ADOPTION OF TRANSCRITICAL CO_2 IN THE RETAIL INDUSTRY IN CHILE - THE ROLE OF THE RAC INDUSTRY ON THE TECHNOLOGY UPTAKE

Ministerio del Medio Ambiente

Gobierno de Chile

Pier Zecchetto / Claudia Paratori July 03 2023

Background

Project started on October 2014.

The initiative was supported with funds from CCAC and the Multilateral Fund.

Implemented by Ozone Unit on the Ministry of the Enviroment with support of UNDP.

In that moment:

- There was only 3,000 stores with CO_2 worldwide.
- Chile did not have any experience working with CO_2.

- **Budget**: US$ 720,000 (CCAC + HPMP 1). **Main objective** introduction of CO_2 technology in retail industry; Funds were used to cover the gap between an HCFC installation, equipment and training compared with a Transcritical CO_2 solution.

- Main counterparts:
  - Ministry of Environment of Chile.
  - Supermarket companies.
  - Chilean Association of Supermarkets.
  - Chilean Chamber of Refrigeration.
  - Refrigeration system designers/installers.

National context (2015 – 2016):

The results of the first round on 2014/2015 to encourage any of the main actors from retail industry to activate a transcritical CO_2 project were not successful.

No experience on transcritical CO_2.
Heavy dependence on HCFC-based and HFC-based refrigerants in the supermarket sector.

Sector is dominated by four large chains: Wal-Mart (through the brand *Líder*), Cencosud, Tottus, SMU. Representing **90% of the sector.**

The local Ozone Unit tirelessly performed and implemented many activities in 2015 and part of 2016 to facilitate and avoid “excuses” from the potential beneficiaries to embrace the initiative.

Assessment of national needs to adopt transcritical CO_2 refrigeration systems conducted.

Identified need	Project's answer
Financial Support.	Seed capital to cover incremental cost given to two companies for their first facilities with TC CO_2. **US$ 720,000 on 3 projects**
Knowlegde of succesful experience.	International experts invited, 2 workshops conducted.
Training on the use of the technology.	Detailed training course to trainers, technical personal from supermarkets and local experts.
Lack of equipment availability.	Facilitation of meetings between providers and supermarkets.

PLUS Training on transcritical CO_2 refrigeration systems & **FINALLY SUCCESS**

International experts from Canada and UK shared their experiences on the use of TC CO_2 in the supermarket sector through workshops in 2015 and 2016, respectively. (31 and 28 persons attended).

Detailed study tour to Italy for 11 persons (4 senior engineers from supermarkets, 4 trainers from universities and training institutions and 3 local refrigeration experts).
Participation on technical congress in Brazil (Febrava/Conbrava 2015) of 2 local refrigeration experts. Discussion with technology providers.

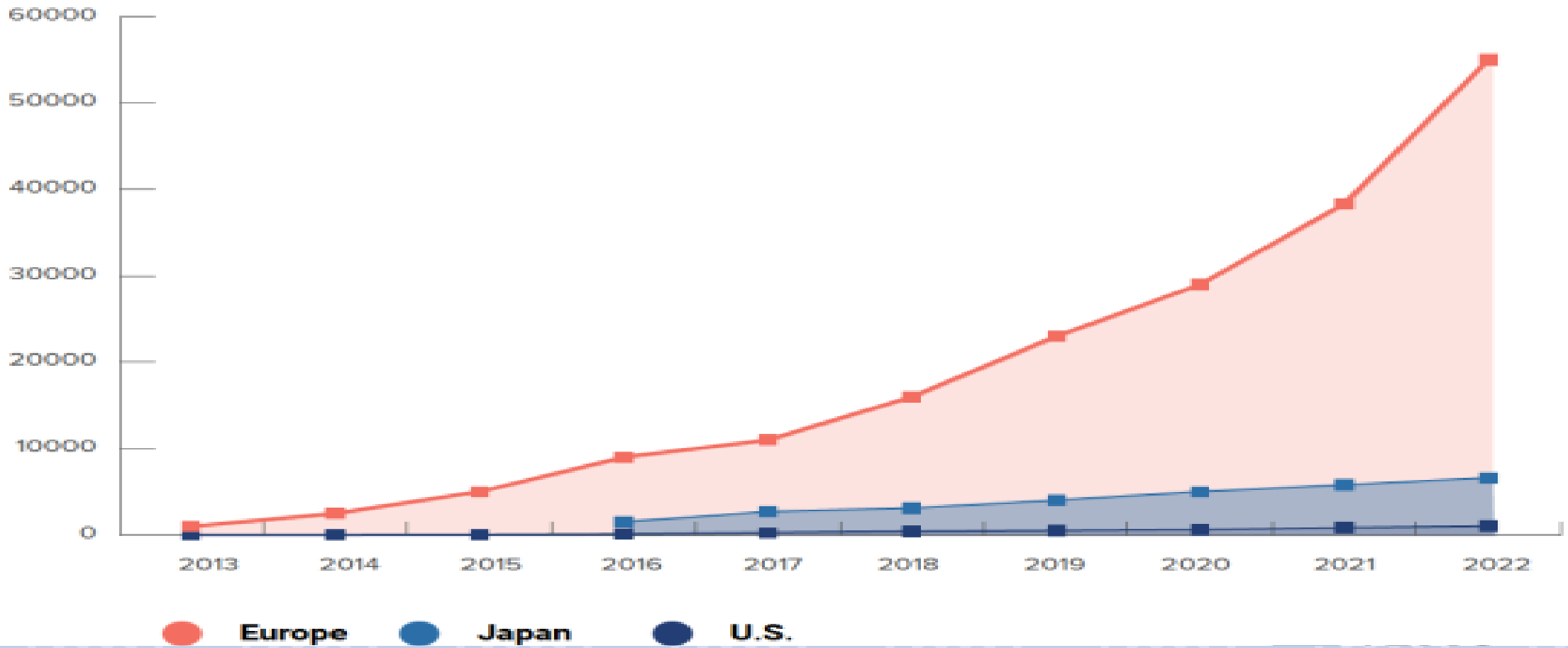
FROM  TO 

SUCCESS, thanks to the consistency and the persistence of the initiative and problem-solving capacity & the joint effort of UNDP – CACC – MLF - OZONE UNIT, 2 of the main supermarket operators in Chile started and opened 3 transcritical CO_2 large supermarkets.

THE EFFORT INVESTED AND THE SUCCESS TO HAVE 3 CO_2 TRANSCRITICAL STORES IN CHILE ON 2017, IS A LONG RUN SUCCESS? IS THE RAC INDUSTRY DOING ITS SHARE? LET'S EXPLORE BRIEFLY AND FIND OUT.

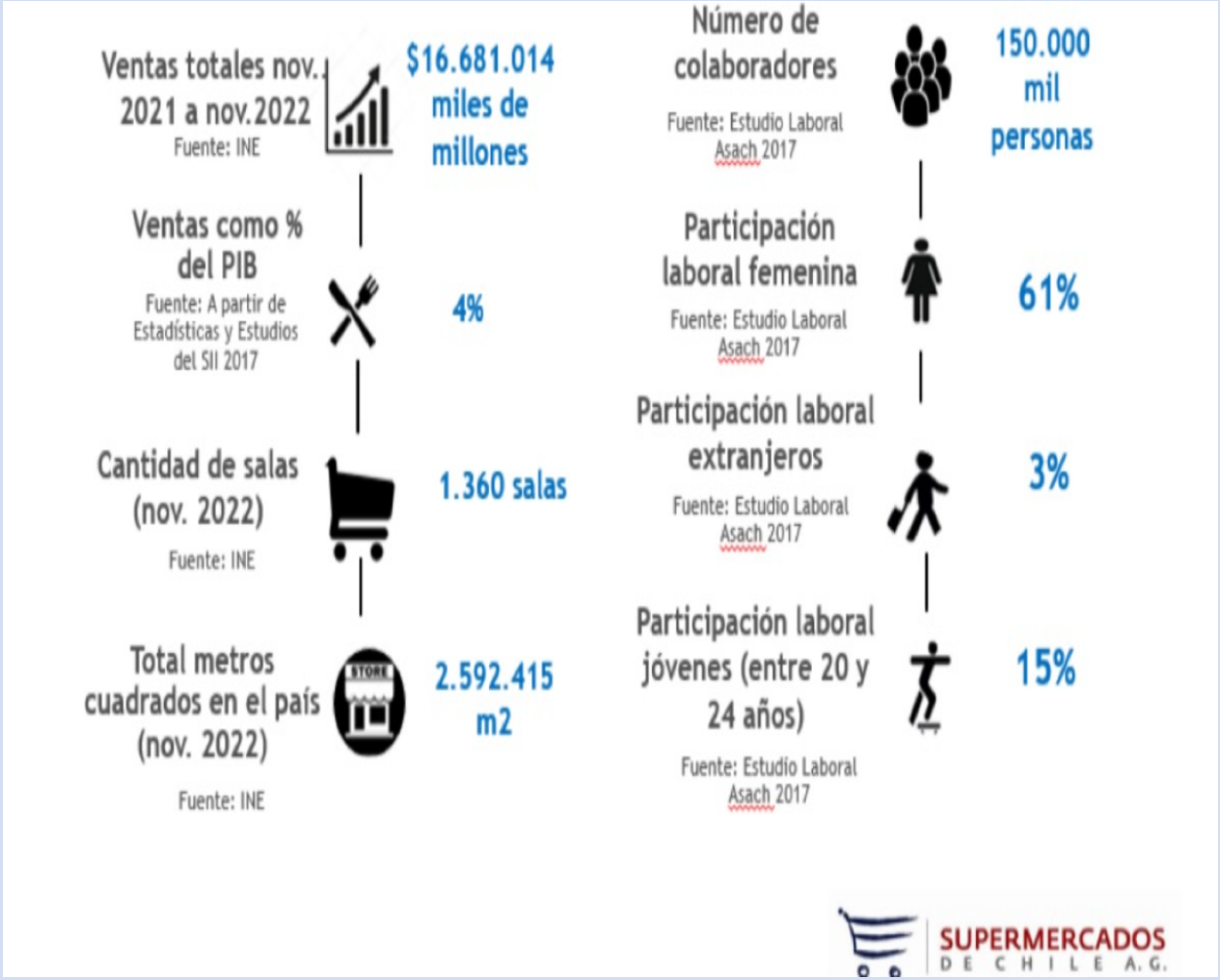
Transcritical CO_2 Installation Growth in Major Regions

(stores)



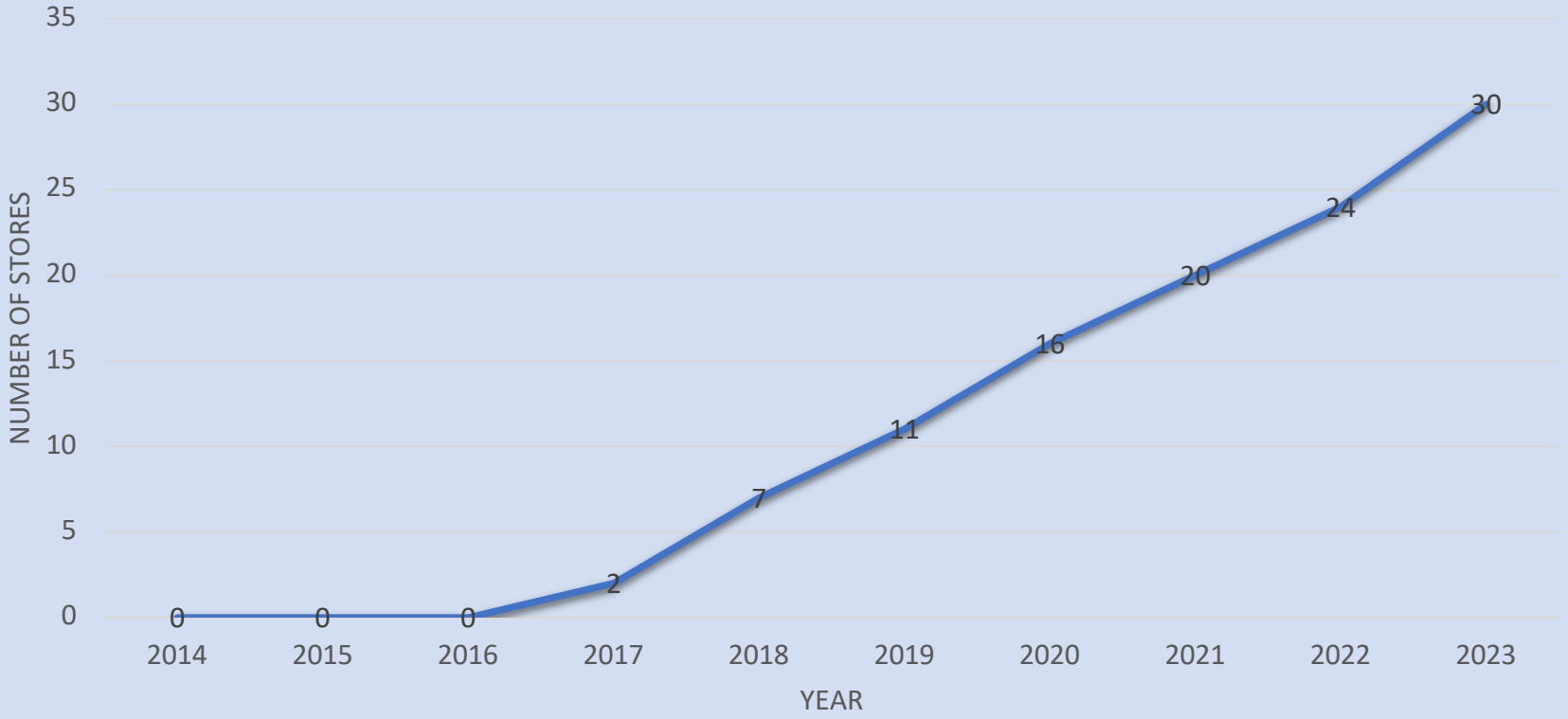
2023 CHILEAN SUPERMARKET INDUSTRY PROFILE

- Like in 2014 the number of medium and large supermarkets is getting close to 1,400. During the social unrest of 2019,-9% of all the supermarket in the country were destroyed.
- 3 years dealing with COVID 19 boosted the online sales and developed a complementary type of supermarket (the dark store format).
- In 2023, 4 retail companies control over the 90 % of the sales in the food retail industry, the same ones that in 2014
- 88% of the population in Chile use supermarket as their preferred food purchase option either online shopping or visit them at least 2 times per week.
- **Transcritical CO_2 installations service 150,000 m^2 of sales area approximately 5.8% of the total sales area of supermarkets**



SUPER & HIPERMARKET INSTALLED IN CHILE WITH TRANSCRITICAL CO_2

Alta replicabilidad del esfuerzo del gob por incentiuvar este desarrollo) al 2030 80 en total.



Transcritical CO_2 Commercial Refrigeration Market Penetration in North America 2023

71,348 supermarkets and grocery stores**

2.2% 1,030 transcritical CO_2 stores mostly discount stores

Transcritical CO_2 Commercial Refrigeration Market Penetration in Chile 2023

1,400 small, medium, large supermarket & Hypermarkets

5.8% 25 mostly hypermakets equivalent to 80 medium sizes supermarket with transcritical CO_2

Transcritical CO_2 Commercial Refrigeration Market Penetration in Japan 2023

77,067 food retail stores

8.6 % 6,630 transcritical CO_2 supermarket and convenience stores

Transcritical CO_2 Commercial Refrigeration Market Penetration in Europe 2023

299,025 total stores

18.4% 55,000 Transcritical CO_2 stores

YEAR	1 EQUIPMENT INVESTMENT & AVAILABILITY	2 COST OF REFRIGERANT	3 INSTALLATION COST AND AVALIABILITY	4 SERVICE AND TELEMETRY 24/7	5 % OF MAIN RETAILERS ON CO_2	6 ENERGY EFFICIENCY CO_2 V/S HFC HCFC	7 TRAINING OPTIONS	8 RELIAYABILITY CO_2 V/S HFC
2017	Limited availability to one or two suppliers **20 to 30%** more expensive than HCFC HFC.	CO_2 **30 to 50%more** expensive than R-22 & R-404A	CO_2 installation **25 to 35%more** expensive than R-22 & R-404A, **1 company installing CO_2**	**1 company with service on CO_2 systems** 100% of installations with remote telemetry 24/7	**50% of the main retailers (40% of market share) testing CO_2**	**CO_2 10 % to 15% more efficient than R-22 or R-404A equivalent solutions**	Training abroad, or itinerant container for limited time	CO_2 much higher, less service
2023	Normalized availability, most world class suppliers **5 to 10 %** more expensive than HCFC HFC.	CO_2 **20 to 40% less** expensive than R-22 & R-404A.	CO_2 installation **0 to 10% more** expensive than R-22 & R-404A, **7 companies installing CO_2**	**6 company with service on CO_2 systems** 100% of installations with remote telemetry 24/7	**100% of the main retailers (90% of market share) using CO_2 on new stores & retrofits**	**CO_2 10 % to 35% more efficcient than R-22 or R-404A equivalent solutions**	Training abroad, 2 new local CO_2 training centers under developme nt	CO_2 much higher operation confidence, less service, less refrigerant leaks

REMARKS & CONCLUSIONS:

- Main Supermarket chains have defined in their specs CO_2 as the primary choice
- CO_2 solution is now on medium and large stores competitive with HFC solutions
- There are many option of materials, Technical resourses and equipment to install according to the timings required by the customers needs either in new supermarkets or retrofitted ones
- Energy efficiency is a accepted advantage of CO_2 if compared with HFC and HCFCs
- Boards of directors on all the main supermaket companies aceept and request sutainable solutions and are looking to be carbon neutral with in 20 years time

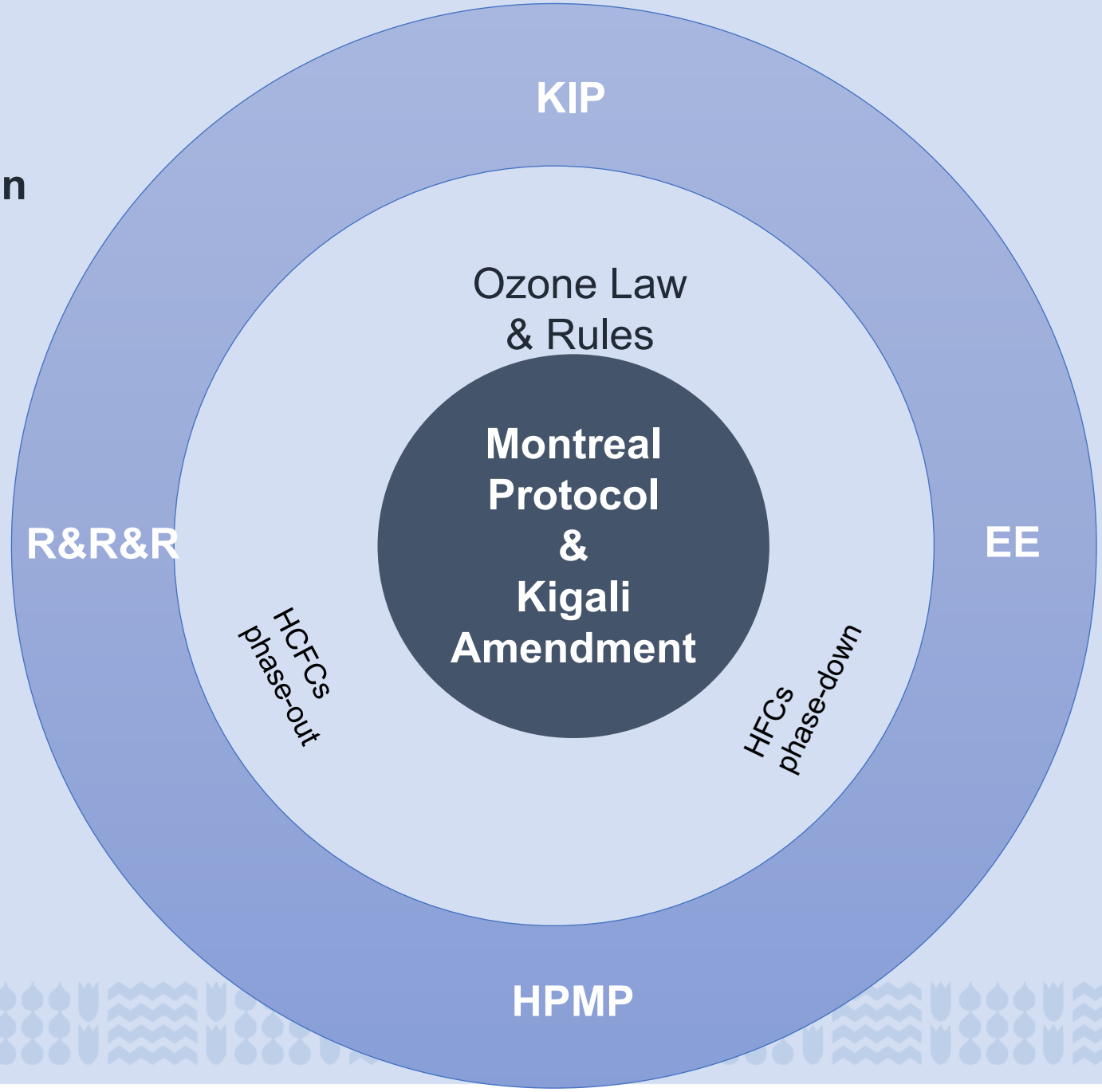
The consolidation and market penetration of CO_2 solutions in the retail is strong and should continue that way, thank to impulse given by the **Ozone Unit, MLF, CCAC and UNDP** that opened the implementation of the novel technology and the RAC and retail industry that have made it a good enviromental and economic busisness.

Synergies and challenges on HCFC and HFC reduction

National Ozone Unit

Framework Law on Climate Change

NDC
&
Long-term
Climate
Strategy

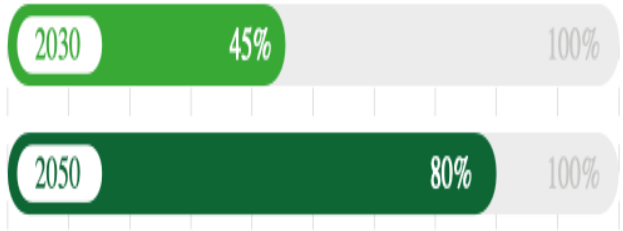


Law on Energy Efficiency

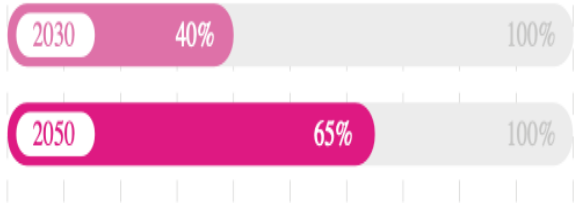
National Plan
on Energy
Efficiency
&
Strategy on
Heat and Cold

Strategy on Heat and Cold

Total % of energy used to generate heat and cold, that is sustainable



Reduction of GHG emissions associated to heat and cold generation



% of population that satisfies their needs of heat and cold in their homes

Framework Law on Climate Change

Carbon neutrality on 2050

2030 MEPS for residential
2050: MEPS for all R&AC commercial, residential, public equipment

NOU's selection criteria for alternatives to HCFCs and HFCs (or why we support refrigeration technologies with transcritical CO_2)	Natural refrigerant / no-HFC
	Lower energy consumption
	Trained technicians
	Country proven technology
	Economic benefits due to energy savings and reduction of leaks
	Contributes to the mitigation measures under the Long-term Climate Strategy of our country
	Replicable!

https://www.youtube.com/watch?v=_6ioh3-olxo

Gracias por su atención

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Thanks for Your attention