FREQUENTLY ASKED QUESTIONS

COOLING INDIA WITH LESS WARMING: THE BUSINESS CASE FOR PHASING DOWN HFCS

WHAT IS THE BUSINESS CASE FOR AN HYDROFLUOROCARBONS (HFCs) PHASE-DOWN?

What is the business case for phasing down HFCs in room and vehicle air-conditioners in India?

Markets around the world are shifting toward more climate-friendly alternatives to potent heat-trapping HFCs. Indian companies have an opportunity to start adopting these alternatives now with financing from the Montreal Protocol Multilateral Fund, avoid higher costs of transitioning later and gain greater access to domestic and foreign markets that are moving away from HFCs. Given the climate and economic benefits of shifting away from HFCs, most nations have expressed support for action under the Montreal Protocol, and many are already taking domestic actions to reduce HFCs. The world's largest economies, the G-20, recently committed to advance a global HFC phase-down. The United States also signed bilateral agreements with India and with China to work together towards an HFC phase-down.

Why should we work on phasing down HFCs now?

By adopting alternatives, India can take advantage of an emerging market and prevent a major share of future climate-changing emissions before they even occur. HFCs are powerful heat-trapping gases with "global warming potentials" (GWPs) hundreds or thousands of times greater than carbon dioxide. They are the fastest growing greenhouse gases in the world. While they represent a relatively small share of the current contribution to climate forcing (less than 1 percent of greenhouse gases), left unabated, HFC use could spike up to 18-fold by 2050. Policies have already been adopted to reduce HFC use in Europe, Japan, Australia, and the United States. To maintain a competitive edge globally, the Indian market will need to shift to HFC alternatives. India can also avoid higher transition costs later by avoiding HFCs where technologies are already available to replace hydrochlorofluorocarbons (HCFCs) currently being phased out under the Montreal Protocol, and where HFCs have already been implemented in uses such as vehicle air conditioners.

THE FASTEST-GROWING SHARE OF GREENHOUSE GAS POLLUTANTS IN THE WORLD ARE HFCs, OFTEN USED IN AIR CONDITIONERS AS A REFRIGERANT. MORE THAN 116 MILLION AIR CONDITIONING UNITS ARE FORECAST TO BE IN SERVICE IN INDIA BY 2030—MORE THAN 20 TIMES THE CURRENT NUMBER—SO ADDRESSING HFCs IN INDIA PRESENTS AN IMMEDIATE OPPORTUNITY TO CURB CLIMATE CHANGE.

These frequently asked questions (FAQs) are part of the continuing research project, Cooling India with Less Warming, a business case for phasing down hydrofluorocarbons (HFCs). Based on several business, government, and civil society discussions in India, this fact sheet answers some of the most often asked questions about an HFC phase-down and their alternatives for room and vehicle air conditioners. For more information, please see: http://www.nrdc.org/international/india/air-conditioner-efficiency.asp

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Much of the expected rise in HFC use will be in room and vehicle air conditioners. Approximately, 116 million room air conditioning units are expected to be in service in India by 2030—20 times more than the current number. Auto air conditioning is also booming. Shifting to cleaner chemicals in air conditioners makes business sense for the Indian market because it transitions away from outdated refrigerant technology in room and vehicle air conditioners and builds domestic and export industries based on more climate friendly alternatives. New room air conditioner models, already on the market, that use HFC alternatives are also more energy efficient and save costs and energy, thus making a stronger case for phasing down HFCs. In addition, HFCs leak from room and vehicle air conditioners during their working lives and when they are eventually retired. If we do not address HFCs now, then on a global basis they could raise the temperature a half degree centigrade by 2100, all by themselves. HFCs are a low hanging fruit to tackle climate change.

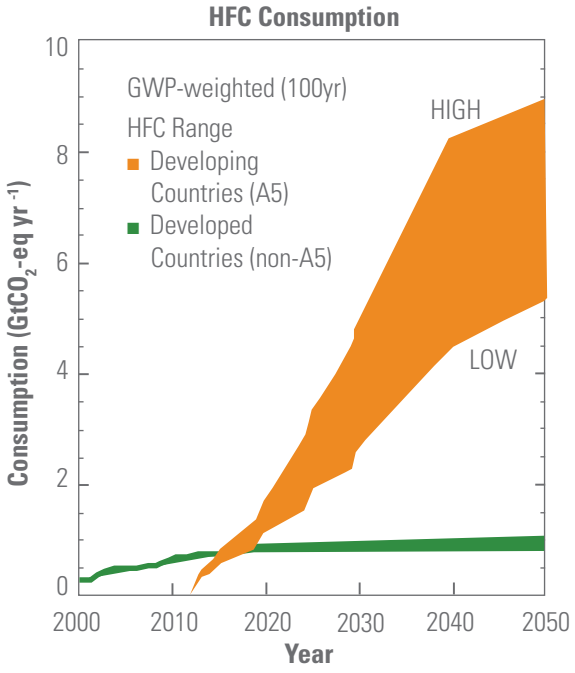
What are the alternatives to high-GWP HFCs and how available are they?

HFCs have multiple uses including in room and vehicle air conditioners, and in foams and other applications. Several existing and emerging alternatives for the range of HFCs uses are available. In India, Daikin has commercialized a mid-GWP compound, HFC-32, in highly energy-efficient room air conditioners. HFC-32 is not subject to production patents, and Daikin has released its patents for the design of HFC-32 room air conditioners. They are now manufactured in India and other developing countries, for both domestic and export sales. Godrej and Boyce produces energy-efficient room air conditioners using a low-GWP hydrocarbon, HC-290. This refrigerant is also unpatented, readily available and less expensive, and available for use by other companies. For vehicle air conditioners, HFO-1234yf is an alterative produced by DuPont and Honeywell, which holds certain patents. HFC-152a is another alternative that is out of patent and produced by many companies. Other companies are working toward producing alternative chemicals and equipment designs. Supply of HFO-1234yf is now sufficient to meet world demand with the opening of production-scale factories and plans for expansion.

The door is open for innovative industries to secure market share with a variety of HFC-alternative products. Costs will trend downward as scale and experience improve, and with the announced entry to the market of new producers.

Does HFO-1234yf pose an unacceptable flammability threat in vehicle air conditioners?

SAE International, the global professional society of automobile engineers, has investigated the potential flammability of HFO-1234yf extensively. Companies belonging to SAE account for 70% of all new vehicle sales worldwide. SAE's analysis found that the refrigerant poses an "extremely low-level risk," a million times lower than other auto fire risks. SAE found that flammability claims being made by one company were based on highly unrealistic crash test conditions, conditions that would be extraordinarily unlikely to occur in real life. Many of other components in automobiles are far more flammable—petrol, for instance. Yet, passengers and service workers are kept safe by effective systems designs—the same is true for HFO-1234yf in auto air conditioners.



Source: G.J.M. Velders et al., PNAS, 2009; 106:10949-10954.

Are hydrocarbon air conditioners feasible for the room air conditioner segment? Does the use of a flammable refrigerant pose a fire hazard?

Designed with relatively small charge sizes, hydrocarbons air conditioners have been found effective and safe, as evidenced by Godrej and Boyce's energy efficient air conditioning units already on the Indian market. As with automobiles, system designs can be used to reduce potential fire hazards for room air conditioners by limiting hydrocarbons leaks as well as, for smaller units, ensuring that leaks pose no flammability threats.

How can we inspire the Indian consumer to invest in green technology?

Energy wasteful air conditioners strain India's power grid, contributing to frequent blackouts and brownouts. They also cost consumers more money due to higher monthly electricity bills. The most modern climate-friendly air conditioning models cost much less to run, and they put lower demands on the power grid. They may have a higher price tag upfront, but payback in lower power bills. Air conditioning manufacturers can make a compelling business case to their customers that what is good for the environment also saves money. Energy-efficient models are the most attractive to anyone who wants all-day comfort at an affordable price.

HOW WOULD A PHASE-DOWN OF HFCS WORK?

HFCs are not ozone-depleting chemicals, so why should they be considered under the Montreal Protocol?

The 1987 Montreal Protocol is the treaty that saved the ozone layer by phasing out chlorofluorocarbons (CFCs), HCFCs, and other ozone-depleting chemicals. Because CFCs and HCFCs are powerful greenhouse gases, the Montreal Protocol has also played a key role in climate protection, beginning even before the United Nations Framework Convention on Climate Change and Kyoto Protocol existed.

HFCs fall within the jurisdiction of the Montreal Protocol and its parent agreement (the 1985 Vienna Convention) because the mandate of those treaties includes assuring the safety of replacement chemicals. HFCs were invented as replacements for CFCs and HCFCs, and their rapid growth is directly attributable to the phase-out of those chemicals under the Montreal Protocol. Though HFCs do not deplete ozone, they are powerful greenhouse gases.

The Montreal Protocol and the climate treaties could complement one another, without any conflict. The Montreal Protocol could control the *production and consumption* of manufactured chemicals, whereas the Kyoto Protocol could control and account for *emissions*. Controlling HFC production and consumption phase-down under the Montreal Protocol would complement, not conflict with, controlling emissions under the Kyoto Protocol and successor agreements under the UN Framework Convention on Climate Change. HFCs would remain under the Kyoto Protocol and future climate agreements for emissions reductions and accounting purposes, making both treaties mutually supportive.

The Montreal Protocol is built on the principles of common but differentiated responsibilities (CBDR). Developed countries are always obligated to act first. Developing countries follow after a grace period, and with the benefit of financial assistance provided through the Montreal Protocol's Multilateral Fund (MLF). Over the Montreal Protocol's 25-year history, the MLF has successfully raised and delivered more than U.S. $3 billion at a current level of about U.S. $500 million/year in assistance to developing countries, facilitating their phase-out of CFCs, HCFCs, and many other chemicals. Using the proven financing mechanism of Montreal Protocol to phase down HFCs offers a distinct advantage over climate treaties, under which a functioning financing mechanism has yet to be created.

Why a phase-down of HFCs and not a complete phase-out?

A phase-down provides time and flexibility for government and industry to manage the transition to alternative chemicals and technologies with the lowest carbon footprint (measured best by Life-Cycle Climate Performance). A phase-down gets the world started – developed countries first, then developing countries – replacing HFCs where alternatives are already available, or are coming to market soon. A phase-down allows time for developing alternatives for uses where they are not now available. By the time developing countries would be expected to begin phasing down HFCs, many more options will be on the market and some industry leaders have already started commercializing effective, climate-safe HFC alternatives. At the same time, because it is not a total phase-out, a phase-down gives the assurance that HFCs can continue to be used indefinitely if there are some applications that prove essential and cannot be replaced.

In some applications, it is feasible to move immediately to chemicals with high energy efficiency and very low climate impact. For example, hydrocarbons and HFO refrigerants have very low GWPs, often less than 4. A gradual phase-down encourages use of these compounds, but it also allows countries to use medium-potency HFCs in applications where a better alternative is not yet available. For example, HFC-32 is a refrigerant with a global warming potential (GWP) of 675, substantially lower than HFC-410a (GWP = 2088) or HFC-404a (GWP = 3900) and with a refrigerant charge typically one third lower than with HFC-410a for the same cooling capacity. HFC-32 also offers superior energy efficiency at high ambient temperatures in some air conditioning applications, further reducing the overall climate impact of systems that use it.

A phase-down would begin with countries freezing production and consumption of HFCs at a baseline level. The freeze would take effect first for developed and later for developing countries. Countries would gradually reduce production and consumption from the baseline, with incremental target decreases occurring over the next two decades, with developed countries acting before developing ones. Just as previous Montreal Protocol phase-downs of ozone-depleting substances used a basket approach based on ozone depletion potentials, an HFC phase-down would use a basket approach based on GWPs.

What is the Montreal Protocol Multilateral Fund (MLF) and how can it help industry transition to a lower-GWP refrigerant?

The MLF is one of the reasons why the Montreal Protocol is the world's most effective environmental treaty. The Montreal Protocol, through the MLF, has a track record of delivering specific funding to go with new control commitments. Having provided more than U.S. $3 billion in financing, it is a proven way to support developing country transitions to environmentally superior technology. Current HFC phase-down proposals include the commitment to additional funding for the MLF to be used to replace HFCs.

What progress has been made to date towards an HFC phase-down under the Montreal Protocol?

There has been major diplomatic progress in 2013 towards phasing down HFCs under the Montreal Protocol. The world's largest economies agreed at the G-20 summit to use the institutions and expertise of the Montreal Protocol to phase down HFC production and consumption, while continuing to account for HFC emissions under the climate treaties. After expressing support for completing the current round of climate treaty negotiations, the G-20 agreement states: "We also support complementary initiatives, through multilateral approaches that include using the expertise and the institutions of the Montreal Protocol to phase down the production and consumption of hydrofluorocarbons (HFCs), based on the examination of economically viable and technically feasible alternatives. We will continue to include HFCs within the scope of UNFCCC and its Kyoto Protocol for accounting and reporting of emissions."

The G-20 agreement builds on earlier multilateral agreements at Rio+20, the Arctic Council, and the Climate and Clean Air Coalition (of which India is not a member), as well as the Bali and Bangkok declarations signed in 2011 and 2012 by the majority of the world's nations, both developed and developing, at meetings of the Montreal Protocol. In addition, both China and India entered important bilateral agreements in September 2013 with the United States, echoing the G-20 commitment to use the institutions and expertise of the Montreal Protocol to phase down HFCs. The China-U.S. agreement expressly calls for establishing a contact group—the formal vehicle for negotiations under the Montreal Protocol—on all aspects of HFC management, including phase-down proposals. The India-U.S. agreement calls for a bilateral task force to examine HFC alternatives and related issues.

The parties to the Montreal Protocol began a formal discussion of HFC management, including consideration of potential proposed phase-down amendments, in June 2013. At their annual meeting in October, the Parties continued the HFC management discussion and tasked the Technology and Economic Assessment Panel (TEAP) with further research on alternative technologies and financing needs relating to an HFC phase-down. They also agreed to consider holding a special session focused on HFCs in connection with their summer meeting next year. In short, support for phasing down HFCs under the Montreal Protocol, and for using its institutions including the MLF, continues to grow.

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