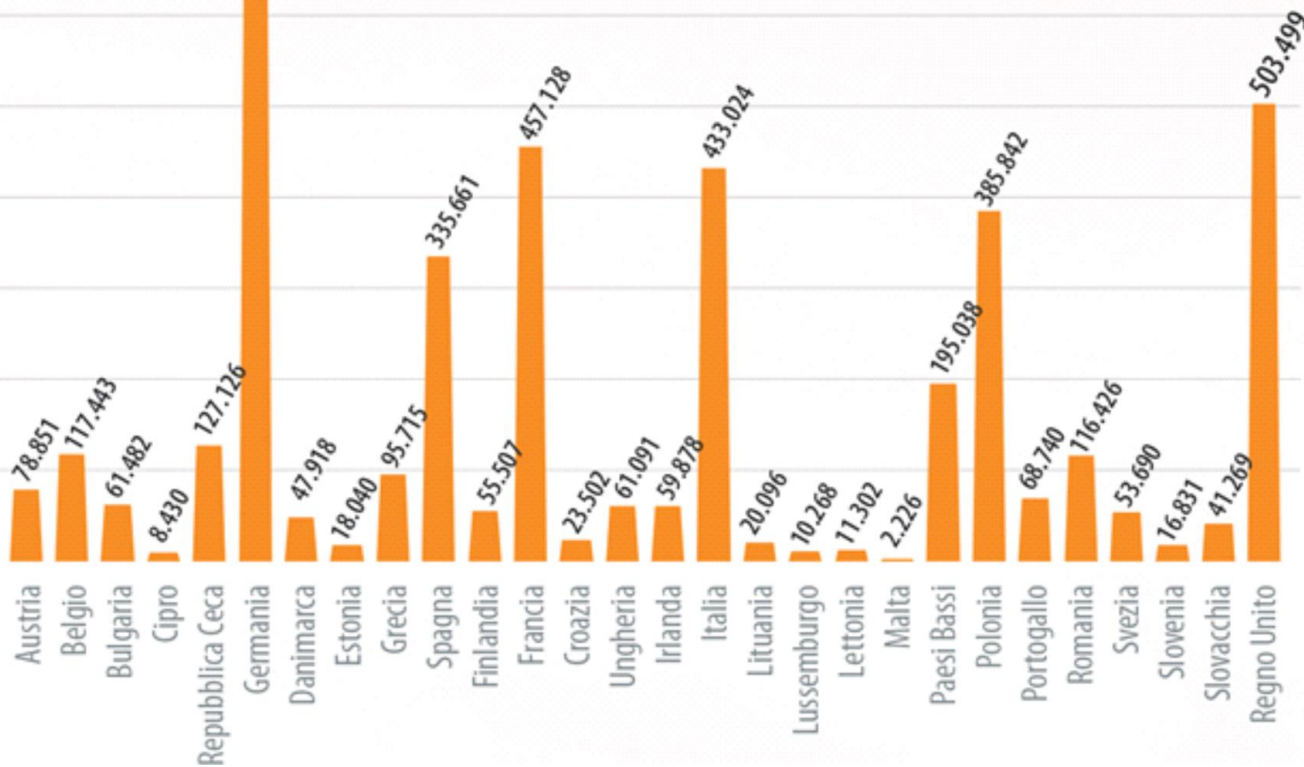
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4.451.813

Totale delle emissioni di gas serra per paese UE nel 2015

[equivalenza in chilotonnellate di CO₂]

Total greenhouse gas
emissions for EU
countries in 2015



*Tutti i settori esclusi uso del suolo, cambiamento dell'uso del suolo e silvicoltura

** CO₂, equivalente in CO₂ di N₂O, equivalente in CO₂ di NH₄, equivalente in CO₂ di idrofluorocarburi, equivalente in CO₂ di PCF, equivalente in CO₂ di SF₆, equivalente in CO₂ di NF₃

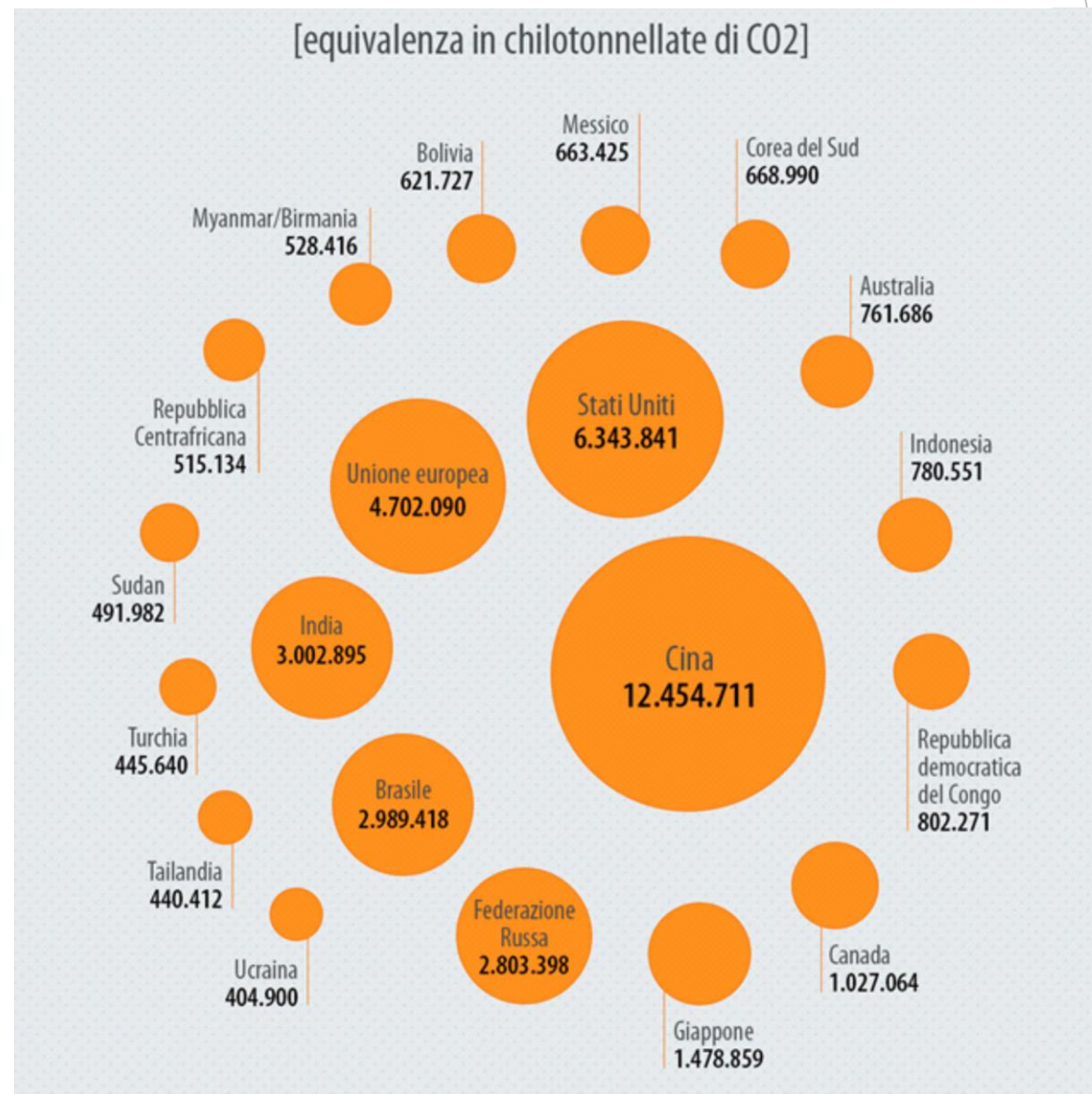
Fonte:
Agenzia europea dell'ambiente,
Eurostat



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**Which
countries
released
more
greenhouse
gases?**





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**Gases used in
refrigeration
systems**

**their
environmental
impact**

The gas used in refrigeration, today generally the hydrofluorocarbons HFC (such as R23, R134A, R404A, R407C, R410A, R507, R508A, R424, R428, R434, R417A, R422A, R422D, R423A, R437A) have a high impact on heating global.

- they have no ODP (Ozone Depletion Potential: damage to ozone).
- they have a high impact on global warming, hence a very high GWP.

Taking as an example the R404A gas, its GWP is equal to 3.922. Considering a car that normally emits 100g / km of CO₂, 1 kg of R404A dispersed in the atmosphere is equivalent to the emissions of a car that travels 40,000 km!



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F-gas regulation

**Europe intervened to regulate the use of fluorinated greenhouse gases with:
REGULATION (EU) No 517/2014 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL**

In summary, as regards our sector, the following has been established:

FOLLOWING THE ARTICLE 11, PARAGRAPH 1, IT WILL BE PROHIBITED TO TAKE TO THE MARKET:

From 1 January 2020

Fixed refrigeration equipment containing HFCs with global warming potential equal to or greater than 2 500, or whose operation depends on the aforementioned HFCs, with the exception of equipment designed to cool products at temperatures below -50° C.

From 1 January 2022

Commercial refrigerators and freezers (hermetically sealed equipment) containing HFCs with global warming potential equal to or greater than 150.

The year-over-year reduction in the proportion of fluorinated gases that can be placed on the market are regulated.

They are indicated for various categories of equipment, depending on the quantity of fluorinated gas loaded, checks to be carried out cyclically by specialized personnel..



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NEMOX CHOICE

Our motto reads:

"A modern company that loves to merge the innovations of technology with total quality to **make tomorrow's products today**"

To be consistent with what was proclaimed, firmly convinced that we must commit ourselves to safeguarding the environment, we gave birth to the Project



ICEGREEN



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NEMOX has chosen
to go for R290 gas.

WHY?

Density: 493 kg/m³
Molecular mass: 44,1 g/mol
Boiling point: -42 °C
Fusion point: -188 °C

NATURAL

R290 is a HC (natural hydrocarbon C₃H₈)

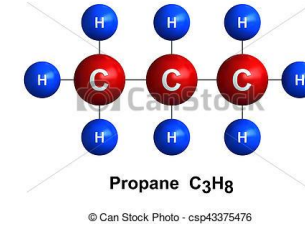
ECOLOGICAL

GWP (Global Warming Potential) = 3
ODP (Ozone Depleting Potential) = 0

EFFICIENT

Low density (50% r404a) then reduced charges
Low pressures
high energy efficiency and capacity compared
to HFCs.

It is flammable, it is not toxic.





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Nemox has chosen to give life to the ICEGREEN project, not only to anticipate and satisfy a regulation that will perhaps come into force in a few years and to which, in many parts, loopholes are sought, but in the full conviction of proposing and promoting **EFFECTIVE ACTIONS for the safeguard environment**, in the interest of both those who produce ice cream and those who consume it.

The replacement of greenhouse gases in thermodynamic circuits, **changing from GWP values close to 4,000 to practically ZERO**, allows an immediate result to be quantified as it shows a 99.9% reduction in potential emissions, as can be seen in the graphs for single machine.

ICEGREEN IS NOT SATISFIED WITH THIS!

Having to redesign our machines to use zero-impact gas, we wanted to give the project an even more environmental footprint.

Hence the presentation of this corner which has the presumption of presenting itself as a **NEW BUSINESS CONCEPT**, cheaper and more harmonious towards the Environment.



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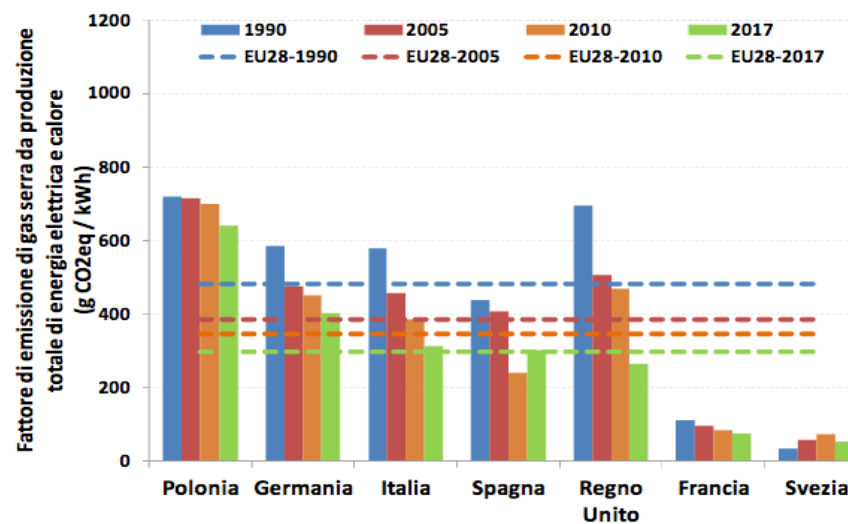
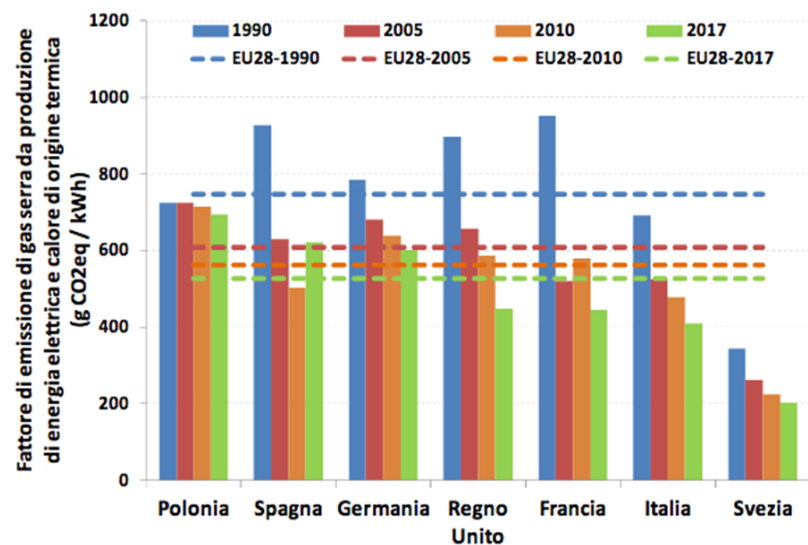
Electricity consumption is an important part of the running costs of an Ice Cream Corner and is a source of continuous greenhouse gas emissions.

(For each kWh consumed 0.43 kg of CO₂ equivalent are emitted)

Greenhouse gas and electricity consumption

The production and distribution of electricity causes greenhouse gas emissions.
in 2017 the greenhouse gas emission factor for Italy is 410 grams of CO₂ equivalent / kWh

If we consider the contribution of renewable sources, the emission factor for Italy thus drops to 312 grams of CO₂ equivalent / kWh but worse than in other countries





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The ICEGREEN project therefore examined every single aspect of the machines and the overall business in order to reduce the use of energy and consequently of greenhouse gases.

- For every kg of steel produced about 2kg of CO₂ is emitted
- For every Kg of Plastic produced about 6Kg of CO₂ is emitted
- For every kg of paper produced, around 1.2 kg of CO₂ is emitted
- For each kg of aluminum produced, approximately 11.8 kg of CO₂ is emitted
- For every kg of copper produced, approximately 2.8 kg of CO₂ is emitted
- For every kg of glass produced, approximately 0.3 kg of CO₂ is emitted
- For every kg of wood produced, around 0.4 kg of CO₂ is emitted

- CO₂ emissions for cars is around 118.5 g / km, and will have to drop from 2021 for new cars to 95g / km.

- For road transport, an average of 2.7Kg of CO₂ per liter of fuel is considered.
(average 300g / Km)



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PROJECT FACTORS TAKEN INTO CONSIDERATION FOR THE REDUCTION OF ELECTRICITY AND OPERATING COSTS

1. The use of R290 has made it possible to use, with the same performance, compressors and motors of lower power, therefore more limited consumption.
2. Design of simple machines with a reduced number of components (less components, less breakages, easier maintenance, less handling)
3. Attention to the structure of each individual component, thickness and weight (the heavier a component the more energy is spent to move it, the thicker it is the more energy is spent to cross it)
4. Choice of recyclable materials with low production impact
5. **A NEW BUSINESS CONCEPT**



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THE NEW BUSINESS CONCEPT

1. Offer a high-quality product, always fresh
2. Use machines of reduced size, consumption and costs
3. Air-cooled thermodynamic systems, less electrical and hydraulic connections, no water consumption and energy costs
4. Reduction of waste for excess of unsold product
5. Use of less equipments
6. Energy saving by having to store only limited quantities of product

Produce only the quantity of gelato that is sold in the day



Nemox switches to green.
We are developing green technology to
provide an environmental friendly, safer
future.





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The concept of ICEGREEN corner allows to offer,
thanks to its modularity,
the solution best suited to the needs of different types and sizes of business allowing
the possibility of expanding over time.

Depending on the daily consumption of ice cream, and the preferred business mode,
everyone can choose the most appropriate combination:

For example:

- The only machine that freezes and conserves (there are different capacities from 1 to 3kg per cycle), particularly suitable for catering.
- The machine that allows to churn and store 2 flavors simultaneously
- A series of machines placed side by side to churn, preserve and deliver gelato or ice cream directly from the machines
- Combinations of machines and gelato, ice cream display case
- Gelato cabinets and Pozzetti storage units



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ICEGREEN CORNER

- 15kg gelato production per hour
- 20 flavors in storage
- 700 portions available

PLUG & PLAY

- Connects to a 10 A socket.
- No installation required



I-GREEN GELATO CORNER CAPACITY

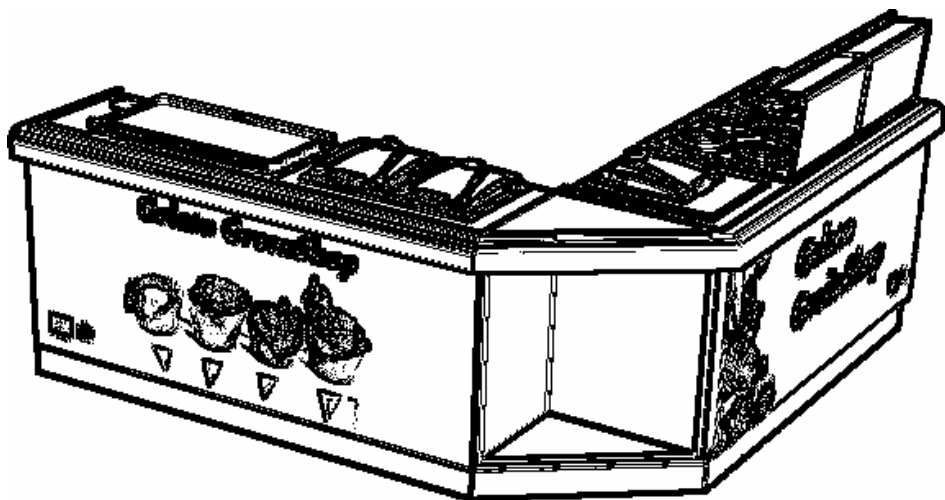
	Production per cycle	Production per hour	Average 80 g. portions
Gelato 5+5K TWIN I-green	2,5 Kg per cycle	7,5 Kg / hour	90 / hour
Gelato 10 K I-green	2,5 Kg per cycle	8Kg / hour	100 / hour
4 Magic PRO 100 I-green	4 trays by 2,5 Kg	10 Kg in storage	150 portions
Sweet 4 Pozzetti I-green - 2 units	16 tubs x 2,5 Kg	40 Kg in storage	600 portions

The corner that we show as an example, is made entirely with machines of the ICEGREEN project, and is composed as follows:



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CORNER FUELED WITH R290 GAS
CO2 EQUIVALENT=1,7 Kg

CORNER FUELED WITH R452 GAS
CO2 EQUIVALENT=3,8 TONS

	Gas load qty R290	GWP 3	Gas load Qty R452	GWP 2141
	grams	Kg CO2 eq.	grams	Kg CO2 eq.
Gelato 5+5 CREA	200	0,60	690	1.477
Gelato10 K	145	0,44	540	1.156
Sweet 4 Pozzetti - 2 units	180	0,54	430	921
4 Magic PRO 100	30	0,09	110	236
		1,67		3.790

RESULT FOR GAS REPLACEMENT

GREENHOUSE GAS EMISSION -99,96%



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Overall energy consumption of the gelato corner in storage mode

The total ELECTRICITY consumption of the ice cream corner presented, in storage mode abd at full load (about 50 kg of ice cream), is 0.600 kWh.

	kWh	kWh	Difference
	R452	R290	R452 vs R290
Gelato 10 k - 1 unit	0,302	0,235	
Gelato 5+5k crea - 1 unit	0,268	0,21	
4 magic pro 100 - 1 unit	0,13	0,034	
Sweet 4 - 2 pozzetti units	0,12	0,09	
	0,82	0,569	-31%

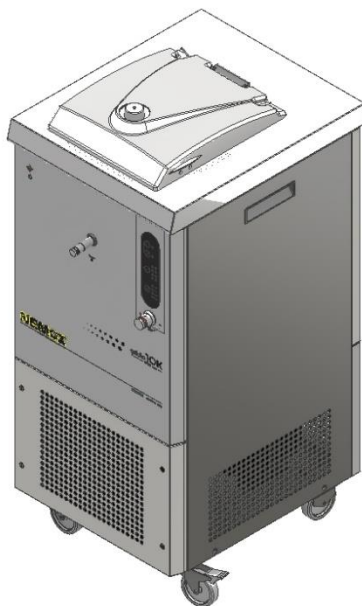
**THE MAXIMUM ABSORPTION FOR THE ENTIRE CORNER IS ABOUT 2kW
(equivalent to an iron, a hair dryer consumption)**

CO2 equivalent emitted in one year for the production and supply of electricity (for 12 hours of operation for 300 days per year)
drops from 1223 kg with R452 to 880Kg with R290 = **31% savings**



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Energy costs and consumption



		Gelato 10 k R452	Gelato 10k i-green R290	Difference R452 vs R290	Gelato 5+5 Crea R452	Gelato 5+5 i-green R290	Difference R452 vs R290
average electrical absorption	W	727,37	606,77	-16,58%	460,88	400,8333	-13,03%
production cycle - time	min	21,00	18,00	-14,29%	24,00	21	-12,50%
production quantity	Kg	2,50	2,50		1,25	1,25	
energy consumption in production mode	kWh	0,25	0,18	-28,50%	0,18	0,14	-23,90%
average energy cost kWh	euro	0,30	0,30		0,30	0,30	
energy cost for production cycle	euro	0,076	0,055	-28,50%	0,055	0,042	-23,90%
energy cost for each kg of gelato produced	euro	0,031	0,022	-28,50%	0,044	0,034	-23,90%
energy consumption during storage	kWh	0,302	0,235	-22,19%	0,134	0,105	-21,64%
average cost for storing 1 kg of gelato for 12 hours	euro	1,450	1,128	-22,19%	1,286	1,008	-21,64%



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Energy costs and consumption



		Show case 4 magic pro100 Gas R452	Show case 4 magic pro100 Gas R290	Difference R452 vs R290	Pozzetti storage 4+4 tubs Gas R452	Pozzetti storage 4+4 tubs Gas R290	Difference R452 vs R290
average electrical absorption	W	260,00	80,00	-69,23%	260,00	80,00	-69,23%
quantity into storage 2,5Kg x 8 tubs	Kg	10,00	10,00		20,00	20,00	
energy consumption during storage	kWh	0,100	0,034	-66,00%	0,060	0,045	-25,00%
average energy cost kWh	euro	0,30	0,30		0,30	0,30	
energy cost for 24 hours	euro	2,40	0,82	-66,00%	1,44	1,08	-25,00%
energy cost to store 1Kg of ice cream for 24 hours	euro	0,240	0,082	-66,00%	0,072	0,054	-25,00%



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Replacement of R134 with R290 in household market



	Gas load qty R290	GWP 3	Gas load R134	GWP 1430
	grams	grams CO2 eq.	grams	grams CO2 eq.
Gelato chef 2200	30	90,00	60	85.800,00
Gelato Next-1 L'automatica	32	96,00	68	97.240,00

Considering that in a year we manufacture about 15,000 machines of this type, the **CO2 equivalent saving** is equal to about 1,500 tons



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R290 - Results on household machine

		Gelato Chef 2200 R134	Gelato Chef 2200 i-green R290	Difference R134 vs R290	Gelaato next-1 L'Automatica R134	Gelaato next-1 i-green R290	Difference R134 vs R290
average electrical absorption	W	126,02	103,33	-18,01%	164,22	148,17	-9,77%
production cycle - time	min	39,00	32,00	-17,95%	31,00	27	-12,90%
production quantity	Kg	0,80	0,80		0,80	0,80	
energy consumption in production mode	kWh	0,08	0,06	-32,72%	0,08	0,07	-21,42%
average energy cost kWh	euro	0,30	0,30		0,30	0,30	
energy cost for production cycle	euro	0,025	0,017	-32,72%	0,025	0,020	-21,42%
energy cost for each kg of gelato produced	euro	0,031	0,021	-32,72%	0,032	0,025	-21,42%
energy consumption during storage	kWh				0,080	0,077	-3,75%
average cost for storing 1 kg of gelato for 12 hours	euro				0,960	0,924	-3,75%



Green technology provides major environmental benefit for our future





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