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World leaders discuss ban of climate-busting refrigerants

Tweaks to treaty that targeted the ozone hole could help to fight powerful greenhouse gasses.

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Air-conditioning units outside a Hong Kong housing complex.

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After being directed for almost 30 years at substances that destroy ozone, the Montreal Protocol will for the first time target a group of greenhouse gases. Beginning today in Kigali, Rwanda, member states of the United Nations are finalizing the terms of what could be the largest commitment to reducing global warming since the Paris Agreement on climate last December.

Delegates are likely to take till the meeting's final day on 14 October to hammer out the knotty details of an amendment to the protocol. Ideally, the amendment will set the terms for a rapid phasedown of hydrofluorocarbons (HFCs), the most common of which is the refrigerant HFC-134a, which has 1,430 times more warming potential than carbon dioxide (CO_2) over 100 years. The amendment would stop the manufacture of HFCs and then reduce their use over time.

"An ambitious amendment is the quickest and least expensive way to reduce the effects of climate change," says Durwood Zaelke, president of the Institute for Governance and Sustainable Development, who has been a mainstay at ozone negotiations since almost the beginning of the 1987 treaty. He says a phasedown could prevent the equivalent of 100 to 200 billion tons of CO_2 being released into the atmosphere by 2050. That prevention could avert half a degree of warming by the end of the century. Considering that the Paris Agreement's goal is to keep global average temperature rise by less than 2 °C, an HFC ban offers a significant opportunity.

The Montreal Protocol was adopted after scientists recognized that chlorofluorocarbons (CFCs) were destroying the protective layer of ozone in the stratosphere. Two years later countries began eliminating the chemicals, which had a helpful by-product of releasing fewer greenhouse gases. After initially balking, industry giants like DuPont turned from producing CFCs to the less ozone-depleting hydrochlorofluorocarbons (HCFCs), as a temporary bridge to substitution with HFCs. By 2009 it was well known that HFCs, while benign to ozone, had an enormous potential to add to global warming. And so the seed of an HFC amendment took root.

Because climate change can threaten many facets of life, UN delegates think it makes sense to tackle it wherever possible. In UN

jargon, HFCs are a “low hanging fruit.” They’re a much simpler problem to solve than ratcheting back carbon emissions; they are deliberately produced, primarily as refrigerants in air conditioners and other cooling systems. There are no natural sources of HFCs, so the planet’s emissions come from manufactured goods.

Today, HFCs comprise a slim 2% of the world’s hefty annual carbon dioxide emissions. But according to the Institute for Governance and Sustainable Development, that could rise to 12% by 2050 if no limits are established, as the developing world aspires to amenities such as air conditioners. A rapid reduction could help ensure the success of the Paris Agreement, and also allow (or force) the developing world to leapfrog HFC-based technologies.

Environmentally friendly alternatives are already for sale. They include natural refrigerants such as what propane and ammonia and a class of fluorinated chemicals known as hydrofluoroolefins. Still, concerns in Kigali will be raised over the cost of substitutes, for countries like India. There is also some question about how effective they can be in hot places like the Persian Gulf states.

Even back in 1987 nations recognized the potential climatic effects of certain manufactured chemicals. Countries have undergone what Zaelke calls the “start and strengthen” approach. With CFCs, the parties originally agree to a 50% phasedown in 12 years. They later agreed to a 100% reduction over a single decade. HCFCs have a similar story, and due to climate concerns, are now in the process of an accelerated phaseout.

In a 2007 study, Guus Velders, now with the National Institute for Public Health and the Environment in the Netherlands, estimated that had CFCs, HCFCs and halons continued to grow in use, as they had before the Montreal Protocol (at about 2 to 3% annually), by 2010 they would have contributed a cumulative equivalent of 135 billion tons of carbon dioxide. In 2015, the world emitted a total of 32.1 billion tons of carbon dioxide.

“What it [the Montreal Protocol] demonstrates is kind of uplifting in my view, that the world can act together on environmental problems, and did in an effective way,” says Susan Solomon, a professor of atmospheric chemistry and climate science at the Massachusetts Institute of Technology. Research by her and others in 1986 showed that ozone was destroyed by CFCs. “Now the ozone hole is beginning to show the first signs of healing, right on time,” she says.

According to Solomon’s most recent paper, published in June, the size of the Antarctic ozone hole has been decreasing since its greatest extent in 2000, mostly attributable to diminishing levels of gases that affect ozone in the atmosphere. A decade ago, scientists predicted the ozone hole would mend by the middle of this century, an increasingly likely forecast.

The question is whether the Montreal Protocol can achieve something similar for HFCs. On 22 September in New York, more than 100 countries, including the US, known as the “group of ambition,” suggested developed countries set an initial reduction of 10% by 2019. They also called for developing countries to “freeze,” or stop increasing, the use of HFCs by an “early date” currently ranging from 2021–2031.

Pinpointing the grace period between when developed and developing countries must freeze the use of HFCs will be one of the main haggling points of this week’s negotiations. So will the speed at which countries reduce their use of HFCs to zero. Past agreements for the other chemicals typically allowed 30 years.

With the Paris Agreement reaching a crucial threshold last week that will put it into effect on 4 November, there is a lot of momentum for heroic fixes for climate change. An HFC amendment would also demonstrate that the Paris Agreement cannot solve climate change alone. Sister agreements must be brought in, according to Zaelke. “There’s a lesson here,” he says. “When you focus on one piece of the problem, you can actually learn how to solve it.”

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