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SUPERMARKETS SHIFT TO HFC-FREE COMMERCIAL REFRIGERATION WORLDWIDE



ABOUT EIA

EIA is an independent campaigning organisation committed to bringing about change that protects the natural world from environmental crime and abuse. As part of our work, we have undertaken groundbreaking investigations into the illegal trade in ozone depleting substances (ODS) and have been closely involved in the international ozone and climate negotiations for well over a decade.

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INTRODUCTION

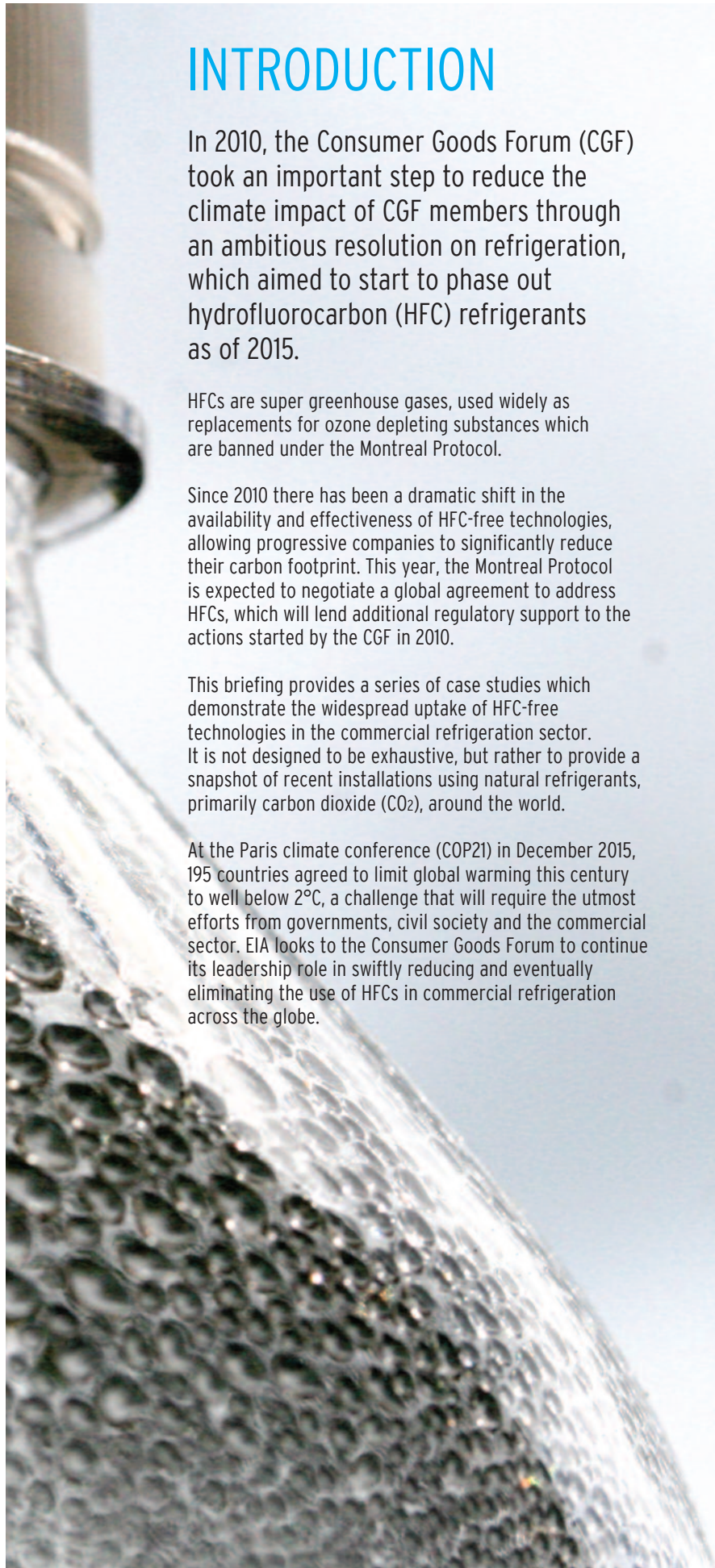
In 2010, the Consumer Goods Forum (CGF) took an important step to reduce the climate impact of CGF members through an ambitious resolution on refrigeration, which aimed to start to phase out hydrofluorocarbon (HFC) refrigerants as of 2015.

HFCs are super greenhouse gases, used widely as replacements for ozone depleting substances which are banned under the Montreal Protocol.

Since 2010 there has been a dramatic shift in the availability and effectiveness of HFC-free technologies, allowing progressive companies to significantly reduce their carbon footprint. This year, the Montreal Protocol is expected to negotiate a global agreement to address HFCs, which will lend additional regulatory support to the actions started by the CGF in 2010.

This briefing provides a series of case studies which demonstrate the widespread uptake of HFC-free technologies in the commercial refrigeration sector. It is not designed to be exhaustive, but rather to provide a snapshot of recent installations using natural refrigerants, primarily carbon dioxide (CO₂), around the globe.

At the Paris climate conference (COP21) in December 2015, 195 countries agreed to limit global warming this century to well below 2°C, a challenge that will require the utmost efforts from governments, civil society and the commercial sector. EIA looks to the Consumer Goods Forum to continue its leadership role in swiftly reducing and eventually eliminating the use of HFCs in commercial refrigeration across the globe.



1. AEON

Location: **Chiba, Japan**

Since first making a public commitment to adopt CO₂ technology in all new stores in 2011, and retrofit all existing stores with this technology going forward,¹ AEON has been rolling its use of natural refrigerant out across its estate.

In 2013, AEON opened its Makayhari New City Mall, featuring twenty systems operating on CO₂ transcritical technology. AEON reports that the new systems are able to save around 20 per cent more energy than an HFC-404A system.² This project was partially funded by a subsidy from the Japanese Ministry of Environment, available under the revised Japanese Fluorocarbon Regulations, which aims to encourage greater uptake of natural refrigeration among Japanese retailers.

2. ALFAMIDI (LAWSON)

Location: **Jakarta, Indonesia**

Having successfully rolled out CO₂ refrigerant across many of its Japanese convenience stores, Lawson is exporting CO₂ technology to a number of its Alfamidi stores in Jakarta, Indonesia. An assessment of two of the CO₂ transcritical stores indicates that 20 per cent energy savings are being realised.³ To date, 13 Alfamidi stores have been transitioned to CO₂ refrigerant under the initiative, with a further 12 projects planned for this year.⁴

As a CGF member, Lawson has considerable experience working with CO₂ technology, having publically declared its commitments to adopt CO₂ technology as standard in all new installations. The company now has an estimated 1,300 stores operating on CO₂ transcritical technology in Japan, with average energy efficiency savings of 27 per cent being achieved here compared to conventional systems.⁵

3. CARREFOUR

Location: **Valencia, Spain**

Undeterred by perceived limitations to the use of CO₂ in hot climates, Carrefour has been working with suppliers Carel to develop CO₂ transcritical systems with parallel compression and ejector technology, capable of maintaining high energy efficiency in temperatures of up to 35°C.⁶ The company recently reported that one of its pilot stores operating on this system in Valencia is achieving 13 per cent energy savings compared to the previous HFC-based system used, equating to a 47 per cent reduction in the store utility bill.⁷ Despite an increase in the initial upfront cost of the systems, Carrefour reports that the return on investment of the system is just 1.2 years,⁸ amounting to savings of €792,000 over ten years.⁹ Following the success of this project, Carrefour is in the process of testing these systems in other locations in Southern Spain and Southern Italy.

As of May 2015, Carrefour had equipped 170 stores with CO₂ transcritical technology, with plans to continue to roll these systems out across its global estate.¹⁰

4. COLES

Location: **Melbourne, Australia**

In 2015, Coles opened a store in Melbourne operating on a CO₂ transcritical system. At the time of the installation, the store was reported to be the first of its kind to use this technology for 100 per cent of its refrigeration and air conditioning requirements. The system is achieving average energy savings of 15 per cent above that of a CO₂/HFC-134A system, rising to 22 per cent during the colder months.¹¹

This store is the second of Coles' to operate using HFC-free refrigeration. In 2008, the company installed a CO₂/ammonia cascade system at a store in a suburb of Sydney. The store in Ropes Crossing was the first example of this type of installation in a commercial application in Australia.¹² When compared with conventional systems, Coles reports that the cascade system is able to operate with reduced energy consumption, while also lowering refrigerant emissions by 700 tonnes of CO₂ equivalent (CO₂e) each year.¹³

5. CONSUM COOPERATIVA

Location: Various locations including Murcia, Spain

Following successful trials of HFC-134A/CO₂ cascade systems in some of its branches as a transitional step to phase out HFCs, Spanish retailer Consum has announced it is now piloting CO₂ transcritical technology in all regions of Spain. Based on data gathered from one of its stores in Murcia, the use of the new technology is expected to help reduce energy use by 25 per cent compared to conventional stores.¹⁴ Despite not being a CGF member, following the successful implementation of its CO₂ transcritical systems in Spain in 2014, Consum has pledged, wherever possible, to introduce this technology in all new installations as standard from 2015.¹⁵

BELOW:
Lawson chiller using CO₂ refrigerant.



6. COOP LIGURIA (COOP ITALIA)

Location: Carasco, Italy

In June 2015, Coop Liguria announced it had installed its first CO₂ transcritical booster system in a store in Carasco, Northern Italy. The use of booster technology is able to help the system function with increased energy efficiency, despite average summer temperatures of 26.3°C.¹⁶ The system also benefits from heat recovery which is used to heat water for use throughout the store.¹⁷ Coop Liguria is a subsidiary of Coop Italia, the largest retail chain in Italy, with over 1,500 stores nationwide. Coop Italia opened its first CO₂ transcritical system in Italy in 2002 at a store in Lestans, and has since announced it will adopt CO₂ as the standard refrigerant for all new stores and retrofits for low temperature refrigeration.¹⁸

7. FAMILYCASH (GRUPO UNAGRAS)

Location: Murcia, Spain

In 2015, Spanish retailer FamilyCash opened its first store operating with a CO₂/R290 cascade system, in the town of Mula in Southern Spain. The system provides cooling to ten cooler display units and 16 freezer islands, helping to achieve total energy savings of 23 per cent compared to a traditional HFC-based system, while significantly reducing the overall CO₂e emissions of the store.¹⁹

8. FAMILYMART

Location: New Taipei City, Taiwan

In December 2015, FamilyMart opened the first store to operate on a CO₂ transcritical system in Taiwan. The system, which was installed at the Linkou Wenyi store in New Taipei City, is located outside the store and is designed to be smaller and lighter than conventional HFC-based systems, helping to reduce installation costs by 18 per cent, with significant energy savings expected.²⁰

9. IGA

Location: **Perth, Australia**

IGA has installed a CO₂ transcritical system at its IGA Morris store near Perth. The IGA store, which is one of 12 in operation in the region, is reported to be the company's most efficient,²¹ maintaining a good energy performance, despite average summer temperature highs of almost 29°C.²²

This announcement follows the installation of a CO₂ transcritical system at IGA's Kingsley store in Western Australia in 2016, with energy savings of 26 per cent recorded.²³

10. IPERMERCATI (GRUPPO FINIPER)

Location: **Milan, Italy**

In April 2016, Ipermercati opened Italy's largest hypermarket in Milan, operating with a CO₂ transcritical system. The combined use of the CO₂ refrigerant and ejector technology helps the system to function efficiently in temperatures of up to 38°C, while also making good use of the favourable heat reclaim properties of CO₂ to warm other parts of the store.²⁴

11. MASSMART HOLDINGS

Location: **Various locations in South Africa, including KwaZulu Natal**

Massmart has been rolling out CO₂ transcritical technology across much of its estate in South Africa, including in a store in the town of Amanzimtoti, just south of Durban. Despite the tropical climate, the retailer reports that this CO₂ transcritical system, and those in operation in high ambient temperature locations in the Northern Province and Gauteng, are 18 per cent more energy efficient than the retailer's conventional refrigeration fleet.²⁵

By using recycled waste water from the refrigerant plant to increase the humidity of air entering the system on hot days, Massmart is able to improve the coefficient of performance (COP) of the systems by 60 per cent when

temperatures rise above 27°C.²⁶ During these periods of high energy demand, up to half of the system's cooling capacity can be retrieved from thermal storage tanks that collect heat waste stored over time.²⁷ As of 2014, over 50 per cent of Massmart's stores were operating on CO₂ transcritical technology, with plans to adopt this as standard for all new stores.²⁸

12. MARUKYU CO Ltd.

Location: **Hiroshima, Japan**

Following the installation of a CO₂ system in its Aruk Iguchi-myojin store in Hiroshima, Japanese retailer Marukyu has reported 36 per cent recorded energy savings compared to an HFC-based system.²⁹ The store, which opened in November 2014, is fitted with 13 rooftop CO₂ condensing units, providing cooling to remotely-controlled showcases and a cool room.³⁰

13. SAVE ON

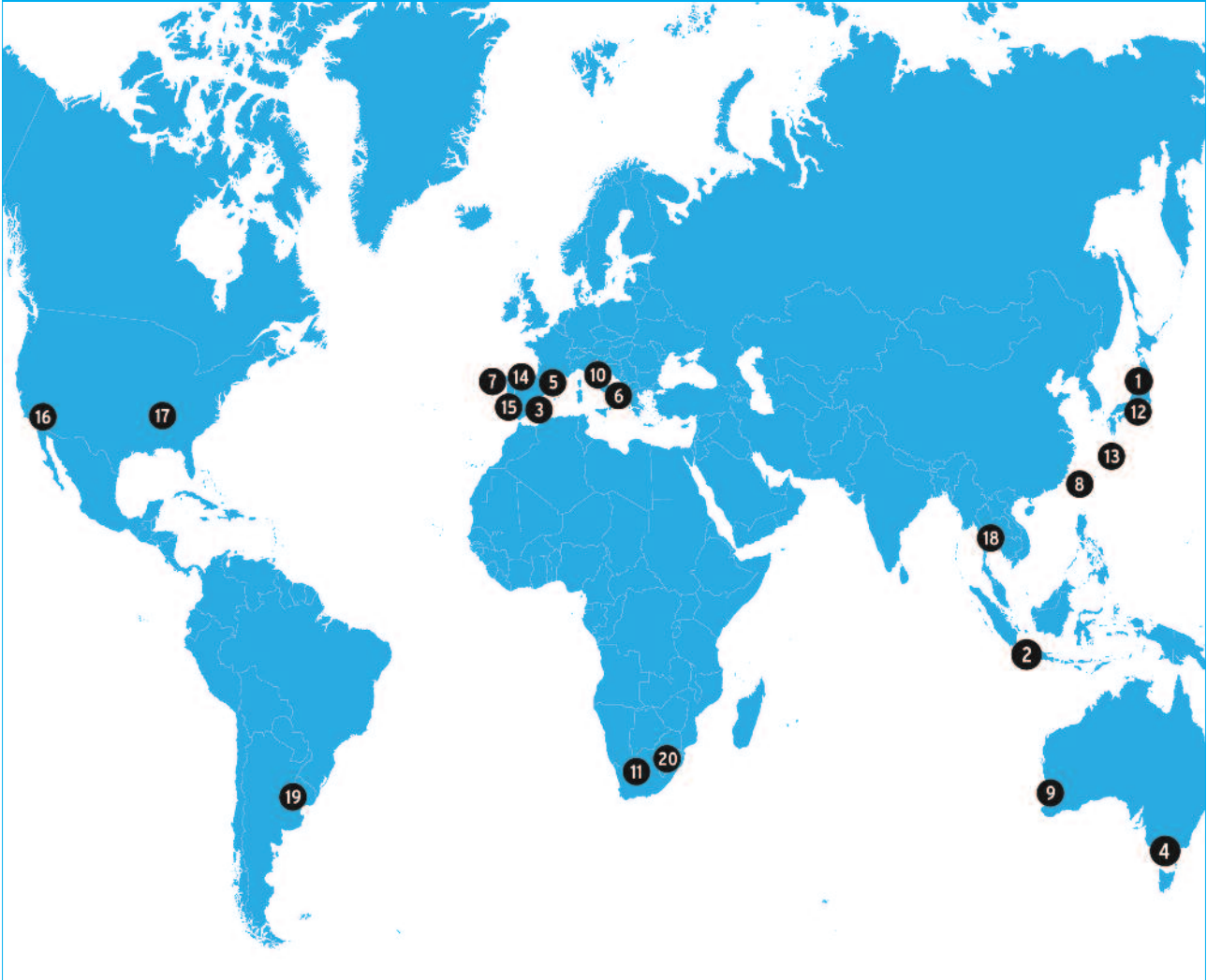
Location: **Iseaki City, Japan**

In February 2015, Save On became the first retailer in Japan to open an entirely HFC-free convenience store. The Iseaki Ko-bayashi Minami store features a R290-based showcase, in addition to further cases chilled by remotely controlled outdoor CO₂ condensing units.³¹ Despite the cost of the system being initially higher than an HFC-404A system, Save On reports that the hydrocarbon plug-ins reduce energy consumption by 77 per cent.³²

Prior to opening its naturally refrigerated store in Iseaki, the retailer had trialled hydrocarbon plug-in units in 30 stores. Following the success of these pilots, it plans to increase the number of stores operating with hydrocarbon plug-in units across its estate by 20 to 30 stores each year, with a view to eventually transitioning its entire estate to hydrocarbon and CO₂-based systems.³³

"The combined use of the CO₂ refrigerant and ejector technology helps the system to function efficiently in temperatures of up to 38°C."

MAP OF RECENT COMMERCIAL INSTALLATIONS USING NATURAL REFRIGERANTS WORLDWIDE



14. SIMPLY (AUCHAN)

Location: Bilbao, Spain

In 2014, Simply, a subsidiary brand of Auchan, opened a store operating with a CO₂ transcritical booster system with integrated air conditioning in Bilbao. The system also features adiabatic cooling technology to help cool ambient air on hot days in order to further improve energy performance. Despite average summer temperature highs of over 25°C,³⁴ Simply reports that the system is capable of out-performing energy efficiency capabilities of an HFC-based system.³⁵ In 2015, after a year of operation, Simply announced plans to extend the test of the system to three further stores in Spain.³⁶ Within its E.U. estate, Auchan has made public commitments to installing CO₂ refrigerant as its technology of choice, wherever possible.³⁷

15. SUPERMERCADOS HIBER

Location: Madrid, Spain

In 2014, Spanish retailer Supermercados Hiber, a member of Grupo IFA, opened a store in Madrid operating on a CO₂ transcritical system. The system was the first of its kind to be installed in an urban environment in Spain. Despite average summer temperatures highs of 29.6°C³⁸ in Madrid, the retailer estimates that the system will reduce energy consumption by 30 per cent compared to a conventional HFC-based installation, and 10 per cent below that of an HFC/CO₂ cascade system.³⁹ The estimated return on investment of the system is just three years.⁴⁰ In line with Grupo IFA's CGF commitments, following the success of this pilot, Supermercados Hiber has indicated it will adopt CO₂ transcritical technology for all new stores, wherever possible.⁴¹

16. SUPERVALU

Location: Carpinteria, California, U.S.A.

In 2013, U.S. retailer, SuperValu, fitted a store in Carpinteria, Southern California, with a CO₂/ammonia cascade system. Replacing an HCFC-22 system previously used by the company, the use of this new technology has so far provided energy savings of 30 per cent.⁴² Despite strict safety regulations governing the use of ammonia in California, the cascade system is able to operate with a reduced charge size of refrigerant, keeping it well below State regulation limits.⁴³ While ammonia is widely used in large-scale industrial applications such as warehouses and distribution centres, the Carpinteria system was developed by SuperValu as a prototype to demonstrate that this type of cooling is also possible in a commercial installation.

17. SPROUTS FARMERS MARKET

Location: Atlanta, U.S.A.

In July 2014, Sprouts Farmers Market opened a store near Atlanta, Georgia, operating with a CO₂ transcritical booster system, helping to reduce store energy consumption by six per cent compared to a conventional system.⁴⁴ The installation benefits from a specially adapted condenser which helps to chill the air at the start of the cooling process, allowing it to function efficiently in summer temperature highs of 31°C.⁴⁵

18. TESCO LOTUS (TESCO)

Location: Bang Phra, Thailand

In 2012, Tesco Lotus installed its first hydrocarbon-based system in a store in Thailand. At the time of its installation, the store in Bang Phra, near Pattaya, was Asia's first zero carbon hypermarket,⁴⁶ and used propane refrigerant to cool its integral cabinets, leading to a 25 per cent reduction in refrigerant emissions compared to a conventional system.⁴⁷ As a member of the CGF, Tesco has publically announced its intentions to phase out HFCs in all new installations from 2015.⁴⁸

19. WALMART

Location: Buenos Aires, Argentina

In September 2015, Walmart installed its first ever CO₂ transcritical system in a store in Buenos Aires. During cold months, it is capable of operating in a subcritical mode in order to conserve energy. In warmer temperatures, the use of parallel compressors and sub-cooling systems helps to maximise efficiency, resulting in expected energy savings of 21 per cent compared to a conventionally refrigerated system.⁴⁹

20. WOOLWORTHS HOLDINGS Ltd.

Location: Johannesburg, South Africa

In 2015, a CO₂ transcritical system operating with parallel compression technology was installed in the Woolworths Holdings Ltd.'s Crawthorne store in Johannesburg as part of a redevelopment and expansion project. Despite increasing the store size by 50 per cent, Woolworths Holdings Ltd. has reported that the new system is able to deliver energy savings of 30 per cent, even in temperatures of up to 50°C.⁵⁰ In line with its CGF Commitments, Woolworths Holdings Ltd. has been rolling out CO₂ transcritical refrigeration systems across its stores in South Africa, having adopted this technology as standard for all new installations. As of 2015, Woolworths Holdings Ltd. had 32 of these systems in operation, reporting significant energy efficiency benefits, and no operational problems as a result of this transition.⁵¹

BELOW:

Woolworths Holdings Ltd. has also been replacing HFCs with natural refrigerants in its refrigerated transport vehicles.



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REFERENCES

1. AEON (2016). Presentation at ATMosphere Asia 2016 by Haruko Kanamaru: "AEON's activities to expand the installation of natural refrigerants". Available at: <http://www.atmo.org/presentations/files/56b9f91aa4ef14550285060UWZd.pdf>. Last accessed: 17 May 2016
2. Ibid
3. R744.com (10 Feb 2016). Lawson, Alfamidi CO2 collaboration bearing fruit. Available at: http://www.r744.com/articles/6873/lawson_alfamidi_co_sub_2_sub_collaboration_bearing_fruit. Last accessed: 12 Mar 2016
4. Ibid
5. Lawson (2016). Presentation at ATMosphere Asia 2016 by Shinichirou Uto: "Becoming the world's best!" Available at: <http://www.atmo.org/media.presentation.php?id=703>. Last accessed: 17 May 2016
6. Carel (12 Oct 2015). Natural refrigeration: Carrefour on CO2 with CAREL. Available at: <http://www.carel.com/documents/10191/0/%2B4000041EN/84b14825-a55e-4ae5-b681-58e5dc2e1673?version=1.0>. Last accessed: 13 June 2016
7. Carrefour (2015). Presentation at ATMosphere Europe 2015 by Jean-Michel Fleury: "Natural refrigeration current status - guest star: Alzira Valencia." Available at: http://www.atmo.org/presentations/files/582_52_jean_michel_fleury_carrefour.pdf. Last accessed: 18 Feb 2016
8. Carel (2013). Integrated CO2 systems for warm climates. Available at: <http://www.atmo.org/media.presentation.php?id=305>. Last accessed: 22 Feb 2015; Carrefour (2015). Presentation at ATMosphere Europe 2015 by Jean-Michel Fleury: "Natural refrigeration current status - guest star: Alzira Valencia." Available at: http://www.atmo.org/presentations/files/582_52_jean_michel_fleury_carrefour.pdf. Last accessed: 18 Feb 2016
9. Carel (2013). Integrated CO2 systems for warm climates. Available at: <http://www.atmo.org/media.presentation.php?id=305>. Last accessed: 22 Feb 2015; Carrefour (2015). Presentation at ATMosphere Europe 2015 by Jean-Michel Fleury: "Natural refrigeration current status - guest star: Alzira Valencia." Available at: http://www.atmo.org/presentations/files/582_52_jean_michel_fleury_carrefour.pdf. Last accessed: 18 Feb 2016
10. Consumer Goods Forum (May 2015). Climate change booklet. Available at: <http://www.theconsumergoodsforum.com/files/Publications/20150519-The-Consumer-Goods-Forum-Climate-Change-Booklet.pdf>. Last accessed: 23 May 2016; Consumer Goods Forum (1st quarter 2015). Carrefour presents webinar on natural refrigeration in warmer climates. Available at: <http://www.theconsumergoodsforum.com/sustainability-pillar-resources-latest-news/refrigeration%20Carrefour-Refrigeration-Webinar>. Last accessed: 23 May 2016
11. R744.com (30 May 2016). Coles Putting CO2 on the Map Down Under. Available at: http://www.r744.com/articles/7001/coles_putting_co_sub_2_sub_on_the_map_down_under. Last accessed: 31 May 2016
12. Visser, K. (2010). Technical Perspectives of and Innovation Applied to CO2 Refrigeration in Australia. Available at: http://www.mga.asn.au/files/omrrbwwend/french_refrigeration_journal.pdf. Last accessed: 5 Mar 2016
13. AIRAH (Aug 2008). Australian Supermarket First. Available at: http://www.airah.org.au/imis15_prod/Content/Files/EcoLibrium/2008/August2008/2008-08-F01.pdf. Last accessed: 14 Mar 2016; Facility Management Magazine (15 May 2015). How Coles has reduced its refrigeration costs and environmental impact. Available at: <http://www.fmmagazine.com.au/sectors/how-coles-has-reduced-its-refrigeration-costs-and-environmental-impact/>. Last accessed: 26 Feb 2016
14. Translated from Consum (8 Jul 2015). Consum abre su segunda tienda en Molina de Segura (Murcia). Available at: <http://www.consum.es/consum-doc/prensa/notas/150708ApMolinadeSegura.pdf>. Last accessed: 15 Mar 2016
15. shecco (Mar 2016). Accelerate. See p46. Available at: http://www.r744.com/articles/6924/stores_keep_their_cool_as_spanish_co_sub_2_sub_transcritical_market_hots_up. Last accessed: 15 Mar 2016
16. Temperatures calculated using data provided by World Meteorological Organisation (2016). World Weather Information Service. Available at: <http://worldweather.wmo.int/en/city.html?cityid=1948>. Last accessed: 14 Mar 2016
17. R744.com (15 Jun 2015). Coop Liguria installs first CO2 transcritical rack. Available at: http://www.r744.com/articles/6467/coop_liguria_installs_first_co_sub_2_sub_transcritical_rack. Last accessed: 4 Feb 2016
18. Ibid
19. R744.com (3 Dec 2015). Challenging CO2 Efficiency in High Ambient Temperatures. Available at: http://www.r744.com/articles/6856/challenging_co_sub_2_sub_efficiency_in_high_ambient_temperatures. Last accessed: 28 Jan 2016
20. R744 (2 Feb 2016). Japanese Giant Panasonic First to Deliver CO2 Transcritical to Taiwan. Available at: http://www.r744.com/articles/6856/japanese_giant_panasonic_first_to_deliver_co_sub_2_sub_transcritical_to_taiwan. Last accessed: 18 Feb 2016
21. A.J. Baker (2015). New Transcritical CO2 Refrigeration at IGA Morris PL INNALOO, W.A. Available at: <http://ajbaker.com.au/projects-news/article/25>. Last accessed: 17 May 2016
22. Temperatures calculated using data provided by World Meteorological Organisation (2016). World Weather Information Service. Available at: <http://worldweather.wmo.int/en/city.html?cityid=314>. Last accessed: 2 June 2016
23. A.J. Baker (2015). IGA Kingsley, the 1st Low & Medium Temperature CO2 Supermarket System in W.A. Available at: <http://ajbaker.com.au/projects-news/article/25>. Last accessed: 17 May 2016
24. Cooling Post.com (26 May 2016). Italy's largest hypermarket goes CO2. Available at: <http://www.coolingpost.com/features/italys-largest-hypermarket-goes-co2/>. Last accessed: 2 June 2016
25. Makro (2016). About us - Environment. Available at: <https://www.makro.co.za/about/environment>. Last accessed: 23 Feb 2016
26. Engineering News (29 May 2015). Retail Group Saves Nearly 8,000kl of Water. Available at: <http://www.engineeringnews.co.za/print-version/retail-group-saves-nearly-8-000-ky-of-water-2015-05-29>. Last accessed: 24 Feb 2016; Fridge Trade SA (21 June 2014). Makro's 10 Secrets of Increasing HVAC-R Energy Efficiency. Available at: <http://fridgetrade-sa.com/makros-10-secrets-increasing-hvac-r-energy-efficiency/>. Last accessed: 23 Feb 2016
27. Fridge Trade SA (21 June 2014). Makro's 10 Secrets of Increasing HVAC-R Energy Efficiency. Available at: <http://fridgetrade-sa.com/makros-10-secrets-increasing-hvac-r-energy-efficiency/>. Last accessed: 23 Feb 2016
28. EIA (2014). Chilling Facts VI: Closing the Door on HFCs. Available at: <https://eia-international.org/wp-content/uploads/EIA-Chilling-Facts-VI-FINAL.pdf>. Last accessed: 18 Mar 2016
29. Marukyu Co. Ltd. (Feb 2016). CO2 Refrigeration Case Study. Available at: http://www.atmo.org/presentations/files/56b9f91aa4ef1455029488_092ED.pdf. Last accessed: 21 Feb 2016
30. Ibid
31. Shecco (Feb 2016). Accelerate. See p48. Available at: <https://issuu.com/shecco/docs/aal601/48>. Last accessed: 15 Mar 2016
32. Ibid
33. Ibid
34. Temperatures calculated using data provided by World Meteorological Organisation (2016). World Weather Information Service. Available at: <http://worldweather.wmo.int/en/city.html?cityid=1233>
35. Simply Supermercados (16 Mar 2015). Simply Supermercados presentation at ATMosphere Europe 2015: Simply Gordoniz Bilbao. Available at: http://www.atmo.org/presentations/files/585_55_gabriel_romero_auchan_super_spain.pdf. Last accessed: 22 Jan 2016
36. R744.com (25 Mar 2015). Gabriel Romero: Simply Gordoniz Bilbao (Spain) CO2 transcritical booster. Available at: http://www.r744.com/knowledge/papersView/romero_simply_atmoeuropa2015. Last accessed: 13 Mar 2016
37. Auchan (2014). 2014 CSR Report. Available at: http://www.groupe-auchan.com/fileadmin/documents/2015/Volet_RSE_Groupe_Auchan_2014_GB.pdf. See p52. Last accessed 12 March 2016
38. Temperatures calculated using data provided by World Meteorological Organisation (2016). World Weather Information Service. Available at: <http://worldweather.wmo.int/en/city.html?cityid=195>. Last accessed: 14 Mar 2016
39. R744.com (26 Nov 2016). Hiber reaping CO2 transcritical dividends. Available at: http://www.r744.com/articles/6762/hiber_reaping_co_sub_2_sub_transcritical_dividends_dr. Last accessed: 12 March 2016
40. Ibid
41. Ibid
42. Ibid
43. Shecco (2013). Guide North America Case Studies - Mycom Mayekawa. See p3. Available at: http://www.ammonia21.com/web/assets/link/4091/GUIDE_NA_Case%20Study_MYCOM_1.pdf. Last accessed: 12 Mar 2016
44. R744.com (2 July 2014). Hillphoenix to unveil first warm-climate CO2 transcritical installation at Sprouts Farmers Market Georgia. Available at: http://www.r744.com/articles/5426/hillphoenix_to_unveil_first_warm-climate_co_sub_2_sub_transcritical_installation_at_sprouts_farmers_market_georgia. Last accessed: 14 Mar 2016
45. R744.com (5 Oct 2015). Grocery store using Emerson compressors, controls proving effective in 'Hotlanta'. Available at: http://www.r744.com/articles/6672/grocery_store_using_emerson_compressors_controls_proving_effective_in_hotlanta. Last accessed: 14 Mar 2016; Temperatures calculated via data provided by WMO (2016). Climatological info for Atlanta. Available at: <http://worldweather.wmo.int/en/city.html?cityid=268>. Last accessed: 14 Mar 2016
46. College of Climate Change (2014). Tesco Asia's first zero carbon store uses hydrocarbons. Available at: <http://collegeofclimatechange.com.au/tesco-asias-first-zero-carbon-store-uses-hydrocarbons/> Last accessed: 9 March 2016
47. Tesco (15 May 2013). Tackling Refrigerant Emissions. Available at: http://www.tescopl.com/assets/files/cms/Resources/Tackling_refrigeration_emissions_15052013.pdf. Last accessed: 9 March 2016
48. Tesco (2013). Tackling Refrigeration Emissions. Available at: https://www.tescopl.com/assets/files/cms/Resources/Tackling_refrigeration_emissions_15052013.pdf. Last accessed: 17 May 2016
49. R744.com (21 Jan 2016). Walmart opts for CO2 refrigeration technology in Argentina. Available at: http://www.r744.com/articles/6840/walmart_opts_for_co_sub_2_sub_refrigeration_technology_in_argentina. Last accessed 23 Feb 2016; Available at: https://issuu.com/shecco/docs/aa_12-book-v6final/12 Last accessed: 22 Feb 2016
50. Bitzer South Africa (16 Feb 2016). Retail store increases in size by 50% & reduces energy consumption by 30%. Available at: <http://bitzersa.blogspot.co.uk/>. Last accessed: 23 Feb 2016
51. Woolworths Holdings Ltd. (2015). 2015 Good Business Journey Report. See p94. Available at: http://www.woolworthsholdings.co.za/investor/annual-reports/ar2015/whl_2015_gbj.pdf. Last accessed: 23 Feb 2016

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