

## BRIEFING NOTE on Intellectual Property Rights and the Montreal Protocol: past practices and current challenges

### 1. Scope of the Briefing Note

The 27<sup>th</sup> Meeting of the Parties to the Montreal Protocol agreed on the *Dubai Pathway on Hydrofluorocarbons (HFCs)*, which identifies a number of issues that would be addressed in working within the Montreal Protocol to an HFC amendment in 2016.<sup>1</sup> Intellectual property rights (IPR) are among the issues identified for further consideration.

The objective of this briefing note is to provide background information on issues related to IPR as they relate to possible actions on HFCs. The note:

- Describes the basic legal framework surrounding patents, the IPR most relevant to the commercialization and use of alternatives to HFCs;
- Identifies key issues that have been raised in recent discussions about HFC management strategies;
- Details how the Montreal Protocol and its Multilateral Fund have addressed such issues in the past; and
- Describes the current landscape for patented technologies that could be used as substitutes for high-global warming potential (GWP) HFCs.

The information presented here is intended only as background for the parties. It is not meant to be exhaustive nor in any way prescriptive.

### 2. What are Intellectual Property Rights?

Intellectual property rights are exclusive rights conferred by law to a person or other entity. While IPR include a range of forms (including copyrights and trademarks), the specific one of interest in the HFC context is patents. Through the use of patents, a country (or regional entity) grants an exclusive, time-limited right to the patent holder to exclude others from making, using, or importing the patented invention in that country. By granting these limited rights to patent holders, the system seeks to reward innovators and in doing so foster future advances in technological innovation. In return for these protections, a patent holder agrees to publically disclose in its application the details of the new technological knowledge created by the patent, which over time informs others and stimulates ideas for additional new inventions. Information contained in the patent remains in the exclusive control of the patent holder for a period of typically 20 years from the date of filing (for the types of patents relevant here). After that date, use of the information in the patent is considered to be in the public domain.

An international treaty, the Agreement on Trade-Related Aspects of Intellectual Property Rights (commonly referred to as TRIPS), sets out minimum standards for countries to meet in establishing their national systems governing intellectual property. The TRIPS agreement applies to all countries that are members of the World Trade Organization.<sup>2</sup>

In addition to being time limited, a patent is applicable only in those countries where the patent has been filed. For example, a patent filed in China would only be valid in China unless the patent holder also filed applications for the

---

<sup>1</sup> Decision XXVII/1 of the Twenty-Seventh Meeting of the Parties (UNEP/OzL.Pro.27/13).

<sup>2</sup> World Trade Organization, “Understanding the WTO - Intellectual property: protection and enforcement.” Available from [https://www.wto.org/english/thewto\\_e/whatis\\_e/tif\\_e/agrm7\\_e.htm](https://www.wto.org/english/thewto_e/whatis_e/tif_e/agrm7_e.htm).

same patent in other countries or regional patent offices.<sup>3</sup> Given the costs associated with filing and maintaining patents in multiple jurisdictions, patents are usually filed only in a limited number of countries. Applicants balance the costs of filing in a specific country against the potential market opportunity and the legal protections accorded to intellectual property rights in that country.

One provision in TRIPS does allow a limited exception to the exclusive rights of an existing patent without the authorization of that patent holder. Member nations can provide for compulsory licensing, but only in limited circumstances and if certain requirements are met including when:

- Efforts to obtain authorization from the patent holder under reasonable commercial terms have been unsuccessful in a reasonable amount of time with some exceptions (e.g. national emergency);
- The patent holder should receive adequate payment for use of its patent; and
- Its use is limited to the domestic market.<sup>4</sup>

Compulsory licensing has been used only in a limited number of cases for pharmaceuticals dealing with public health in Brazil, India, South Africa, and Thailand.<sup>5</sup> In the context of technologies relevant to the Montreal Protocol, there are three broad types of patents that are most applicable.

1. *Production process patents* are typically filed by chemical producers and directly affect the production sector (e.g. the production of hydrofluoroolefins (HFOs)). They generally cover a specific process (e.g. the number and type of steps in the production process) or identify key inputs (e.g. specific feedstocks and/or catalysts) used to produce the substances.
2. *Use or application patents* typically cover the use of a substance or blend in a particular type of equipment or product (e.g. the use of HFO-1234yf in vehicle air conditioning units).
3. *Patents for products, parts or equipment* often filed by equipment manufacturers in various end use sectors (e.g. for compressors, aerosol products, foam systems).

Patents are not unique to the sectors covered by the Montreal Protocol, nor are they new to those sectors. Patents covered many of the substances used to replace chlorofluorocarbons (CFCs) and other ozone-depleting substances and historically have not been a barrier to technology transfer. But increases in the number and scope of patents, and the relatively recent development of several low-GWP alternatives have raised important questions about the role of patents in future actions to manage HFCs.

### 3. Patent-Related Issues of Concern to Parties

In recent discussions related to the management of HFCs and a possible amendment to the Montreal Protocol, a number of patent-related issues have been raised:

- Whether low-GWP alternatives will be available in adequate quantities, from multiple suppliers, and at reasonable costs during the needed timeframe;
- Because a few transnational corporations generally hold patents for specific chemicals that are part of the next generation of chemical substitutes, producers in Article 5 parties may be either prevented from entering these markets or otherwise placed at a competitive disadvantage;

---

<sup>3</sup> To facilitate review of patents by multiple jurisdictions, the Patent Cooperation Treaty (PCT) was agreed to in 1970. The Patent Cooperation Treaty now includes 148 countries and is administered by the World Intellectual Property Organization. World Intellectual Property Organization, "The PCT now has 148 Contracting States." Available from [http://www.wipo.int/pct/en/pct\\_contracting\\_states.html](http://www.wipo.int/pct/en/pct_contracting_states.html).

<sup>4</sup> World Trade Organization, "Intellectual Property (TRIPS) - agreement text - standards," accessed December 27, 2015. Available from [https://www.wto.org/english/docs\\_e/legal\\_e/27-trips\\_04c\\_e.htm#art31](https://www.wto.org/english/docs_e/legal_e/27-trips_04c_e.htm#art31).

<sup>5</sup> John R. Thomas, "Compulsory Licensing of Patented Inventions," CRS Report for Congress R43266 (Washington, DC: Congressional Research Service, 2014).

- Where producers in Article 5 parties obtain their own production patents or enter licensing arrangements to become producers, application patents on the use of substitutes may restrict their ability to sell into certain end-use sectors in certain countries;
- From the perspective of manufacturing companies and end users, the existence of application or use patents could limit the number of chemical suppliers from which they are able to purchase alternatives;
- Finally, the Protocol’s Multilateral Fund may not adequately compensate for the patents and licensing fees as agreed incremental costs associated with a transition to low-GWP alternatives.

#### 4. Technology Transfer Provisions under the Montreal Protocol and its Multilateral Fund

Actions under the Montreal Protocol to phase-out ozone-depleting substances have always necessitated the development of technological innovations in the form of chemical substitutes and not-in-kind alternatives<sup>6</sup> to be used alongside existing alternatives. From the earliest days of the Protocol, there was agreement among parties that the success of the treaty would depend on technology transfer and the financial support to turn that promise into a reality to enable compliance with agreed control provisions. Article 10 of the Protocol sets out the key provisions for both technology transfer and financial support to Article 5 parties. It specifies the creation of the Protocol’s Multilateral Fund and calls for the Fund to “meet on a grant or concessional basis as appropriate, and according to criteria established by the parties, the agreed incremental costs”.<sup>7</sup>

To implement this mandate, the parties adopted an “indicative list of categories of incremental costs.” This list has served as key guidance in determining the costs that the Multilateral Fund has covered to enable compliance with the Protocol’s control provisions, including whether patents and licensing fees have been compensated for by the Fund.<sup>8</sup> The indicative list of categories of incremental costs first sets out a number of general principles to guide expenditures including that projects should be based on the “most cost-effective and efficient option,” that they should take into account “the national industrial strategy of the recipient party” and that timeframes should be set for paying for incremental costs on a sector specific basis.<sup>9</sup> The indicative list goes on to specify a number of specific categories of costs that would be eligible to be compensated by the Fund. This list specifically includes “cost of patents and designs and incremental costs of royalties” as a category eligible for funding by the Fund for:

- The cost of conversion of existing production facilities;
- The cost of establishing new production facilities for substitutes to replace lost capacity; and
- Use in manufacturing as an intermediate good (e.g., manufacturing refrigerators, foam, or other end-use sectors).

<sup>6</sup> Not-in-kind alternatives and substitutes have historically played a significant role in replacing ozone-depleting substances, with one study reporting that only 15 percent were replaced by new chemical substitutes. The availability of not-in-kind technologies also provides important price competition for patented alternatives. See 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). Available from <http://www.chathamhouse.org/publication/global-response-hfcs>.

<sup>7</sup> In addition, Article 10A of the Protocol directly addresses technology transfer and calls for Parties “to ensure (a) that the best available, environmentally safe substitutes and related technologies are expeditiously transferred to Parties operating under paragraph 1 of Article 5 and (b) that the transfers referred to paragraph (a) occur under fair and most favorable conditions.”

<sup>8</sup> The indicative list was adopted on a provisional basis at the 1990 Meeting of the Parties to the Montreal Protocol and formally adopted two years later. See decision IV/18, paragraph 6. While the guidance has been implemented in a flexible manner (e.g. the list is only “indicative”), the parties have never formally amended it. See United Nations Environment Programme (UNEP) Ozone Secretariat, “The Montreal Protocol on Substances that Deplete the Ozone Layer – Article 10: Financial mechanism,” accessed September 16, 2015. Available from <http://ozone.unep.org/en/handbook-montreal-protocol-substances-deplete-ozone-layer/27>.

<sup>9</sup> Ibid.

These provisions make clear that payment for patents and royalties are eligible for funding under the terms of the Multilateral Fund.<sup>10</sup>

## 5. Experience to date

No comprehensive review has been undertaken of the extent to which the Multilateral Fund has paid for patents and royalties. However a recent analysis found that, consistent with the indicative list of categories of incremental costs, patents and royalties (i.e., licensing fees) were included in a number of manufacturing sector guidelines adopted by the Fund's Executive Committee and have also been specifically included in a small number of investment projects (see Box 1).<sup>11</sup>

### Box 1: Where the Multilateral Fund (MLF) Directly Paid for Patents or Licensing Fees

#### Examples of MLF Sector-Specific Guidelines that Included Funding Related to Patents

- **Liquid carbon dioxide systems:** considered under a trial program as replacement for CFC-11 in polyurethane foam-blowing applications. Included a US\$50,000 per unit fee for licensing patented technology.<sup>12</sup>
- **Tobacco expansion projects:** allowed use of carbon dioxide in a patented technology (Dry Ice Expanded Tobacco) to replace CFC-11 for a royalty fee of US10 cents per pound.<sup>13</sup>
- **Metered-dose inhaler projects:** replacement of CFCs in metered dose inhalers allowed for royalty payments upfront of US\$2-4 million or a few cents per canister.<sup>14</sup>

#### Examples of Investment Projects Where Funding was Provided for Patented Technologies

- **Refrigerator manufacturers conversion:** A series of projects in Thailand in the early 1990's supported the phase-out of CFC-11 and CFC-12 in the manufacture of refrigerators. In one of these projects technology transfer fees for a patented technology was paid for a CFC-free refrigerator design and in another project fees were paid for technology related to HFC-134a compressors.<sup>15</sup>
- **Sprayed polyurethane foam demonstration project:** To shift out of HFC-141b in sprayed foam applications, while avoiding the use of a high-GWP alternative, a company in Colombia proposed transitioning to a supercritical carbon dioxide-based system. The project proposal utilized a patented technology held by a Japanese company and involved payment of \$401,000 as a technology transfer fee.<sup>16</sup>
- **Tobacco expansion projects:** In a project for the largest single end-user of CFCs in the Philippines, the Fund supported shifting from CFC-11 to a carbon dioxide-based system and paid a licensing fee for the patented technology of US9-12 cents per pound. Similar projects were funded in China and technology fees of US\$100,000 to \$120,000 per manufacturing unit were paid to cover the costs of licensing the patented technology.<sup>17</sup>

Projects where the Multilateral Fund has directly paid for patents and licensing fees were identified in only a small number of cases. However, the costs associated with patents or licensing fees were likely incorporated into the price

<sup>10</sup> It should be noted that technology transfer is broader than simply patents and includes other types of support in addition to patents.

<sup>11</sup> Research on this issue was recently conducted through consultations with current and former staff from the Multilateral Fund and two of its implementing agencies. See, Stephen Seidel and Jason Ye, *Patents and the Role of the Multilateral Fund* (Arlington, VA: Center for Climate and Energy Solutions, 2015). Available from <http://www.czes.org/publications/patents-role-multilateral-fund>.

<sup>12</sup> Multilateral Fund Secretariat, "Chapter IX: Project Proposals" in *Policies, Procedures, Guidelines and Criteria (As at May 2015)*, pp. 279-281.

<sup>13</sup> Ibid.

<sup>14</sup> Paragraph 45 of UNEP/OzL.Pro/ExCom/37/58.

<sup>15</sup> Based on information contained in Project Summary Reports for Thailand for the refrigeration sector. Prepared by the World Bank for the Secretariat to the Multilateral Fund (May 1993).

<sup>16</sup> UNEP/OzL.Pro/ExCom/60/25.

<sup>17</sup> Paragraph 90 of UNEP/OzL.Pro/ExCom/39/43.

paid by the Fund for the technology itself in a much larger number of cases. For example, where the investment project paid for technology being sold by the patent holder, the Fund indirectly paid for the costs associated with any patents through the purchase price of the technology. Patents typically are cross-licensed among technology developers and suppliers, but such commercial arrangements are not publically disclosed. As a result, it is likely that patents were involved in, and indirectly compensated for, in many of the projects supported by the Multilateral Fund without being directly included as a specific cost item in project budgets.

It also appears that in many cases, patents did not cover technologies supported by the Fund. There were several reasons why this would have been the case:

- Some substitute technologies used to replace ozone-depleting substances were always in the public domain and not covered by patents (e.g. pump spray technology).
- By the time controls on Article 5 parties took effect, patents had expired on some of the alternatives (e.g. patents on the production process for HCFC-141b).
- There are 147 Article 5 parties receiving support under the Fund and relevant patents would only have been filed in a small number of these countries.
- The Fund's guidelines to support the most cost-effective option and, where possible, to avoid technological upgrades may have limited the use of technologies still under patents because they may not yet have benefited from economies of scale and price competition.
- In a few cases, technologies to reduce ozone-depleting substances that were covered by patents were made available free of charge for public use.<sup>18</sup>

While the above examples in Box 1 are all drawn from the manufacturing sector, the issue of patents and licensing fees is also critical to the production sector. The Fund has supported a number of production sector phase-out projects. The indicative list of categories of incremental costs includes paying for patents and royalties for the cost of converting existing production plants or establishing new plants for substitutes. In practice, the Fund has negotiated payments to Article 5 parties primarily based on the lost revenue from premature retirement of their existing production facilities. Recipient countries have flexibility in how they use the funds from these production sector projects to meet their phase-out goals. In one case, China used a portion of the funds it received for closing CFC production plants to support the development of an HFC-134a plant.<sup>19</sup>

This overview has shown that patents and royalties are clearly identified on the indicative list of categories of incremental costs and that the experience to date demonstrates that the Fund has compensated for these costs in a limited number of cases and indirectly paid for them in other cases. However, it is also likely that in some cases other aspects of the Fund's practices (e.g. funding the most cost-effective option, technology selection criteria, and limits on payment of operating costs) may have limited the extent to which the fund has paid for patents and licensing fees.<sup>20</sup> The overview has also noted that in the production sector there have been no explicit agreements to pay for patents, but compensation that has been provided can be used flexibly, including for licensing agreements or research and development for alternatives.

---

<sup>18</sup> Stephen O. Andersen, K. Madhava Sarma, and Kristen N. Taddonio, *Technology Transfer for the Ozone Layer*, (London: Earthscan 2007); see also Daikin Industries, "Technical Assistance to Thailand for Next Generation Refrigerant HFC32," 27 April 2015. Available from <http://www.daikin.com/press/2015/150427/index.html>.

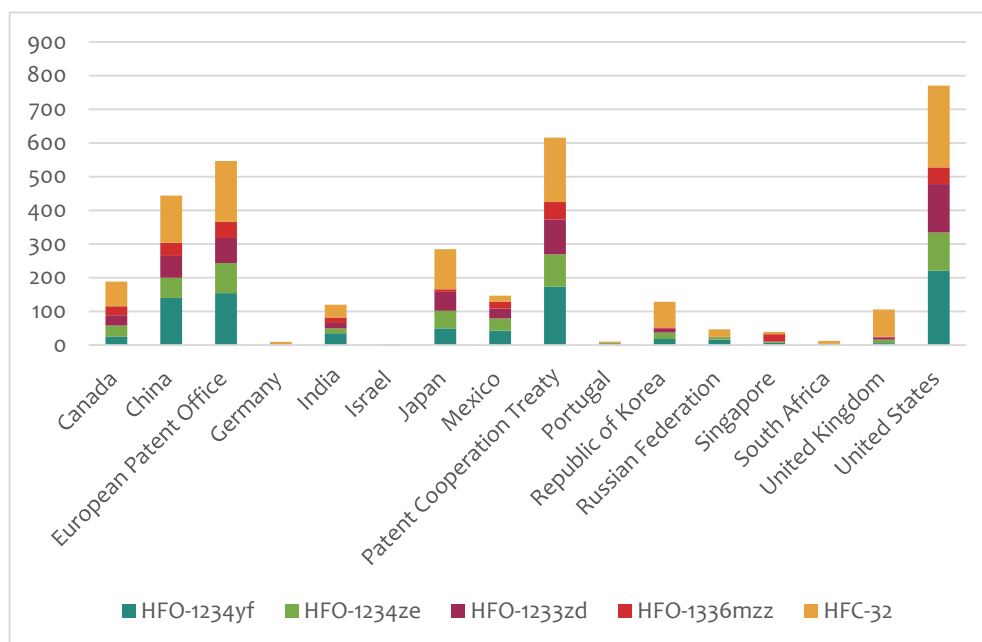
<sup>19</sup> China used some of the money (\$17 million) included in its CFC phase-out project to fund Xi'an Jinzu Modern to construct a 5,000 tons per year HFC-134a plant. Paragraph 56 of UNEP/OzL.Pro/ExCom/42/12.

<sup>20</sup> The review identified evidence of only 2 instances where patents appeared to be an obstacle to possible projects going forward. See Andersen, Stephen O., K. Madhava Sarma, and Kristen N. Taddonio, *Technology transfer for the ozone layer: lessons for climate change*; see also Veena Jha and Ulrich Hoffmann, *Achieving Objectives on Multilateral Environmental Agreements: A Package of Trade Measures and Positive Measures* (New Delhi: United Nations Conference on Trade and Development, 2001 (UNCTAD/ITCD/TED/6)).

## 6. The Existing Landscape of Patents on Alternatives to High-GWP HFCs

To better understand the issues surrounding the role of patents in transitioning to low-GWP alternatives, this section explores the current landscape of where patents have been filed on some of the next generation of chemical substitutes.<sup>21</sup> The information shown below is drawn from current patent filings included in PatentScope, a database developed by the World Intellectual Property Organization.<sup>22</sup> The search was conducted using the chemical name and covered the front page of the filing. The results from these searches should be viewed as indicative of the existing patent landscape for these specific alternatives, but is by no means definitive. Searches using other key words or other parts of the patent filing would inevitably produce different results. Figure 1 shows the number of patents by the country in which they were filed for several of the leading chemical substitutes.

**Figure 1: Number of Alternatives to High-GWP HFC Patents Filed by Country**



Patents published from January 1, 1991 to December 31, 2015.

Source: Patents compiled using World Intellectual Property Organization (WIPO), PatentScope and the Indian Patent Advanced Search System.

The figure shows that a large number of patents have been filed in the largest countries. Relevant patents have been filed in only 15 of the 41 nations covered by the WIPO database and in India. Of the Article 5 parties covered by this data, India, China, Mexico, South Africa, Singapore, and Republic of Korea are directly impacted by patents filed for these specific alternatives to high-GWP compounds. Although transnational corporations hold the vast majority of these patents, in recent years a growing number have been filed by local entities from Article 5 parties (e.g. China and Mexico).

<sup>21</sup> While this review focuses on a number of chemical alternatives to HFCs, there are also non-fluorinated alternatives (e.g., hydrocarbon, carbon dioxide and ammonia in refrigeration and air conditioning systems) being employed as substitutes to high-GWP HFCs. While component and system design patents on these alternatives are also being filed, products in some sectors based on non-fluorinated technologies are nonetheless being employed in many countries.

<sup>22</sup> World Intellectual Property Organization PATENTSCOPE, "Search International and National Patent Collections," accessed September 16, 2015. Available from <https://patentscope.wipo.int>. PatentScope covers 41 countries including most developed and the larger developing countries with the exception of India. To add India's patents, the analysis incorporated into the results similar searches from the Indian government's Patent Advanced Search System.

While a large number of patents have been filed for these alternatives, some percentage of these filings will never be granted because they are allowed to lapse by the applicant, will be denied by the patent authority, will be successfully challenged by another entity,<sup>23</sup> or were filed as a way to improve or expand upon an earlier patent and will expire at the date the earlier patent (“parent”) expires.

One option that has been used in other sectors (e.g., electronics manufacturing) where a large number of potentially overlapping or conflicting patents exist is the creation of patent pools. Patent pools are generally thought of as an agreement between two or more patent owners to license one or more of their patents to one another or to third parties. While this approach could take many forms, it might involve licensing agreements on a voluntary basis for key patented technologies that would then be made available under these terms to Article 5 parties.<sup>24</sup> In addition, the creation of an information clearinghouse may be considered helpful for monitoring and periodically reporting on the availability of alternatives to HFCs, the status of alternative end use technologies, and any associated patents. Information could also be provided where companies on a voluntary basis have made relevant patents freely available to parties or have agreed that specific patents would be available to be licensed on a concessional or reasonable and non-discriminatory basis to enterprises in Article 5 parties.

## 7. Summary

- Parties have raised a number of concerns that patents on the production and use of substitutes for HFCs could adversely impact efforts to shift away from these compounds.
- The Multilateral Fund includes in the indicative list of categories of incremental costs patents as eligible for funding under certain circumstances.
- A review of past experience suggests that such costs were directly included in project funding in a limited number of cases and were indirectly paid for in other cases.
- Going forward, given the number of patents and the timing of their expiration on some of the low-GWP alternatives, there may well be more cases where the costs associated with patents and licensing fees will arise in the context of projects coming before the Multilateral Fund.
- The parties may wish to consider how the existing policies and guidelines could work to address projects involving patented technologies that may be used to meet limits on HFCs and whether any modifications are warranted.

---

<sup>23</sup> For example, several application patents for hydrofluoroolefins (HFOs) have been successfully challenged at the administrative level, but remain in effect during the appeals process. For an update of challenges to four application patents in the United States, see United States District Court Eastern District of Pennsylvania, *Arkema Inc v. Honeywell*; Civil Action No. 2:10-cv-02886-CDJ (January 26, 2016). For a description of a challenge to European Patent 1,716,216, see Mobile Air Conditioning Society Worldwide, *Honeywell’s HFO-1234yf Patent Revoked in Europe*, April 24, 2012. Available from: <https://macsworldwide.wordpress.com/2012/04/24/honeywells-hfo-1234yf-patent-revoked-in-europe>

<sup>24</sup> World Intellectual Property Organization, *Patent Pools and Antitrust – A Comparative Analysis* (Geneva: WIPO, 2014). Available from: [http://www.wipo.int/export/sites/www/ip-competition/en/studies/patent\\_pools\\_report.pdf](http://www.wipo.int/export/sites/www/ip-competition/en/studies/patent_pools_report.pdf)