Transitioning HFCs in India

Why Multinationals Must Support India's Kigali Amendment Goals



environmental investigation agency

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The Environmental Investigation Agency (EIA) is an independent campaigning organization that identifies and campaigns for solutions to the world's most pressing environmental problems. 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 over a decade.

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INTRODUCTION

In 2016, EIA released Transitioning HFCs in India, a report estimating the growing contributions of multinational fast food and beverage companies to hydrofluorocarbon (HFC) emissions in India.[1] Since the last report was published, the HFC regulatory landscape has changed dramatically. In October 2016, India along with nearly 200 other Parties to the Montreal Protocol adopted the historic Kigali Amendment on HFCs, committing the world's nations to significantly reduce consumption and production of HFCs.

The Kigali Amendment, if properly implemented, is expected to prevent 70 billion metric tons of CO_2 equivalent ($MTCO_2e$) emissions by 2050. Under the agreement, India will freeze and then phase-down HFCs starting in 2028.[2] India also launched the second stage of its plan to phase out the ozone depleting refrigerants that are precursors to HFCs, hydrochlorofluorocarbons (HCFCs). The plan, which will run from 2017 to 2023, could reduce up to 10 million $MTCO_2e$ emissions annually.[3] Early action by multinational companies that are major end users of HFCs can help reduce India's baseline HFC emissions under the Kigali Amendment and support the country's efforts to implement the Kigali Amendment. For this year's report, EIA reviewed the same companies from last year which fall into two categories: eight of the largest fast food chains and four of the largest food and beverage manufacturers were surveyed and studied. Anheuser-Busch InBev is a new addition to this year's report due to its recent acquisition of SABMiller, a member of Refrigerants, Naturally![4] and the second-largest beer company in India by market share. The Indian beer market is expected to grow at an annual rate of 7.5% over the next five years and holds significant potential for long-term growth.[5]

India's foodservice industry is growing rapidly, which will contribute to India's growing consumption of HFCs until the Kigali Amendment goes into effect unless efforts are made to prevent that growth. According to the National Restaurant Association of India, the restaurant sector in India is expected to grow by 10% annually through 2021, with nearly three quarters of the sector consisting of 'quick service' and 'casual dine-in' formats like those operated by the major fast food chains covered in this report.[6] The fast growth in this sector and rapid number of new restaurant locations opening represents an opportunity to shift the market for new equipment toward HFC-free alternatives in both refrigeration and air conditioning.

Despite the clear policy signals at the national and international levels, the food and beverage companies operating in India seem to have made little progress in moving away from HFCs over the past year. Only Hindustan Unilever provided EIA with India-specific information on adopting HFC-free equipment. Overall, the five food and beverage manufacturers have made more progress as a group toward tangible commitments and actions on HFCs, but sufficient information is still lacking on the breakdown and impact of these commitments in major emerging markets such as India. Some of the fast food chains have taken limited action in other countries to move beyond HFCs, but they do not seem to have plans to apply these changes in India.

The conclusions drawn from this year's report show that transitioning to HFC-free refrigeration and air conditioning equipment in the rapidly growing Indian market makes sense economically as well as environmentally. By purchasing HFC-free equipment in all new retail locations, our analysis estimates the eight fast food chains could save in excess of $300 million USD in electricity costs between now and 2030 due to the increased energy efficiency of HFC-free equipment. There is very little evidence that companies have fully recognized these tremendous potential cost-savings from the energy efficiency gains of HFC-free equipment. HFC refrigerants have also begun to see price hikes and supply shortages in other countries as phase-down policies come into effect. It is only a matter of time before these price increases come to India, yet many of the multinational companies in this report are doing very little to prepare.

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CLIMATE IMPERATIVE & KIGALI AMENDMENT

In October 2016, Parties to the Montreal Protocol agreed to adopt the Kigali Amendment to phase down HFCs globally. The Kigali Amendment represents the largest near-term temperature reduction from any single agreement, and has the potential to catalyze significant additional climate benefits beyond what is already projected.

The Kigali Amendment will cap and phase down HFC consumption starting in 2019, with developed countries taking the first steps of climate action, and developing countries beginning the phase-down in 2024. Most developing countries, including China have committed to freeze HFC consumption in 2024 (Group 1). A second, later schedule was agreed for a small number of countries including India, Kuwait, Pakistan, and Saudi Arabia, which will freeze HFC consumption in 2028 (Group 2).

The Kigali Amendment, if implemented successfully, could avoid emissions of over 70 billion $MTCO_2e$ by 2050. In the absence of proper implementation of the Amendment, the climate benefits previously achieved by the Montreal Protocol during the phase-out of ozone depleting substances, could be significantly offset by the growth in HFC consumption and emissions over the coming decades (see Figure 1).[7]

The next seven years before India's HFC freeze takes effect represents a substantial opportunity for early action to reduce the baseline consumption and emissions under the Kigali Amendment. Between 2020 and 2030 India's annual direct emissions related to HFC use and the cooling sector are expected to increase from 72 million to 111 million $MTCO_2e$.[8] This leaves nearly 40 million $MTCO_2e$ of increased annual HFC emissions in India that could be prevented by early action over the next decade.

Some multinationals have already committed voluntarily to phasing down HFCs in refrigeration. In October, 2016 the Consumer Goods Forum (CGF), a group of major manufacturers, announced its support for the Kigali Amendment and its renewed commitment to a rapid phase down of high GWP HFCs in commercial and industrial refrigeration. The CGF Refrigerant Resolution commits members of the CGF to installing new equipment using only nautural refrigerants and low-GWP refrigerants under 150 GWP in all markets where it is commercially viable to do so and to work with suppliers, civil society, and governments to break down barriers to deploy in markets where they exist. Finally, CGF members have committed to developing individual targets and action plans to measure and achieve these goals and to regularly publish information on their progress. Coca-Cola, PepsiCo, Unilever, and Nestle are all members of the CGF.

Montreal Protocol and HFCs

The Montreal Protocol is widely hailed as the most successful environmental agreement in history, phasing out 98% of ozone depleting substances (ODS) and putting the ozone layer on the path to recovery by the middle of this century. Since most ODS such as hydrochlorofluorocarbons (HCFC) and chlorofluorocarbons (CFC) are also powerful greenhouse gases (GHGs), the Montreal Protocol has avoided more than 135 billion $MTCO_2e$ emissions through phasing out their production and consumption.[9] Under the Montreal Protocol, Parties have historically achieved close to 100% compliance rates, with many meeting their targets well ahead of reduction schedules. HFCs are man-made, highly potent GHGs used as replacements for ODS in refrigeration and air-conditioning equipment. Natural climate-friendly alternatives such as CO_2, ammonia and hydrocarbons, which do not damage the climate or the ozone layer, are commercially available and rapidly gaining market share.

If left unchecked, HFC emissions will continue to increase exponentially and could constitute up to 19% of all GHG emissions by 2050 globally and contribute to up to half a degree Celsius of warming by the end of the century. It is essential that companies operating in India demonstrate that there is momentum by private industry to transition to low-GWP technologies. Due to its size and projected growth (see Figure 2), the Indian market will be key to the development and penetration of low GWP technologies globally and will play a critical role in achieving a quick phase-out of HFCs. End-user leadership, including but not limited to the fast food industry, is a fundamental piece to a successful transition of the Indian market to low global warming potential (GWP) technologies.

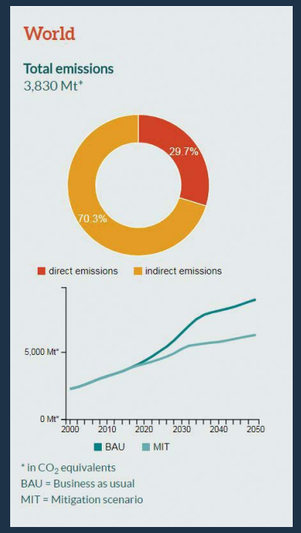


Figure 1. Projected World Emissions of HFCs

Green-Cooling-Initiative.org

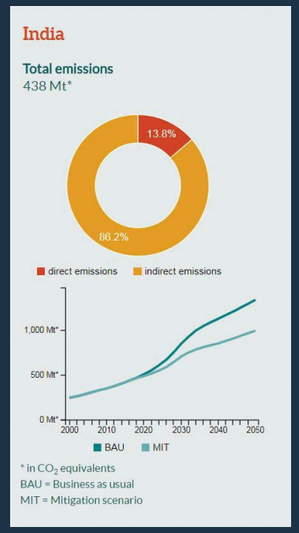


Figure 2. Projected Emissions of HFCs in India

Green-Cooling-Initiative.org

THE ENERGY EFFICIENT SOLUTION

Refrigeration and cooling account for about half of a restaurant's electricity consumption and over a quarter of its total energy use.[10] While direct greenhouse gas emissions from refrigerant releases are significantly large, as detailed in the Key Findings and Climate Section of this report, the indirect greenhouse gas (GHG) emissions from energy consumption of air conditioning and refrigeration equipment are an order of magnitude larger.

The eight fast food chains surveyed in this report could add more than 120 million $MTCO_2e$ from increased electricity consumption in India by 2030. The cumulative impact on the climate from this added electricity consumption would be equivalent to the annual emissions of about 26 million cars. However, natural, low-GWP refrigerants including hydrocarbons and ammonia have properties that are well suited to operating efficiently under high ambient conditions such as those in India, while carbon dioxide (R-744) solutions are also emerging as a viable option in many hot climates (up to 40°C) when paired with efficiency enhancing technologies.[11] Transitioning to low-GWP refrigerants and increasing energy efficiency go hand-in-hand in reducing GHG emissions.

AIR CONDITIONING

A typical rooftop commercial AC unit in a hot and humid climate can consume more than 20,000 kilowatt-hours[12] in one year resulting in lifetime GHG emissions of more than 540 $MTCO_2e$ from one unit alone. This is the equivalent amount of CO_2 that 114 cars emit in one year. With each fast food outlet having an average of two rooftop units[13] and with the number of fast food outlets in India projected to grow from a few thousand to over fifteen thousand in the



Figure 3. A typical rooftop AC unit can consume more than 20,000 kWh/year.
Image Credit: U.S. Department of Energy

next decade,[14] increasing the energy efficiency of AC units through the use of natural refrigerants can put a significant dent in the energy use and emissions of India's commercial sector.

Ammonia (R-717) is the most thermodynamically efficient refrigerant at high ambient conditions. Two new technologies, low charge ammonia and secondary loop systems, are making ammonia a viable choice for a broader range of industrial, commercial, and even domestic applications. Low charge ammonia systems are available in various types of commercial refrigeration and air conditioning systems including packaged systems and chillers.[15] Packaged ammonia systems in particular have been shown to achieve 20-25% reductions in energy consumption and have a 50-75% reduction in charge size.[16] Low-charge ammonia systems including rooftop units are becoming increasingly popular worldwide.[17]

Hydrocarbons, including propane (R-290) and isobutane (R-600a), have been proven safe and effective refrigerants to use in many kinds of small to medium sized equipment

For smaller fast food outlets, room air conditioners (RACs) using hydrocarbons may be a more viable option. Godrej developed India's first commercially available propane (R-290) split air conditioner in 2012 and has sold over 300,000 units since. In addition, the R-290 units provide 10% energy savings compared to similar R-22 and R-410A units.[18]

REFRIGERATION

A typical fast food outlet can have up to 20 pieces of refrigeration equipment including walk-in refrigerators and freezers, reach-in refrigerators and freezers, ice machines, under the counter refrigerators and freezers, fountain machines, refrigerated prep tables, and ice cream machines. The larger pieces of equipment (e.g., walk-in refrigerators) each use more than 10,000 kilowatt-hours annually resulting in indirect emissions over the lifetime of the equipment of 270 $MTCO_2e$. This is the same as the annual emissions of 57 cars.

Hydrocarbons, including propane (R-290) and isobutane (R-600a), have been proven safe and effective refrigerants to use in many kinds of small to medium sized equipment for domestic and light commercial uses, including stand-alone commercial refrigerators and freezers, vending machines, water coolers, and ice makers. Commercially-available foodservice and food retail coolers and freezers using propane have been shown to be 15% to 25% more

Component Suppliers that can Support Natural Refrigerants

As food and beverage, food retail, and foodservice companies transition from HFCs toward natural refrigerants, there will be greater demand-side pressure on manufacturers of HVAC and refrigeration equipment as well as their component suppliers. Two such component suppliers have proactively embraced natural refrigerants conducting the R&D and providing the components and systems needed to fully utilize natural refrigerants on the Indian market.

In November 2014, Danfoss India inaugurated its new manufacturing and administrative campus in Chennai. The campus features an "ammonia training unit" which serves as an operational demonstration of the technology and provides training for ammonia systems. Danfoss has an overall mission to improve knowledge and use of ammonia and to improve training in India and abroad.[80] At this campus, the company is working to apply natural refrigerant technology in India that is available elsewhere in the world. This includes research on applying transcritical CO_2 to the high ambient temperatures of India, and focuses on refrigeration and HVAC from 2 tons all the way up to 50 tons. Danfoss has said that high ambient temperatures as well as cost and skill level/training of technicians are some of the barriers to adopting natural refrigerants. The new campus is working to overcome these barriers.[81]

Kirloskar is another such company that provides components and systems to the industrial sector including for food processing, food preservation, cold storage, beverage, and dairy/ice cream applications. Kirloskar has provided a number of compressors, packages, and systems that utilize natural refrigerants such as ammonia, propane, and propylene.[82] Nestlé, for example, is mainly using ammonia in its manufacturing facilities in India using Kirloskar compressors.[83]

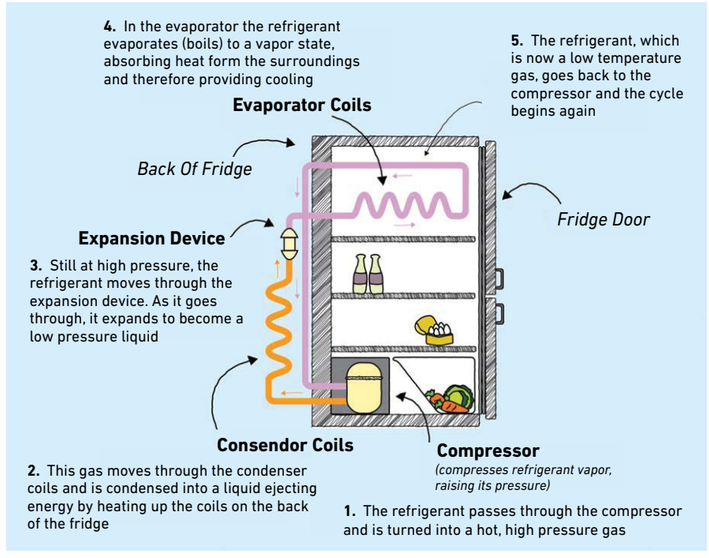


Figure 4. A typical refrigeration cycle.
Image credit: EIA, Chilling Facts V

energy efficient than similar HFC equipment.[19] True Manufacturing offers a variety of propane refrigeration equipment for foodservice in the Asia-Pacific region including undercounter units, prep tables, and reach-in units.[20] Testing by Emerson has shown that R-290 consistently outperforms R-404A in commercial refrigeration equipment.[21]

CO_2 stand-alone systems have been installed all over the world and are showing energy efficiency improvements of 18% to 37% compared to HFC-134a units depending on the climate, with some advanced micro-distributed systems achieving as much as 79% increased efficiency.[22] In addition, Panasonic provides CO_2 refrigeration systems for foodservice and food retail in India through the distributor APIN-CC that provide 20% energy savings over systems using R-404A.[23]

ENERGY EFFICIENCY STANDARDS

In 2006, the Bureau of Energy Efficiency (BEE) established the Standards and Labeling Programme for equipment and appliances. Currently, only room air conditioners and household refrigerators have to comply with mandatory energy efficiency standards. At the same time, there are no energy efficiency standards, either mandatory or voluntary, for commercial refrigeration or air conditioning equipment.[30, 31] Updated standards for commercial equipment would increase the availability and uptake of natural refrigerants and lower the indirect emissions from retail and foodservice outlets throughout India.

THE NEED FOR SMARTER SAFETY STANDARDS

The Kigali Amendment provides a strong market signal that will accelerate innovation and technology development for climate-friendly refrigeration technologies, conditions which may trigger a more rapid HFC phase-down than currently prescribed under the amendment. Some HFC-free technologies face barriers to widespread uptake due to restrictive industry standards, in particular for flammable refrigerants.

One such standard, the International Electrotechnical Commission, IEC 60335-2-89, only allows up to 150 grams of flammable refrigerants, like hydrocarbons, in commercial refrigeration equipment. While 150 grams is sufficient for many types of commercial refrigeration equipment, it limits use of hydrocarbons in some larger pieces of equipment such as walk-in freezers. A larger charge size may also allow for more cost effective design of some pieces of equipment. Several proposals have been made to increase the charge size limit in the IEC standard to between 300 grams to up to 1 kilogram, when equipment is installed and designed according to certain requirements. These proposals, if passed, would allow use of flammable low-GWP alternatives such as hydrocarbons in a much wider range of commercial refrigeration system capacities and configurations, and make these systems more cost effective. In addition, it would increase the availability of low-GWP, energy-efficient commercial refrigeration for use in retail and foodservice outlets throughout India. Similarly, revising standards on air conditioning could also increase the availability of low-GWP, energy efficient AC equipment in India's commercial sector.

Hindustan Unilever

Unilever, headquartered in London, United Kingdom, with Hindustan Unilever (HUL) headquartered in Mumbai, has over 30 factories in India with products available in over 7 million retail outlets.[75] HUL's brands, include ice cream brands, such as Magnum and Kwality Wall's. Additionally, HUL operates small, regional warehouses throughout India with Freon or ammonia refrigeration. As of August 2017, HUL has 73,000 standalone freezer cabinets throughout India that use hydrocarbons.[76] Globally, Unilever has more than 2.3 million hydrocarbon freezers in use.[77]

The use of hydrocarbon freezers by Unilever has the potential to avoid up to 125,000 $MTCO_2e$ in direct emissions compared to HFC standalone retail units,[78] and according to the company, provide energy savings of about 9%, further avoiding emissions from less efficient HFC units. In addition HUL uses electronic condensing fan motors and high efficiency compressors to further increase energy efficiency.

To prevent refrigerant leakage from the standalone freezer cabinets the company reduced the number of brazed joints in the refrigeration circuit, introduced vibration elimination loops in the condensing unit, and eliminated flare nuts, flared unions, and dead nuts. Additionally, HUL also periodically services the condensing units. HUL has acknowledged barriers to adopting natural refrigerants, including:

- The lack of Indian manufacturers of HFC-free equipment
- The lack of skilled technical manpower for which it has developed and applied in-house training concepts to overcome
- Spare parts have to be imported from other countries as there are currently no suppliers in India
- A ten month delay to find a supplier of hydrocarbon refrigerant with the necessary licenses and permits to import the refrigerant
- The lack of regulatory framework, specifically with regard to use of hydrocarbons as a refrigerant in commercial appliances, on safe storage of hydrocarbon cabinets and hydrocarbon refrigerant, on service technician skills requirements, and on service station safety compliance.

HUL has stated that it would be essential to partner with like-minded stakeholders going forward to overcome these challenges.[79]

METHODOLOGY

This report estimates the total lifecycle emissions impact of equipment used in existing and new retail locations by 2030, including both the emissions from refrigerant use and indirect emissions from electricity consumption. Direct lifecycle emissions represent the total emissions impact of the HFC refrigerant.

This number is calculated based on an average number of pieces of refrigeration equipment in each restaurant[32], charge sizes[33], leakage rates, equipment lifetimes,[34] and type of refrigerant[35] used in various types of refrigeration equipment (reach-in refrigerator and freezers, walk-in coolers and freezers, ice machines, undercounter refrigerator and freezers, refrigerated prep tables, fountain machines, and ice cream machines).[36] The direct emissions from air conditioning equipment were calculated in a similar manner.[37, 38]

Indirect lifecycle emissions represent the total emissions from electricity use of equipment. This number takes into account greenhouse gas emissions factors for electricity consumption in India,[39] nameplate power inputs, and usage factors of different types of refrigeration equipment[40] with the same number/type of equipment and equipment lifetimes as the direct emissions calculations. The annual electricity consumption for the air conditioning equipment was calculated using Pacific Northwest National Lab's rooftop unit comparison calculator[41] with the same number of equipment and equipment lifetimes as the direct emissions calculations.

Projections to 2030 are based on a compound annual growth rate (CAGR) of 10% for the Indian foodservice market.[42]

Cumulative savings from reduced energy consumption (in new stores) through 2030 take into account average price of electricity in India[43], CAGR of the Indian foodservice market, and 25% energy savings from HFC-free equipment (see "The Energy Efficient Solution" section).

KEY FINDINGS ON CLIMATE IMPACT

EIA analyzed information on each of the following companies from publicly available sources, including the companies' current commitments, actions, and goals on climate change and sustainability; more specifically, on HVAC, refrigeration, and HFCs.

While some companies now have India-specific information related to HFCs, most companies still have little to no information on HFCs or climate change. In addition, EIA also calculated the direct lifecycle emissions, indirect lifecycle emissions, and cumulative savings from reduced energy consumption through 2030 for eight of the largest fast food chains in India.

Key findings on climate impacts and preventable emissions:

- The direct emission benefits alone that would be achieved by 2030 of transitioning to HFC-free systems add up to 7 million $MTCO_2e$, which is the equivalent of taking 1.5 million cars off the road for one year.
- By transitioning to HFC-free systems, these chains would also achieve energy efficiency gains of between 15-25% resulting in avoided indirect emissions of between 16-31 million $MTCO_2e$, the same as taking 3-7 million cars off the road for one year.
- The reduction in electricity consumption resulting from these efficiency gains would also lead to cumulative cost savings for these companies of up to $300 million through 2030.

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Key findings on company commitments and actions toward adopting HFC-free technologies:

- There has been little to no progress since last year's report in terms of new commitments and actions or additional information on HFC use provided by these companies.
- Food and beverage manufacturing companies appear to have made faster progress than the fast food chains toward transitioning away from HFCs. All five food and beverage manufacturers have made information available on some specific HVAC commitment or action related to HFC-free refrigerants with several committing to integrate HFC-free equipment in new purchases across their value chains. On the other hand, only three out of eight fast food chains had information on using HFC-free refrigerants and none had specific commitments to using HFC-free refrigerants in new equipment.
- Three of the fast food chains have taken some actions to test or pilot HFC-free equipment, but none have made information available about applying these actions to the Indian market. Notable examples of this include McDonald's, which has installed 9,000 pieces of HFC-free equipment in Europe and Starbucks, which has conducted initial lab testing of R-290 equipment in the United States.
- Many of the fast food chain companies have energy efficiency commitments in place, but very few have explicitly recognized the energy benefits of transitioning to HFC-free equipment and none have quantified these benefits in terms of emissions and cost-savings.



Table 1: **Key Findings on Climate Impact of Fast Food Chains**

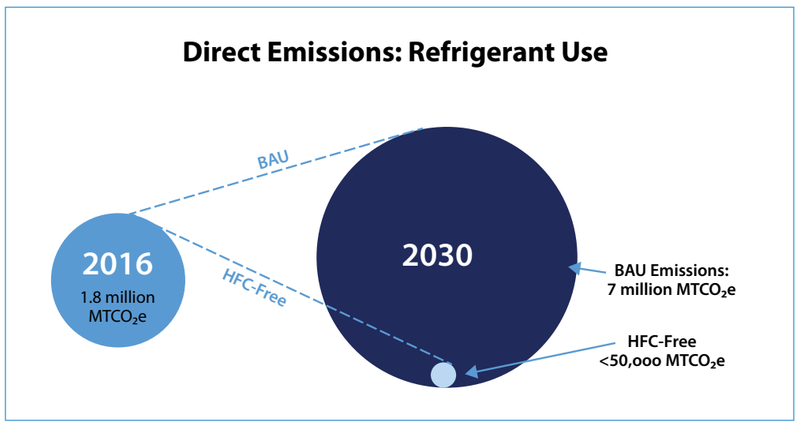
	Burger King	Café Coffee Day	Domino's	Dunkin' Donuts	McDonald's	Starbucks	Subway	Yum! Brands
Number of outlets in India[44]	100	1,607	1,125	55	173	84	613	661
World Headquarters	Miami, Florida, USA	Bangalore, India	Ann Arbor, Michigan, USA	Canton, MA, USA	Chicago, Illinois, USA	Seattle, Washington, USA	Milford, Connecticut, USA	Louisville, Kentucky, USA
India Headquarters	New Delhi	Bangalore	New Delhi	New Delhi	New Delhi	Mumbai	Gurgaon	Gurgaon
Direct lifecycle emissions by 2030 ($MTCO_2e$)	158,838	2,552,501	1,786,911	87,361	274,788	133,422	973,668	1,049,909
Indirect lifecycle emissions by 2030 ($MTCO_2e$)	2,749,322	44,181,605	30,929,873	1,512,127	4,756,326	2,309,432	16,853,343	18,173,021
Cumulative savings from reduced energy consumption through 2030*	$6,811,888	$109,467,048	$76,633,746	$3,746,539	$11,784,567	$5,721,986	$41,756,876	$45,026,583
General Commitments & Actions	Developed design standards to help improve energy and water conservation, which are now required at all new and remodeled Burger King restaurants in the U.S. and Canada.	No publically-available information related to sustainability	No publically-available information related to sustainability	Established DD Green Achievement program to help U.S. franchisees build sustainable, energy-efficient restaurants[45]	Goal of 20% increase in energy efficiency of company-owned restaurants in top 9 markets[49]	Build and operate 10,000 greener retail stores globally by 2025 Invest in 100% renewable energy to power operations globally by 2020[50]	Focused sustainability initiatives on energy efficiency, water & resource conservation, waste reduction, sustainable sourcing and supply chain management[51]	Succeeded in its goal to reduce energy consumption in company-owned restaurants by 15% by the end of 2015 and reduced energy consumption by 17%.[52]
HVAC and Refrigeration Commitments & Actions	High efficiency rooftop HVAC units were used in U.S. restaurants in 2016.[46]	No publically-available information related to refrigeration or HVAC	No publically-available information related to refrigeration or HVAC	Upgraded to ENERGY STAR certified vending machines with HFC-free insulation at its headquarters and placed HVAC units on a schedule to turn on and off depending on occupancy	In 2003, opened world's first 100% HFC-free restaurant in Denmark and is operating several more HFC-free stores in Denmark and Germany. Since 2010, McDonald's Europe has installed more than 9,000 HFC-free systems, including meat freezers, frozen fry dispensers, blended ice machines, ice machines, juice dispensers, and beverage chillers.[53] In 2014 McDonald's reaffirmed its commitment stating, "We will also continue to work with our equipment suppliers to develop and implement HFC-free refrigerant solutions."[54]	Starbucks conducted initial lab testing of R-290 equipment in Seattle and validated performances in different climates and stores indicating opportunity for 20% energy reduction per unit[55] Developed a strategy to implement natural refrigerants into front and back of house refrigeration units. Plans to transition more than 150,000 units to natural refrigeration equipment.[56]	Back counter chillers in the United Kingdom and Ireland use hydrocarbon-based refrigerants and saves more than 13% energy than traditional systems.[57]	No publically-available information related to refrigeration or HVAC
Member of Refrigerants Naturally![47]	No	No	No		No	No	No	No

* The savings from using HFC-free equipment in new stores through 2030 assuming a 10% CAGR and 25% energy savings from HFC-free equipment

Table 2: **Key Findings on Climate Impact of Food and Beverage Manufacturers**

	Coca-Cola	Hindustan Unilever	Nestlé	PepsiCo	Anheuser-Busch InBev
Number of factories in India[58]	57	30+	8	45	10+
World Headquarters	Atlanta, GA, USA	London, UK	Vevey, Switzerland	Purchase, NY, USA	Leuven, Belgium
India Headquarters	Gurgaon	Mumbai	Gurgaon	Gurgaon	Bangalore
General Commitments and Actions	Reduce the carbon footprint of "the drink in your hand" by 25%	Halve the greenhouse gas impact of our products across the lifecycle by 2030[59]	25% reduction in GHG emissions from manufacturing and 10% reduction in GHG emissions from distribution by 2020	Commit to an absolute reduction in GHG emissions across global operations[60]	Secure 100% of purchased electricity from renewable sources by 2025 and reduce company's operational carbon footprint by 30%[61]
HVAC and Refrigeration Commitments and Actions	2.5 million units of HFC-free equipment in use worldwide[62] Phasing out the use of HFCs in all new cold-drink equipment as of 2015 Introduced CO2-based coolers in 2015 and are targeting complete replacement of HFC coolers in India.[63] Has invested more than $100 million over the past decade to make coolers more environmentally responsible[64]	There are currently 73,000 freezers with hydrocarbon technology in India, which covers more than 90% of their retail freezers in India, and they will be phasing out HFC freezers completely[65] By the end of 2016, they had purchased over 2.3 million freezers worldwide containing natural hydrocarbon refrigerants[66]	Using natural refrigerants for 84% of industrial refrigeration needs in Asia As of 2016, all Nestle's new ice cream chest, island, and upright freezers worldwide use natural refrigerants[67]	350,000 HFC-free units in use worldwide[68] PepsiCo has placed HFC-free equipment in 30 countries, including India, Mexico, China, Russia, and Brazil.[69 70] In the U.S., PepsiCo is phasing out HFCs from new vending machines and coolers in 2019[71]	Reached goal of 70% eco-cooler purchases in 2015, and this year, 96% of cooler purchases had at least two of the following features: LED lighting; energy-saving controllers; or eco-friendly refrigerant gas.[72] All SABMiller's breweries use ammonia for industrial refrigeration[73] SABMiller adopted propane as their refrigerant of choice for trade fridges and is committed to using natural refrigerants in 100% of new fridges procured by 2020[74]
Member of Refrigerants Naturally!	Yes	Yes	No	Yes	No

Figure 5. Refrigeration & Air Conditioning Emissions Eight Fast Food Chains in India



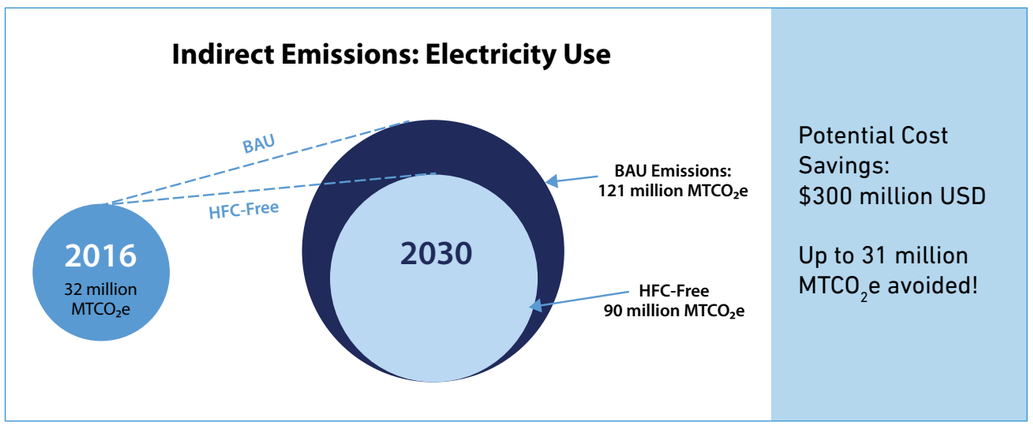


Image Credit: EIA Analysis

RECOMMENDATIONS

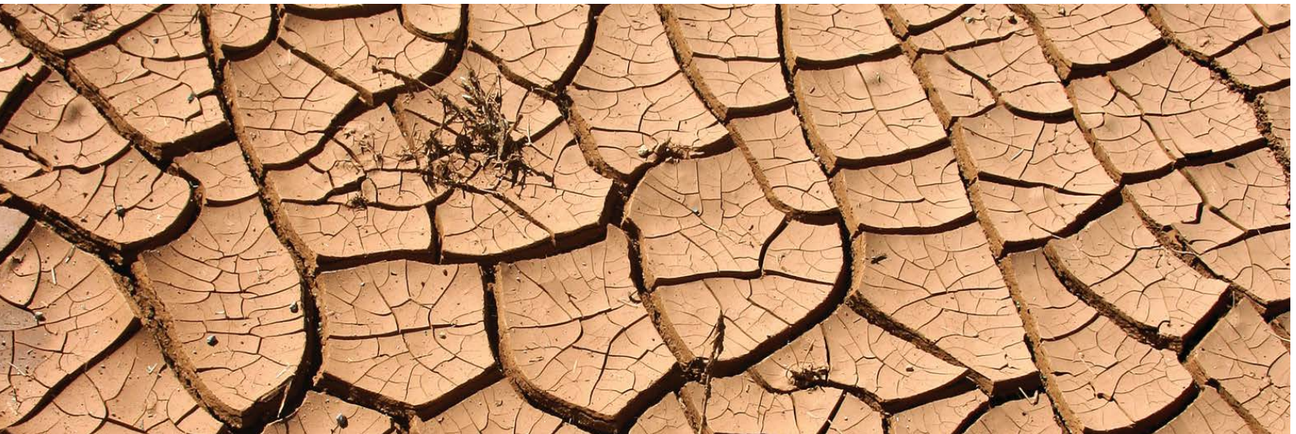
Fast food companies and food and beverage manufacturers must make a commitment to contribute to fast-mitigation of HFCs by:

- Rapid initiation of pilot programs for low-GWP equipment in stores throughout India.
- Development of a refrigerant management policy that mandates the following:
  - An inventory of all systems that use refrigerant and their refrigerant charge.
  - Annual leak checks and prompt repair of all leaks.
  - Recordkeeping of all refrigerant leaks, repairs, and disposal.
  - Installation of doors on all refrigeration retail equipment.
  - Proper disposal and destruction of all equipment and refrigerants at end-of-life.
  - Use of reclaimed HCFC or HFC refrigerants, where and whenever feasible, in servicing existing equipment.
- Development of in-house training concepts and procedures for safely servicing and maintaining equipment using flammable refrigerants.
- Make information publicly available in annual reports on progress toward adoption of HFC-free systems, including a country specific breakdown for major markets such as India on commitments and actions and number of HFC-free systems installed.
- Conduct a comprehensive assessment of potential energy and cost savings from adoption of HFC-free equipment on a per-store and cumulative basis and disseminate this information to franchises.

The Indian Government should... support transition to HFC-free technologies by increased capacity building of RAC servicing sector that could support these multinationals in increasing usage of natural refrigerants in India.

The Indian Government should:

- Mandate large multinationals to only install new equipment that utilize refrigerants under 150 GWP effective immediately
- Support transition to HFC-free technologies by increased capacity building of RAC servicing sector that could support these multinationals in increasing usage of natural refrigerants in India
- Mandate responsible disposal and destruction of all equipment and refrigerants at end-of-life by these companies
- Mandate reporting of leaks and emissions from these companies annually
- Update domestic standards for commercial equipment to increase the availability and uptake of natural refrigerants



The Shifting AC Market in India

The entrance of multinational companies to the Indian market is cited as a key driver of India's real estate boom and the associated rapid growth in demand for air conditioning. The fastest growing segment of the market is for air conditioners with a 5 star energy efficiency rating and those using inverters to achieve high energy efficiency.[25] The market is shifting toward split room air conditioners using inverters, which are expected to grow from 30% to 50% of the market between 2018 and 2020.[26]

At least 25 companies supply air conditioning equipment to the Indian market. Among these, at least six manufacturers are based in India including Godrej, Voltas, Blue Star, Videocon, Fedders Lloyd, and Onida.[27]

Godrej is the only Indian AC manufacturer making AC units that use hydrocarbon refrigerants, which have been assigned a 5 star rating. According to one market analyst, Godrej is targeting a 20% share of the 5-star and inverter segments of the Indian market.[28]

Several Chinese manufacturers that supply the Indian market have introduced hydrocarbon models to the domestic market in China including Midea and Gree. India remains a major untapped market for these companies which are seeking to gain market share in the Indian market.[29] Given the shifting trend in the Indian AC market toward energy efficient split AC units, there is a strong growth potential for 5-star rated units using hydrocarbons such as those produced by Godrej and Chinese manufacturers.

CONCLUSIONS

The Kigali amendment to the Montreal Protocol is a legally binding multilateral measure which mandates concrete, sector-wide HFC emission reductions for both developed and developing countries. With as few as four years left at current global greenhouse gas emissions level before the option to limit warming to 1.5°C is lost, the Kigali amendment represents a crucial contribution to the world's commitment under the Paris Agreement to avoid dangerous climate change.[84]

The 2016 Consumer Goods Forum Resolution commits members to "install new equipment that utilize only natural refrigerants or alternative ultra-low GWP refrigerants, effective immediately" in all commercial and industrial refrigeration equipment along the food and beverage supply chain.

Fast food companies operating in India have a significant opportunity to meet sustainability goals, reduce GHG emissions, increase the efficiency of operations, and provide leadership to the Indian market by transitioning to low-GWP technologies in new stores and in new equipment placed in existing stores. These global companies also have a responsibility to ensure that their growth in emerging markets such as India does not lead to a corresponding surge in the use of HFCs. It is therefore vital that these big multinationals do their part in minimizing Indian HFC consumption by managing their own refrigeration and AC footprint and contribute to the transition to a HFC-free India.



Figure 6. A typical fast food restaurant can have up to 20 pieces of refrigeration equipment.
Image Credit: U.S. Environmental Protection Agency

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EIA — WASHINGTON, DC

PO Box 53343, Washington, DC 20009, USA

www.eia-global.org

TEL + 1 202 483 6621

FA X + 1 202 986 8626

EMAIL info@eia-global.org