TEN MYTHS ABOUT INTELLECTUAL PROPERTY RIGHTS AND THE MONTREAL PROTOCOL

CENTER FOR CLIMATE AND ENERGY SOLUTIONS

Steve Seidel
Jason Ye
Center for Climate and Energy Solutions

MYTH #1: INTELLECTUAL PROPERTY RIGHTS (IPR) ARE NOT CONSIDERED ANYWHERE IN THE MONTREAL PROTOCOL.

Fact: While there is no direct mention of intellectual property rights in the Montreal Protocol, Article 10 of the treaty addresses this issue in several ways. It created the Protocol's Multilateral Fund to support efforts by Article 5 Parties to comply with the treaty's control requirements and facilitate the transfer of technologies. In implementing these provisions, parties to the Montreal Protocol have agreed that costs associated with IPR (patents and royalties) are included in the indicative list of categories of incremental costs, and therefore are eligible for funding under the Multilateral Fund. (For more information see Myth # 4).

MYTH #2: PATENTS LAST FOREVER AND IMPACT ALL COUNTRIES.

Fact: Patents are both time-limited and geographically specific. The types of patents relevant to the Montreal Protocol typically last for 20 years from the date of their filing. (But see Myth #6). While information contained in the patent is public once the patent has been published, it remains in the exclusive control of the patent holder (subject to any licensing or other agreements it arranges) for a period of 20 years. After 20 years the knowledge contained in the patent can be freely be used by anyone. A patent is applicable only in the countries where it has been filed. Thus a patent filed in China is valid only in China. Because substantial costs are involved, patent holders will often file patents in a limited number of countries where they believe markets for the patented technology are most substantial and where legal systems afford adequate protections.

For example, the World Intellectual Property Organization's database (PatentScope) covers 40 countries, of which 28 are Article 5 Parties. While more than 980 patents related to HFO-1234yf have been filed to date in this database, patents for this compound were filed in only five of the 28 Article 5 Parties covered in the PatentScope database.

MYTH #3: THERE ARE THOUSANDS OF PATENTS ON ALTERNATIVES TO HYDROFLUOROCARBONS, (HFCS), WHICH MAKES USING ANY OF THESE SUBSTITUTES NEXT TO IMPOSSIBLE.

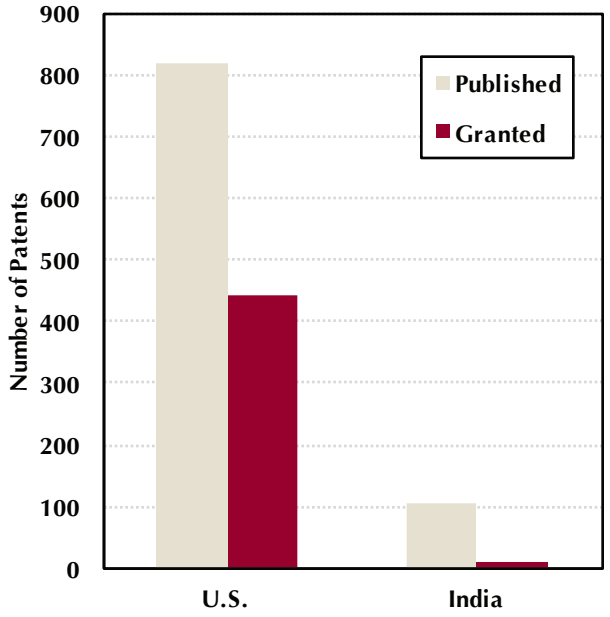
Fact: While several thousand patents have been filed on alternatives to HFCs, far fewer have actually been granted. Over time, some of the filed patents will be allowed to lapse by the companies that filed them, some will be rejected by the national patent authorities, while others will be successfully challenged by competitors. (See Myth #5). While individual patents can be significant, the large number of patents filed to date, by itself, should not be taken to mean that substitutes cannot be employed.

As an example, we looked at patents filed for HFO-1234yf in the United States (via Google Patents) and in India (via InPass). Based on this review we found that 33 percent of patents (477 out of 1428) filed in the U.S and 12 percent (12 out of 116) in India had been granted.

MYTH #4: THE PROTOCOL'S MULTILATERAL FUND DOESN'T PAY FOR THE COSTS OF PATENTS AND LICENSING FEES ASSOCIATED WITH TRANSITIONING OUT OF OZONE-DEPLETING SUBSTANCES (ODS).

Fact: The costs of patents and royalties (i.e., licensing fees) are specifically included in the indicative list of categories of incremental costs adopted by the Parties

FIGURE 1: Percent of Published and Granted Patents in the United States and India



C2ES analysis of patents published from January 1, 2002 to September 10, 2015.

Source: U.S. patents compiled using Google Patents and the Indian Patent Advanced Search System (InPass).

for what qualifies as eligible costs under the Multilateral Fund. A review of past fund activity showed that patents were included in a several of the subsector technology guidelines (e.g., metered dose inhalers, tobacco expansion, certain foam applications) approved by the Executive Committee of the Fund and that the costs of patents were included in a limited number of investment projects (e.g., domestic refrigerators and compressors, metered dose inhalers, foams). In other projects, the costs of patents were incorporated into the price of the technology itself and therefore were indirectly paid for by the fund. In some cases, it appears that other aspects of the fund's practices (e.g., funding the most cost-effective option, limits on operating costs, technology selection criteria) may have limited the extent to which it has paid for patents and licensing fees. But this review also found that for many projects, patented technology was not involved because the technology was in the public domain (e.g., either the patent had expired or the technology had never been covered by a patent).

Given the large number of patents on HFC alternatives and the timing of the expiration on some of these alternatives, there may well be more projects where the costs associated with patents would qualify for funding under an HFC amendment.

MYTH #5: PATENTS ON THE USE OR APPLICATION OF HFC CHEMICAL SUBSTITUTES ARE THE MAIN CONSTRAINT ON TRANSITIONING TO THESE ALTERNATIVES.

Fact: Some Article 5 Parties have voiced concerns that even if chemical companies in their countries develop their own unique way to produce hydrofluoroolefins (HFOs), that patents on their use (i.e., application patents) would prevent them from selling these alternatives. There are a large number of application patents that have been filed for some of the HFC alternatives. In the past, cross-licensing or joint venture agreements among chemical producers have sometimes been used to ensure adequate supplies and to expand markets for patented compositions. Chemical companies will not be able to make the necessary investments in production facilities unless barriers to marketing their product are overcome.

It is also worth noting that several of the HFO applications patents have been challenged and overturned by the national patent offices. The European Patent Office revoked one of Honeywell's application patents in 2012 (EPO 1,716,216) and the U.S. Patent Office, in re-examination hearings, invalidated all the claims in four of Honeywell's application patents (US 7,279,451; US 7534,366; US 8,065,882; and US 8,033,120.) A number of other challenges to application patents have been filed and are in various stages of review. These reviews can extend over a number of years during which the challenged patents remain in effect.

MYTH #6: GIVEN THE LARGE NUMBER OF PATENTS FILED JUST IN THE LAST FEW YEARS, IT'S LIKELY THAT PATENTS ON HFC SUBSTITUTES WILL BE IN EFFECT THROUGH 2030-2035.

Fact: While patents typically are in effect for 20 years from their date of filing, in many cases when patents are filed, they build on an earlier patent filed by the same entity. In doing so they also take the priority date of that earlier filing and would expire 20 years from the date the earlier patent was filed (i.e., priority date). This relation-

ship is often referred to as a patent family, with the oldest patent being the parent. Since a significant number of the patents filed on HFC substitutes have priority dates in the 2000s, they would expire 20 years later, in the 2020s.

For example, DuPont (now Chemours) filed a production process patent related to HFO-1234yf in India in 2008 (Application #3949/DELNP/20008). This patent has a priority date of 2005 linked to other related patents filed by DuPont in the United States, and all of the patents with that priority date in that family would expire in 2025.

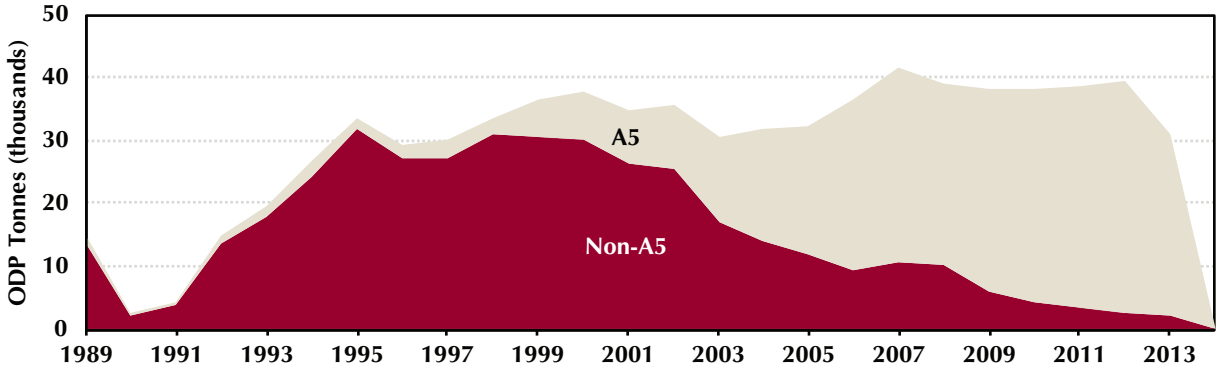
MYTH #7: BECAUSE PATENTS ON PRODUCING HFO SUBSTITUTES HAVE BEEN FILED BY A FEW TRANSNATIONAL COMPANIES, THEY ARE THE ONLY ONES THAT WILL BE ABLE TO PRODUCE THESE CHEMICALS.

Fact: While the initial patents on producing HFOs were filed by a small number of transnational companies, production process patents have since been filed by a larger number of entities including several local entities in China (e.g., Zhejiang University of Technology (C104109077) and Xi'an Modern Chemistry Research Institute (C102603465, C102603464, C102001911, C1020001910, and C101935268.)) Production patents cover a range of factors that go into producing HFOs, including the feedstocks used, the number of steps in the production process, and the types of catalysts employed. There are a number of pathways to producing a chemical and over time more are likely to be developed. In the case of HCFCs and HFCs, patents were first developed by several of these same transnational corporations and production began in developed countries, but over time a large percentage of production shifted to Article 5 parties. See Figure 2 and 3. Licensing and joint venture agreements are commercial arrangements often used as a way of broadening markets for patented technology. The first such agreements have already been publicly announced for HFOs, with production now planned by domestic companies in India and China.

MYTH #8: THE TRANSITION AWAY FROM HFCS IS DEPENDENT ON PATENTED HFOS AND WILL BE ADVERSELY IMPACTED BY THE RESTRICTIONS AND HIGHER COSTS ASSOCIATED WITH THEIR USE.

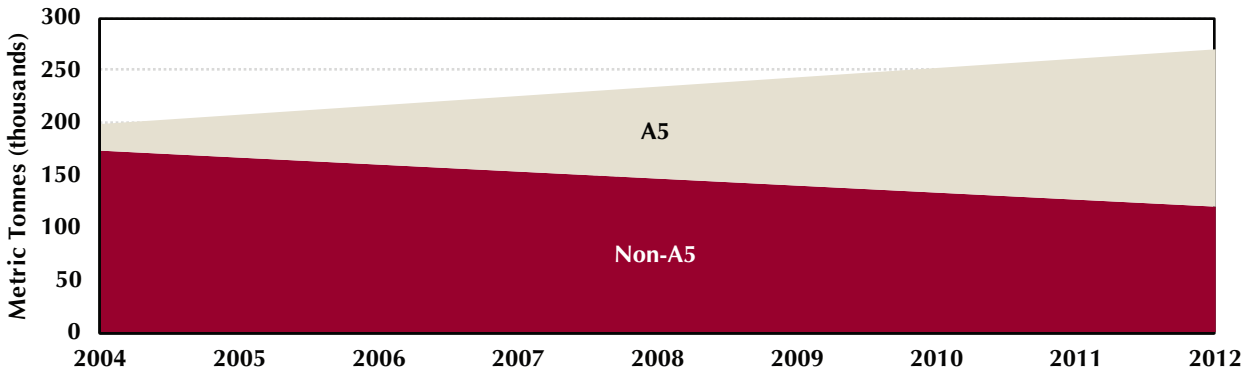
Fact: Historically only a small percentage of CFCs and other ODS were replaced by a new generation of fluorochemical substitutes. One report estimates that only 15 percent of ODS were replaced by fluorochemical substitutes with not-in-kind (NIK) alternatives and emission reduction strategies responsible for the remainder.[1] In looking at substitutes to limit the use of high global warming potential HFCs, a range of options exists for most sectors. For example, hydrocarbons have already made substantial inroads in replacing HFC-134a in refrigerators. They are also being introduced in small air-conditioning systems in a number of countries. Car-

FIGURE 2: HCFC Production by Montreal Protocol Parties, 1989-2013



Source: "Data Center," Ozone Secretariat, last accessed June 29, 2015, http://ozone.unep.org/reporting.

FIGURE 3: HFC-134a Production, 2004–2012



Source: "Production and Sales Data," AFEAS, last accessed June 29, 2015, http://www.afeas.org/data.php. *And "Decision XXVI/9 Task Force Report Additional Information on Alternatives to Ozone-Depleting Substances," Report on the Technology and Economic Assessment Panel (Nairobi, Kenya: United Nations Environment Program Ozone Secretariat, 2015),* http://conf.montreal-protocol.org/meeting/oewg/oewg-36/presession/Background%20Documents%20are%20available%20in%20English%20only/TEAP_Task-Force-XXVI-9_Report-June-2015.pdf.

bon dioxide systems are being used for some commercial refrigeration applications and in blowing certain types of foam. Even in the case of vehicle air-conditioning systems where HFOs have been adopted widely in developed countries, research continues on other alternatives, including carbon dioxide and HFC-152a systems.

While NIKs play a critically important role in providing price competition for patented alternatives, it is also true that these alternatives are increasingly subject to patent protections. Many of these patents are focused on system component designs and relate to enhancements that do not restrict the use of the basic underlying technologies. The costs of licensing and technology transfer fees for patents impacting NIKs would also be eligible for funding under the Multilateral Fund.

TABLE 1: Role of Not-In-Kind (NIK) and other Alternatives

SECTOR	ALTERNATIVES
Domestic refrigeration	HFO-1234yf; HC-600
Air conditioning—split systems	HC-290 (smaller systems) HFC-32; R-452b and other blends
Vehicle air conditioning	HFO-1234yf; R-744 (CO2); HFC-152a; HFC/HFO blends

MYTH #9: PARTIES WON'T BE IN A POSITION TO MAKE HFC REDUCTIONS BEFORE PATENT ISSUES ARE FULLY RESOLVED.

Fact: Parties have in the past focused on reducing consumption first from those sectors where lower cost, commercially available alternatives exist. In implementing any controls on HFCs, Parties would likely adopt a similar approach and act first to make reductions in servicing HFC equipment and in adopting alternatives in those sectors where suitable alternatives are readily available at reasonable costs. Parties have the option of postponing action in specific sectors to later in a phase-down schedule where the costs of alternatives are high, or if patent-protected technologies create challenges.

MYTH #10: PRODUCTION OF HFOS IS ONLY OCCURRING IN DEVELOPED COUNTRIES.

Fact: While HFO production is in its early stages, there are already several facilities planned or in production in China and India. Another alternative for certain applications, HFC-32 is widely produced in China and being considered by two producers in India.

TABLE 2: Production of Key Chemical Alternatives to High-GWP HFCs

CHEMICAL	PRODUCER	LOCATION OF PRODUCTION	STATUS OF PRODUCTION
HFO-1234yf	3F Zhonghao (Chemours)	China	In production Expansion (2016)
	AGC (Honeywell)	Japan	2015
	Arkema Changshu	China	Expected by end of 2016
	Chemours	Japan U.S. (Texas)	In production Permit applied for Jan. 2016
	Honeywell	U.S.	2016
	Navin (Honeywell)	India	Late-2016
	SRF pilot plant	India	Announced March 31, 2016
HFO-1234ze	Honeywell	U.S. (La.)	In production
HFO-1233zd	Arkema	TBD	TBD
	Central Glass	Japan	In production
	Honeywell	U.S.	In production
HFO-1336mzz	Chemours	China	2017
HFC-32	Arkema	U.S.	In production
	Changshu 3F Zhonghao New Chemical Materials Co., Ltd.	China	In production
	Daikin	Japan	In production
	Guangdong DONGYANGGUANG Al Co.,Ltd	China	In production
	Hindustan Fluorocarbons	India	Plan to modify existing plant
	Jiangsu Meilan	China	In production
	Jiangxi Liwen Chemical Co. Ltd.	China	In production
	Linhai Limin	China	In production
	Shandong Dongyue	China	In production
	Shandong Huaan New Materials Co.	China	In production
	Shandong Zibo Feiyuan Chemical Co., Ltd.	China	In production
	Sinochem Lantian	China	In production
	SRF	India	Announced plans to convert HFC-134a plant to make both HFC-134a and HFC-32
	Zhejiang Jinhua Yonghe Fluorochemical Co., Ltd	China	In production
	Zhejiang PujiangBailian	China	In production
	Zhejiang Quhua (Juhua)	China	In production
	Zhejiang Sanmei	China	In production

Source: Compiled from company announcements and websites.

The authors welcome corrections and additions to the information in this table.

ENDNOTES

1 Stephen O. Andersen, Duncan Brack, and Joanna Depledge, *A Global Response to HFCs through Fair and Effective Ozone and Climate Policies* (London: Chatham House, 2014), p. 24,http://www.chathamhouse.org/publication/global-response-hfcs.

CENTER FOR CLIMATE AND ENERGY SOLUTIONS

The Center for Climate and Energy Solutions (C2ES) is an independent nonprofit organization working to promote practical, effective policies and actions to address the twin challenges of energy and climate change.

2101 WILSON BLVD. SUITE 550 ARLINGTON, VA 22201 703-516-4146 C2ES.ORG