

DEFINING THE LEGAL AND POLICY FRAMEWORK TO STOP THE DUMPING OF ENVIRONMENTALLY HARMFUL PRODUCTS

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*Love your neighbor as yourself, but don't take down your fence.
Carl Sandberg*

Environmental dumping is a practice historically associated with the export of hazardous product waste from a developed country for irresponsible and often illegal disposal in a developing country. Now, with the industrialization and globalization of China and other developing countries, environmental dumping can involve both developing and developed countries as origin and destination. This dumping can be especially harmful to attempts to control under the Montreal Protocol ozone-depleting and climate-forcing chemical substances and/or products requiring unnecessarily high energy consumption. While developing country Parties to the Montreal Protocol are allowed to delay their phasedown of climate-forcing and ozone-depleting hydrofluorocarbons (HFCs) during a multi-year grace period, there are advantages to earlier implementation when superior alternatives are already available at reasonable costs, as is the case for

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many uses of HFCs today. Thus, developing countries can benefit under the Protocol from setting controls for environmental dumping. This article aims to give policymakers, especially those in developing countries, a legal and policy “toolkit” that can be used to stop unwanted environmental dumping. It includes an examination of the history of environmental dumping, illustration of such dumping in practice, a detailed explanation and examination of the legal and policy tools, and a summary of the consequences of environmental dumping.

INTRODUCTION

Law textbooks are replete with examples of cases in which legally deployable technology has been identified as posing unacceptable environmental harm and eventually outlawed. Typically, regulations start in one or more developed countries and spread first to other developed countries and then to developing countries. Only recently have large numbers of developed and developing countries acted almost simultaneously to avoid environmental risks, most notably through the Montreal Protocol on Substances that Deplete the Ozone Layer (Montreal Protocol).¹ The Montreal Protocol is now the only United Nations (UN) treaty with universal membership and adherence—every UN State is a Party and every Party is usually in full compliance.² Approval of the Protocol means that national governments agree to future deadlines to phase out products harmful to the stratospheric ozone layer, which are also harmful to climate.³ At any given time, a large number of environmentally unacceptable products and practices are legal in some countries while their

1. See *The Montreal Protocol*, UN ENV'T PROGRAMME (UNEP), <http://web.unep.org/ozonaction/who-we-are/about-montreal-protocol> (last visited Sept. 23, 2018) (stating that “[T]he [Montreal] Protocol is to date the only UN treaty ever that has been ratified [by] every country on Earth.”).

2. See *UN Environment Taking Action on the Montreal Protocol*, UNEP, <http://web.unep.org/ozonaction/who-we-are/overview> (last visited Sept. 23, 2018) (reporting that “[a]ll 197 UN Member States have ratified this multilateral environmental agreement”). A possible exception to full compliance is suggested in a new report in *Nature*, showing a 25% increase in emissions of banned CFC-11 since 2012; see also Stephen A. Montzka et al., *An unexpected and persistent increase in global emissions of ozone-depleting CFC-11*, 557 NATURE 413, 413–17 (2018) (finding that Eastern Asia is the source of the emissions); *Id.*, Some have blamed China for the increase. See Durwood Zaelke and Veerabhadran Ramanathan, *Unexpected, Unreported, and So Far Unexplained Emissions of CFC-11*, Bulletin of the Atomic Scientists (2018). China reports that it has not found any large scale violations of the treaty, but nevertheless announced a special campaign to identify any illegal CFC-11 production. *Id.*

3. See *The Montreal Protocol*, *supra* note 1 (“Under this treaty, all parties have specific responsibilities related to the phase out of the different groups of ODS, control of ODS trade [C]ountries have binding, time-targeted and measurable commitments.”).

governments struggle to overcome stakeholder opposition in order to enact regulations and incentives to transform markets.⁴

Environmentally harmful product dumping (hereinafter referred to as “environmental dumping”) is a practice historically associated with the export of hazardous product waste and associated unwanted chemicals from a developed country for irresponsible and often illegal disposal in a developing country.⁵ This historical dumping of hazardous waste and chemicals was possible because developing countries did not always: 1) know what was being imported, 2) know what the hazards were, 3) have the enforcement structure in place to apprehend and halt imports, or 4) possess the political consensus or necessary good will to look out for their own national interests.

Growth in economic activity and global trade corresponded with expanded and intensified environmental dumping.⁶ Dumping caused harm to product consumers, national health and prosperity, and the global environment.⁷ It has also had negative impacts on the receiving jurisdiction’s ability to fulfill international treaty obligations.⁸ Fortunately, global agreements like the Basel Convention on Transboundary Movement of Hazardous Waste (Basel Convention) and the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals & Pesticides in International Trade (Rotterdam Convention) have reduced some kinds of waste from the historical situations that first brought attention to the problem.⁹

4. For example, lead feedstock and tetraethyllead stakeholders have for more than 30 years after the first national ban of lead in gasoline (Japan), defended their export markets. The global phaseout is still underway in six countries (Afghanistan, Algeria, Iraq, Myanmar, North Korea, and Yemen). See The LEAD Group, *Chronology of Leaded Gasoline / Leaded Petrol History* at 4, 9 (Dec. 23, 2011).

5. See, e.g., *History of the Negotiations of the Basel Convention*, BASEL CONVENTION, <http://www.basel.int/TheConvention/Overview/History/Overview/tabid/3405/Default.aspx> (last visited Sept. 23, 2018).

6. See Glen P. Peters and Edgar G. Hertwich, *The Importance of Imports for Household Environmental Impacts*, 10 J. OF INDUS. ECOLOGY 89 (2006).

7. See María-Ángeles Cadarso, Fabio Monsalve & Guadalupe Arce, *Emissions Burden Shifting in Global Value Chains – Winners and Losers Under Multi-regional Versus Bilateral Accounting*, 30 ECON. SYSTEMS RES. 439 (2018).

8. See Decision XIV/7: Monitoring of international trade in ozone-depleting substances and preventing illegal trade in ozone-depleting substances, <http://ozone.unep.org/en/handbook-montreal-protocol-substances-deplete-ozone-layer/549?language=fr>; See also Decision XII/10: Monitoring of international trade and prevention of illegal trade in ozone-depleting substances, mixtures and products containing ozone-depleting substances, <http://ozone.unep.org/en/handbook-montreal-protocol-substances-deplete-ozone-layer/640>.

9. See BASEL CONVENTION, *supra* note 5.

With the industrialization and globalization of China and other developing countries, environmental dumping can involve products made with or containing ozone-depleting and climate-forcing chemical substances and/or products requiring unnecessarily high energy consumption that are not in the interest of the consumer, the local economy, or the global commons.¹⁰ Such trade can involve both developing and developed countries as origin and destination including: developed to developing (North-South), developing-to-developed (South-North), and developing-to-developing (South-South).¹¹

The Montreal Protocol sets different schedules for developed and developing countries to phaseout ozone-depleting substances (ODSs) and phase down hydrofluorocarbons (HFCs).¹² Developed countries have a faster phasedown schedule and bear the burden of research, development, commercialization, and sorting out which replacement technology is superior.¹³ Following a “grace period”, the slower phasedown schedules for developing countries provide transition advantages with less investment risk and lower prices as a result of economies of scale, competition, and expiration of patents.¹⁴

However, there is no advantage from delay under the Montreal Protocol if technical innovation and the manufacture of alternatives occurs in developing countries or if the next-generation technology is economically superior to obsolete ODS and HFC technology. Developing countries are well-served by taking advantage of the grace

10. See STEPHEN WIEL and JAMES E. MCMAHON, *ENERGY-EFFICIENCY LABELS AND STANDARDS: A GUIDEBOOK FOR APPLIANCES, EQUIPMENT, AND LIGHTING* 11, (2d ed. 2005).

11. See *id.* (“In an unusual twist, a recent study that benchmarked the performance of air conditioners among five Asian economies found that the ‘developing’ countries (China, Korea, Malaysia, and Thailand) were ‘dumping’ inefficient air conditioners on the more developed countries (Australia), which at the time did not have a minimum efficiency standard for air conditioners. In part as a response to the report, Australian manufacturers and distributors have agreed to speed the adoption of minimum standards for air conditioners, in order to keep the inefficient imported models off the market.”) (citing DANISH ENERGY MANAGEMENT, *BENCHMARKING OF AIR CONDITIONER EFFICIENCY LEVELS IN FIVE ASIAN COUNTRIES* (2004)).

12. See *The Montreal Protocol*, *supra* note 1.

13. See Timothy T. Jones, *Implementation of the Montreal Protocol: Barriers, Constraints and Opportunities*, 3 *ENV'TL LAW* 813, 846 (1997) (“[D]eveloped countries pledged technical support and financial assistance to meet ‘all agreed incremental costs’ of [developing countries] compliance.”).

14. See *id.* at 846 (“Article 5, entitled Special Situation of Developing Countries, provides a grace period for developing countries to comply with the required reductions.”); UN Environment, *About the Montreal Protocol*, <http://web.unep.org/ozonaction/who-we-are/about-montreal-protocol>.

period when there is a benefit of waiting for economically and environmentally superior technology at an affordable cost.¹⁵ Developing countries should take steps to stop dumping when it is in their economic, social, and public health interest, while at the same time applying for financial support from the Montreal Protocol's Multilateral Fund to transition early to next-generation technology. This strategy ultimately will also reduce costs for donor countries.

Further, stopping environmental dumping of energy inefficient products made with high-global warming potential (GWP) hydrochlorofluorocarbons (HCFCs) and HFCs is critical in the effort against climate change. The Intergovernmental Panel on Climate Change (IPCC) Special Report on Global Warming of 1.5°C notes that constraints on the import of products banned in other countries are an available regulatory tool for enhancing energy efficiency.¹⁶

Mindful of this history and what it teaches concerning developing country empowerment for environmental good, this paper explores environmental dumping and aims to give policymakers, especially those in developing countries, a legal and policy “toolkit” that can be used to stop unwanted cases of such dumping.

Part I explains the origins of the term “environmental dumping” and expands the definition to include trade in products that have environmentally harmful consequences to the destination country or territory and to the global commons, including stratospheric ozone and climate.

Part II illustrates the potential magnitude of environmental dumping through a Brazilian case study. The study finds that inefficient room air conditioners (RACs) are being assembled in and/or imported into Brazil, while efficient RACs have not been made available, which is likely indicative of the situation of many developing countries worldwide.

Part III places the environmental dumping discussion in the context of the Montreal Protocol, through which developing countries

15. See Sean Cumberlege, *Multilateral Environmental Agreements: From Montreal to Kyoto – A Theoretical Approach to an Improved Climate Change Regime*, 37 *DENV. J. INT'L L. & POL'Y* 303, 308–09 (2009) (“Regulating a public good such as pollution creates difficulty in that there is an increased incentive for states to ‘free-ride’ in the collective efforts of other states.”).

16. INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, *GLOBAL WARMING OF 1.5°C* 4-92 (2018), <https://www.ipcc.ch/report/sr15/> (“Regulatory instruments are a common tool for improving energy efficiency and enhancing renewable energy in OECD countries (e.g., US, Japan, Korea, Australia, the EU) and, more recently, in developing countries (M.H. Scott et al., 2015; Brown et al., 2017) including constraints on the import of products banned in other countries (Knoop and Lechtenböhmer, 2017).”).

classified under Article 5 (A5 Parties): a) are just now making the transition from ozone-depleting greenhouse gases (GHGs) called HCFCs to next generation ozone-safe refrigerants, b) will soon begin the phasedown of ozone-safe GHGs called HFCs, and c) can use this transition to simultaneously upgrade to high energy efficiency and low-GWP equipment, including RACs.

Part IV summarizes the environmental consequences of the dumping of energy-inefficient RACs in developing countries and the rest of the world.

Part V devises a legal and policy “toolkit” that can be used to stop unwanted environmental dumping, drawing from international treaty and national regulatory and policy guidance.

Part VI recommends key considerations for policymakers and other stakeholders to help them prevail over challenges to the application of environmental dumping control tools, including their home countries’ laws and regulations as well as pressure from companies profiting from environmental dumping and their supporters.

Part VII concludes with six takeaways for policymakers and other interested stakeholders.

The 11 tools recommended in this paper are presented according to the authors’ judgement and experience concerning the relative ease of tool deployability and implementation, starting with tools that are relatively easier to deploy. In doing so, readers should note that some tools are strengthened through the existence of Tool 5 (product minimum performance standards).¹⁷ The 11 tools are:

Tool 1: Prior informed consent (voluntary and traditional, treaty-based);

Tool 2: Green supply chain guidelines or government-industry accords;

Tool 3: Government procurement and buyers clubs;

Tool 4: Registration of exporters and importers or import/export agents;

17. The authors recognize that meaningful development and frequent strengthening of MEPS requires an administrative and technical process that can be quite time consuming. Practically speaking, as a tool for rapid deployment to address environmentally harmful product dumping therefore, such standards may be less useful. However, the authors recommend that governments seriously consider such standards where they do not exist or where they require strengthening, and that these governments consider launching the development or strengthening process for such standards as early as possible after identifying environmentally harmful product dumping.

Tool 5: Product minimum performance standards;

Tool 6: Product labeling requirements;

Tool 7: Pre-shipment verification of conformity;

Tool 8: Environmental taxes and incentives;

Tool 9: Environmental dumping tariffs;

Tool 10: Prohibitions on import and local manufacture;

Tool 11: Multilateral agreement(s) to phase out or phase down the production and consumption of unsustainable chemical substances and products.

These tools and their uses are described, along with insights into the international legal underpinnings, where relevant. Policymakers and other stakeholders are provided with examples of these tools from selected jurisdictions, with a focus on examples from developing countries. Of course, deployment and prioritization of any of these tools are the choices of government authorities in each country.

While the focus of this paper is on tools aimed at stopping environmental dumping that harms air quality, energy conservation, and climate mitigation efforts, such tools and strategies could also be used to address other kinds of environmental dumping activities.

I. ORIGINS OF ENVIRONMENTAL DUMPING

Environmental dumping can be interpreted as a modern variation of past business practices that involved some combination of the exploitation of labor, natural resources, and trade policy to extract extraordinary profits at the expense of manufacturers or other parties in the nation or territory being exploited. These historic practices included: compelling trade even if unwanted (e.g., Commodore Matthew C. Perry opening up trade with Japan through “gun-boat diplomacy”);¹⁸ forcing product acceptance in exchange for the wanted trade (e.g., Great Britain forcing China to legalize opium, which British merchants wanted to barter in exchange for spices and fabrics);¹⁹ and colonial landholders forcing colonial farmers to produce cash crops such as coffee and tobacco in order to pay rent rather than traditional staple foods for local consumption.²⁰ These practices undergird dumping activities such as those described below.

18. See Mark Landlaer, *A New Era of Gunboat Diplomacy*, N.Y. TIMES (2011), <https://www.nytimes.com/2011/11/13/sunday-review/a-new-era-of-gunboat-diplomacy.html>.

19. Austin Ramzy, *How Britain Went to War With China Over Opium*, N.Y. TIMES (2018), <https://www.nytimes.com/2018/07/03/world/asia/opium-war-book-china-britain.html>.

20. See Sam Moyo, *Family Farming in sub-Saharan Africa: Its Contribution to Agriculture, Food Security and Rural Development*, UN FAO (2016), <http://www.fao.org/3/a-i6056e.pdf>.

Price dumping is a type of dumping that is typically defined as the practice of using “discriminatory pricing” – wherein goods and services are sold in the importing country at prices below the selling price and/or cost of production in the country of export.²¹ Intermittent discriminatory pricing of goods and services constitute a significant percentage of sales to the importing country market, which causes injury to competing industries in the importing country.²² Product price dumping has occurred for centuries, with an increasing abundance of legal complaints pursued since 1980 because of the advent of anti-dumping laws and their enforcement.²³

Social dumping occurs when employers pay lower wages to workers disadvantaged by legal status, bargaining power, or discrimination, in contrast with the ideal of a “fair day’s wage for a fair day’s work.”²⁴

Hazardous waste dumping is the practice of exporting hazardous waste and scrap from one country or territory to another country or territory with less stringent environmental laws and associated enforcement for disposal or other purposes.²⁵ Hazardous waste

21. Peter D. Ehrenhaft, *Protection Against International Price Discrimination: United States Countervailing and Antidumping Duties*, 58 COLUM. L. REV. 44, 46 (1958). (“[D]umping’ generally refers to sales for export at prices lower than those charged at the same time and under like circumstances to buyers in the domestic market.”).

22. *See id.* at 47.

23. *See* Douglas A. Irwin, *The Rise of US Anti-Dumping Activity in Historical Perspective*, 28 WORLD ECON. 651, 652 (2005) (“The proximate determinants of the annual number of AD cases is the unemployment rate, the exchange rate, import penetration, and a 1984 legal change that encouraged the filing of multiple petitions.”).

24. Thomas Carlyle, *Forbes Quotes, Thoughts on the Business of Life*, <https://www.forbes.com/quotes/9100> (last visited Sept. 25, 2018); *see also* Christopher L. Erickson and Sarosh Kuruvilla, *Labor Costs and the Social Dumping Debate in the European Union*, 48 INDUS. & LAB. REL. REV. 28, 29 (1994) (stating that “[s]ocial dumping” occurs when “firms in high labor cost countries . . . relocate their operations, thereby strengthening their bargaining power . . . to exert downward pressure on wages and working conditions”).

25. *See* Zada Lipman, *Trade in Hazardous Waste: Environmental Justice Versus Economic Growth*, Basel Action Network (2011), <http://archive.ban.org/library/lipman.html>; *see also* As an example of the thinking that can be used to justify hazardous waste dumping, Lawrence Summers, former President of Harvard University and Chief Economist of the World Bank, issued a confidential memo at the World Bank arguing:

Just between you and me, shouldn’t the World Bank be encouraging MORE migration of the dirty industries to the LDCs [Least Developed Countries]? I think the economic logic behind dumping a load of toxic waste in the lowest wage country is impeccable and we should face up to that. . . . I’ve always thought that underpopulated countries in Africa are vastly UNDER-polluted, their air quality is probably vastly inefficiently low compared to Los Angeles or Mexico City.

Furor on Memo at World Bank, N. Y. TIMES (Feb. 7, 1992), <https://www.nytimes.com/1992/02/07/business/furor-on-memo-at-world-bank.html>.

dumping includes waste disposal on land and in the oceans.²⁶ The Basel Convention and the London Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (London Convention) are examples of vital multilateral environmental agreements currently in place to address transboundary hazardous waste dumping.²⁷

Environmental dumping is the practice of exporting products to another country or territory that: 1) contain hazardous substances, 2) have environmental performance lower than is in the interest of consumers or that is contrary to the interests of the local and global commons, or 3) can undermine the ability of the importing country to fulfill international environmental treaty commitments.²⁸

Environmental dumping of refrigeration and air conditioning equipment includes:

- 1) Export of technology that cannot legally be sold in the country of export as a consequence of failure to meet environmental, safety, energy efficiency, or other product standards;²⁹ and

26. See, e.g., *Learn about Ocean Dumping*, U.S. ENVTL. PROTECTION AGENCY, <https://www.epa.gov/ocean-dumping/learn-about-ocean-dumping> (last visited Sept. 25, 2018); see also *Illegal Dumping*, ENVTL. PROTECTION AUTHORITY SOUTH AUSTRALIA, https://www.epa.sa.gov.au/environmental_info/waste_management/illegal_dumping (last visited Sept. 25, 2018).

27. Despite these conventions, ninety percent of hazardous shipbreaking continues in Bangladesh, China, India, Pakistan and Turkey with high risks of asbestos, lead, polychlorinated biphenyls and heavy metals as well as occupational hazards of explosions and fire, suffocation, and mutilation from falling metal. See *Ship-Breaking: A Hazardous Work*, INT'L LABOUR ORG., http://www.ilo.org/safework/info/WCMS_110335/lang-en/index.htm (last visited Sept. 25, 2018).

28. See Decision XIV/7 *supra* note 8.

29. See, as an example how such exports might be defended, Article 26 of China's Standardization Law, (as amended Jan. 1, 2018), http://www.npc.gov.cn/npc/xinwen/2017-11/04/content_2031446.htm. Article 26 provides that the "technical requirements for exported products and services shall be implemented in accordance with the contract articles [therefor]." *Id.* According to the Interpretation of Article 26 of the Standardization Law, both import and export parties can agree to adopt, for instance, international standards, importing country standards, exporting country standards, or third country standards, to define the technical requirements for their contracts. Interpretation of the Standardization Law, Article 26 (2018) (Ch.), http://www.sac.gov.cn/zt/bzhf/bzhfsy/201803/t20180306_341816.htm. This Interpretation also indicates that the import and export parties can directly negotiate their own technical specifications. *Id.* That said, this Interpretation further specifies that the goods or services exported must be in line with the local laws and regulations of the importing country (such as the importing country's mandatory standards). *Id.* Essentially, if the importing country lacks minimum standards for the imported products, the language of Article 26 of China's Standardization Law would not stipulate that the exported product must at least meet China's minimum standards for such products. Article 26 of China's Standardization Law stands in somewhat stark contrast with Article 25 of the same Law, which specifies "products and services that do not meet compulsory standards shall not be produced, sold, imported or supplied."

- 2) Export of technology that is unusable in the country of export because refrigerants are no longer available because of national regulation or phaseout and phasedown control schedules under the Montreal Protocol.³⁰

Because of rapid economic development and evolving scientific assessments, a legal activity can be considered environmental dumping while government authorities scramble to enact new legislation.

Environmental performance, in the context of environmental dumping, encompasses direct, indirect, and embodied impacts over the life cycle of the product or product constituent, including production, consumption, recovery, recycling and disposal.³¹

An example of environmental dumping is described in Box 1.

Box 1

China–US HFC Dumping

1,1,1,2–Tetrafluoroethane (HFC-134a) from China

Investigation No. 731-TA-1313 (April 2017)³²

United States (US) anti-dumping laws provide a mechanism for US company and labor stakeholders to seek relief from a foreign company's materially injurious (i.e., sale at less than fair value) dumping of imports into the US, including imports that are subsidized through foreign government programs. The laws aim to provide an opportunity for domestic products to compete with imported goods on a level playing field.³³

HFC-134a is a highly climate-forcing HFC (GWP = 1,300) used worldwide in motor vehicle air conditioners (MACs), stationary air

30. DUNCAN BRACK ET AL., INTERNATIONAL TRADE AND CLIMATE CHANGE POLICIES (1996) (using “technology dumping” to refer to the export of second-hand technology that would not find a market in the country of export, because regulations would make the equipment unusable or the ODS it relied on unavailable). That circumstance now applies to HFCs. *See also Thailand Accelerating Shift to R32, JAPAN AIR CONDITIONING, HEATING & REFRIGERATION NEWS, LTD.* (Sept. 24, 2017), <https://www.ejarn.com/detail.php?id=47149> (“Manufacturing, sales, and import of R22 air conditioners will be completely prohibited from January 1, 2018. Accordingly, storage of R22 air conditioners has to be cleared within 2017 and the current R22 air conditioners in stock will probably be exported to Africa and other foreign countries.”).

31. *See* Mohammad Monkiz Khasreen et al., *Life-Cycle Assessment and the Environmental Impact of Buildings: A Review*, 1 SUSTAINABILITY 674, 676 (2009) (describing how “[Life-Cycle Assessment] includes the entire life-cycle of a product, process, or system encompassing the extraction and processing of raw materials; manufacturing, transportation and distribution; use, reuse, maintenance, recycling and final disposal”).

32. *See* INT’L TRADE ADMINISTRATION, FACT SHEET: COMMERCE FINDS DUMPING OF IMPORTS OF 1,1,1,2-TETRAFLUOROETHANE FROM THE PEOPLE’S REPUBLIC OF CHINA (2017).

33. *Id.*

conditioners (ACs), refrigeration, and metered-dose inhalers (MDIs) used in the treatment of asthma and chronic obstructive pulmonary disease.³⁴

It would be an advantage to patients using MDIs if dumping by China lowered prices, but pharmaceutical grade HFC-134a is produced in dedicated factories and has not been reportedly sold at a discount.³⁵ Discounted HFC-134a, sold for refrigeration and AC service, is environmentally disadvantageous because low prices discourage the recovery and recycling of used refrigerants.³⁶ Instead, HFC-134a is emitted to the atmosphere, where it contributes to climate change.³⁷ Of course, low price is an advantage to refrigeration and AC equipment manufacturers, which may or may not pass on savings to equipment buyers.

Pursuant to petitions filed in March 2016, the US Department of Commerce final investigation report found that Chinese companies (respondents) had engaged in harmful dumping in the US market of their products, namely HFC-134a or its chemical equivalent, regardless of form, type, or purity level.³⁸

In the resulting case (hereinafter called the “HFC-134a Dumping Case”), US petitioners included the American HFC Coalition and its individual members: Amtrol Inc. (Rhode Island), Arkema Inc. (Pennsylvania), The Chemours Company FC LLC (Delaware), Honeywell International Inc. (New Jersey), Hudson Technologies (New York), Mexichem Fluor Inc. (Louisiana), and Worthington Industries Inc. (Ohio), as well as District Lodge 154 of the International Association of Machinists and Aerospace Workers.³⁹ Chinese producer-respondents filing pre-hearing and post-hearing briefs in the HFC-134a Dumping Case included Zhejiang Sanmei Chemical Industry Co., Ltd., Zhejiang Quhua Fluor-Chemistry Co., Ltd., Sinochem Environmental Protection Chemicals Co., Ltd., and

34. See NAT'L RESEARCH COUNCIL (US) SUBCOMMITTEE ON ACUTE EXPOSURE GUIDELINE LEVELS, ACUTE EXPOSURE GUIDELINE LEVELS FOR SELECTED AIRBORNE CHEMICALS: VOLUME 2 121 (2002) (“HFC-134a is used in refrigeration and air conditioning systems, as a blowing agent for polyurethane foams, and as a propellant for medical aerosols.”).

35. See US INTERNATIONAL TRADE COMMISSION, PUB. NO.4679, 1,1,1,2-TETRAFLUOROETHANE (R-134A) FROM CHINA at II-15 (2017) (referencing “report[s] that pharmaceutical grades are not available from China”).

36. See World Bank Group White Paper, *Refrigerant Recycling, Reclaim and Reuse* (2006).

37. See, e.g., Sukumar Devotta, Aroja Asthana and Rahul Joshi, *Challenges in Recovery and Recycling of Refrigerants from Indian Refrigeration and Air-Conditioning Service Sector*, 38 ATMOSPHERIC ENV'T 845 (2004).

38. See US INTERNATIONAL TRADE COMMISSION, *supra* note 35, at 23.

39. *Id.* at 1.

Zhejiang Bluestar Green Technology Co., Ltd.⁴⁰

The anti-dumping order issued pursuant to the US Department of Commerce and International Trade Commission investigation instructed the US Customs and Border Protection to “assess antidumping duties equal to the amount by which the normal value of the merchandise [in question] exceed[ed] the export price (or constructed export price) of the merchandise, for all relevant entries of [HFC-134a] from [China].”⁴¹

Environmental dumping also covers current legal situations in which obsolete products that present the potential for environmental harm are exported to unsuspecting countries or territories after their use has been prohibited in the exporting country/territory (e.g., export of automobile air conditioning and refrigeration systems that contain substances that have been phased out in the exporting country and have not yet, but are in the process of being phased out in the importing country).⁴² Such exports increase consumption for servicing and make it more challenging and onerous for the importing country to comply with international agreements. An example is described in Box 2.

40. *Id.* at 3.

41. 1,1,1,2 Tetrafluoroethane (R-134a) from the People’s Republic of China: Antidumping Duty Order, 82 Fed. Reg. 74, 18422 (Apr. 19, 2017).

42. *See, e.g.,* Laird M. Street, *Comment: U.S. Exports Banned for Domestic Use, But Exported to Third World Countries*, 6 MD. J. INT’L L. 95, 95 (1980) (“Consumers in foreign nations are frequently the recipients of products which may not be sold in the United States because the agency with jurisdiction over the product has either banned it from the domestic market or has promulgated standards to which the exported produce does not conform.”). Consider that the EPA credits for fuel efficiency from the use of low-GWP refrigerants in motor vehicle air conditioning exempts export of vehicles to markets believed not to be ready for the new technology. EPA, *EPA and NHTSA Set Standards to Reduce Greenhouse Gases and Improve Fuel Economy for Model Years 2017 - 2025 Cars and Light Trucks* (2012).

*Box 2***ODS Environmental Product Dumping:
Republic of Viet Nam Case Study⁴³**

In 1994, a delegation that included members of the Industry Cooperative for Ozone Layer Protection (ICOLP), the Japan Industrial Conference on Ozone Layer Protection (JICOP) and the United Nations Environment Programme (UNEP) were on a study tour with workshops in Hanoi and Ho Chi Minh City, Viet Nam. While on tour at Viet Nam Motors, where German and Japanese automobiles were assembled from parts (i.e., total knock-down assembly (TKA)), the delegation noticed that certain German and Japanese vehicles contained CFC-12 air conditioners that had been replaced by ozone-safe HFC-134a in the same vehicles sold elsewhere.⁴⁴ Later in the same tour, the delegation noticed that refrigerated food processing equipment imported from Japan featured ozone-depleting chlorofluorocarbons (CFCs) and HCFCs in equipment that had transitioned to ozone-safe refrigerants in Japan and other markets.⁴⁵

The delegation became increasingly concerned that multinational companies might be intentionally or inadvertently dumping obsolete products in Viet Nam and other developing countries. Regardless of intent, such dumping demonstrates global irresponsibility with respect to stratospheric ozone depletion and makes emerging economies dependent on obsolete technology that would become difficult to service and repair as next-generation equipment starts to dominate other markets.

A group of individuals successfully came together and devised the idea of organizing global companies to pledge to invest and market in ways consistent with the intent of the Montreal Protocol on Substances

43. For further information, see PENELOPE CANAN & NANCY REICHMAN, *OZONE CONNECTIONS: EXPERT NETWORKS IN GLOBAL ENVIRONMENTAL GOVERNANCE* (2002); see also Yuichi Fujimoto, *Lessons from the Thailand Leadership Initiative, the Viet Nam Corporate Pledge, and the Global Semiconductor Agreement Protecting the Ozone Layer*, in *PROTECTING THE OZONE LAYER: LESSONS, MODELS, AND PROSPECTS* 201–05 (Philippe G. Le Prestre et al. eds., 1998); Yuichi Fujimoto, Naoki Kojima, Tetsuo Nishide & Tsutomu Odagiri, *JAPANESE LEADERSHIP IN TECHNOLOGY COOPERATION* (Box 6.9 pp 269-270) in Stephen O. Andersen & K. Madhava Sarma, *PROTECTING THE OZONE LAYER: THE UNITED NATIONS HISTORY* (2002). For additional context, see generally Stephen O. Andersen et al, *The Global Search and Commercialization of Alternatives and Substitutes for Ozone-Depleting Substances*, 350 *COMPTES RENDUS GEOSCIENCE* 410 (2018).

44. See CANAN & REICHMAN, *supra* note 43, at 79; Fujimoto et al., *supra* note 43; see also E-mail from Stephen O. Andersen to author (Dec. 5, 2018, 08:44 EST) (on file with author).

45. See CANAN & REICHMAN, *supra* note 43 at 79.

That Deplete the Ozone Layer.⁴⁶ Overnight, they drafted the pledge and took it door-to-door in Hanoi collecting signed endorsements from key agencies, including the Ministry of Defence (MOD, in Vietnamese: B Qu c phòng), the Ministry of Finance (MOF, in Vietnamese: B Tài chính), the Ministry of Industry and Trade (MOIT, in Vietnamese: B Công Th ng), and the Ministry of Natural Resources and Environment (MONRE, in Vietnamese: B Tài nguyên và Môi tr ng). At a gala dinner attended by senior officials from each of the endorsing Ministries, consensus was reached on the importance of insisting on the latest technology to protect stratospheric ozone and in support of sustainable national development.⁴⁷

With the important endorsement by the Government of Viet Nam and with support from OzonAction at UNEP's Division of Technology, Industry and Economics (DTIE), leadership corporations were recruited during the next few months. At the same time, the companies that were identified as marketing ODSs in Viet Nam after having transitioned away from ODSs in other markets were contacted and asked for explanations.⁴⁸ Japanese automobile companies admitted their mistake and corrected the supply.⁴⁹ German automobile companies stated that they were not aware of the situation and corrected the supply.⁵⁰ Japanese food processing companies explained that Vietnamese customers were offered equipment with either ODS-containing or ozone-safe refrigerants and selected the ODS-containing products.⁵¹ In Viet Nam, it was confirmed that the choice had been offered, but with a substantially lower price for the ODS-containing option.⁵²

In September 1995, at the Hanoi conference entitled "Scientific Meeting for ODS Elimination," the Government of Viet Nam, the US EPA, ICOLP, and JICOP announced the following "Viet Nam Leadership Pledge" endorsed by more than 40 multinational companies:

46. *See id.* at 78–80. Individuals included: Du Duc Tuan (Viet Nam National Ozone Office, Ministry of Environment), Stephen O. Andersen (then with US EPA), David Chittick (AT&T), Arthur Fitzgerald (NORTEL), Yuichi Fujimoto (ICOLP), Robert Holcomb (Motorola), Shinichi Ishida (Hitachi), Market Kerr (Nortel), and Viraj Vitthoontien (UNEP). *Id.*; Stephen O. Andersen, *supra* note 44.

47. E-mail from Arthur Fitzgerald to author (Oct. 20, 2018, 16:04 EST) (on file with author).

48. *Id.*; Stephen O. Andersen, *supra* note 44.

49. *Id.*

50. *Id.*

51. *Id.*

52. *Id.*

Our company pledges to invest only in modern, environmentally acceptable technology to avoid the use of CFCs, halons, carbon tetrachloride, and 1,1,1-trichloroethane. Our company also pledges to limit the use of transitional substances such as HCFCs when suitable replacements become available. We also encourage our joint ventures and suppliers to make this pledge.⁵³

To further illustrate the circumstances in which environmental dumping occurs, consider minimum energy performance standards (MEPS) for ACs established in exporting countries to minimize life-cycle ownership costs from energy use and reduce environmental damage from air pollution and climate change. MEPS set in temperate climates are often less stringent than would be justified in developing-country export markets with longer, hotter, and more humid cooling seasons, especially in cases in which electricity is more expensive.⁵⁴ Furthermore, AC consumers in developing countries are often less able to afford the higher cost of cooling with inefficient room air conditioners (RACs) than the wealthier consumers in developed countries.⁵⁵ Of course, selecting technology with the lowest life-cycle ownership costs should take into account the local cost of electricity, cost of borrowing, and factors that can make next generation inverter technology more economic in developing countries because it likely is less vulnerable to voltage variation.⁵⁶

53. CANAN & REICHMAN, *supra* note 43, at 80. The first 40 companies making the Viet Nam Pledge included: Asahi Glass, Asea Brown Boveri, AT&T, British Petroleum, British Petroleum Vietnam, Carrier, the Coca-Cola Company, Daihatsu, DuPont, Ford, Fuji Electric, Fuji Heavy Industries, Hewlett-Packard, Hino, Hitachi, Honda, Honeywell, ICI, Isuzu, Kawasaki Heavy Industries, Lufthansa, Matsushita Electric, Mazda, Meidensha, 3M, Mitsubishi Electric, Mitsubishi Heavy Industries, Mitsubishi Motors, Motorola, Nissan, Nissan Diesel, Nortel (Northern Telecom), Sanyo, Seiko Epson, Sharp, Suzuki, Taiwan Fertilizer Company, Toshiba, Toyota, Trane, Yamaha, Yaskawa, Vulcan Materials and UNISYS. *Id.*

54. Consider for example the Philippines, which has four times more cooling degree days than the United States at 3508 vs. 882, *see* Sivak, *Will AC Put a Chill on the Global Energy Supply*, AMERICAN SCIENTIST, 2013, and has a household electricity tariff of 8.90 Philippine Peso per kilowatt-hour (0.17 USD) compared to the average residential rate of 0.12 USD per kWh in January 2017. *See Electric Power Monthly, Table 5.6.A Average Price of Electricity to Ultimate Customers by End-Use Sector*, US ENERGY INFORMATION ADMINISTRATION (last visited April 9, 2018). The MEPS for air conditioners (>3.33 kW cooling capacity) in the Philippines is 2.69 Cooling Season Performance Factor compared with 4.10 Seasonal Energy Efficiency Ratio. *Id.*

55. *See* Tony G. Reames, Michael A. Reiner, & Ben M. Stacey, *An incandescent truth: Disparities in energy-efficient lighting availability and prices in an urban U.S. county*, 218 APPLIED ENERGY 95, 96 (2018). Relatedly, one study of a US county shows that energy efficient lightbulbs are less available and more expensive in high poverty areas. *Id.*

56. *Solar Electricity Costs*, SOLAR CELL CENTRAL, http://solarcellcentral.com/cost_page.html.

II. 2016 BRAZIL CASE STUDY – AN ALERT AS TO THE POTENTIAL SCOPE AND MAGNITUDE OF GLOBAL ENVIRONMENTAL RAC DUMPING

In 2015-2016, a preliminary survey was conducted of the brands and models of RACs available in Brazilian markets and compared that list to the registry of RACs officially rated for energy efficiency under the national RAC energy efficiency labeling law.⁵⁷ The survey discovered that many of the RACs tested for highest energy efficiency were not generally available for purchase in the Brazilian market.⁵⁸ The environmental implication was that customers seeking energy efficiency could only choose among models in the middle range of product labels. Furthermore, the Brazilian MEPS at that time were relatively low, which allowed the sale of RACs with unnecessarily high ownership cost in the hot and humid climates typical of Brazil's large urban areas.⁵⁹

One problem identified in the case study is that low-cost, low-efficiency ACs manufactured-in or imported-to developing countries by non-domestic companies force the domestic manufacturers to lower price, energy efficiency and quality to satisfy consumers that look for low purchase prices without realizing the higher ownership cost of inefficiency.⁶⁰ This can become a race to the bottom and made worse when ACs using obsolete refrigerants HCFC-22 and HFC-410A are dumped in developing countries at prices below the local cost of manufacturing, which causes local business failure and loss of jobs. From the perspective of national policy, energy efficiency improvements can improve energy security and reduce energy imports, saving energy-importing countries billions.⁶¹

57. Stephen O. Andersen et al., *The Montreal Protocol Can Encourage Superior Efficiency: Case Study of Energy Efficiency and Price of Room ACs in Brazil and Beyond*, THE 38TH MEETING OF THE OPEN-ENDED WORKING GROUP (OEWG) OF THE PARTIES TO THE MONTREAL PROTOCOL (2016), http://conf.montreal-protocol.org/meeting/oewg/oewg-38/events-publications/Observer%20Publications/EE_Brazil_RAC_IGSD_IPEN_IEE_21July_FINAL.pdf.

58. *Id.*

59. *Id.*

60. *Id.*

61. See INT'L ENERGY AGENCY (2017), ENERGY EFFICIENCY MARKET REPORT 2017, https://www.iea.org/publications/freepublications/publication/Energy_Efficiency_2017.pdf. The IEA's report reads:

In countries that rely on imports to meet domestic energy demand, energy efficiency can enhance energy security by reducing imports of coal, oil and gas (Figure 1.17). Efficiency improvements between 2000 and 2016 avoided nearly USD 50 billion in expenditure on energy imports. Gas import savings were significant in IEA member countries, equivalent to 10% of global annual gas imports. Oil import savings were also significant,

Another problem identified in the case study is that none of the highest efficiency AC models tested, specifically those that significantly exceeded the top category on the Brazilian efficiency label, were available for purchase in Brazil.⁶² The absence of such high-efficiency products from Brazil's market may imply a lack of motivation for manufacturers to market products that cannot be distinguished from less efficient models based on the current label. As a result, Brazilian consumers do not have access to the highest efficiency products registered, creating the false impression that these consumers had a choice but freely choose inefficiency.⁶³ This perpetuates the myth that citizens of developing countries are not willing to pay for environmental quality even if the savings in electricity pay back the added cost of efficiency.

These case study findings alerted the authors to the prospect that RAC products, which are hazardous to local air quality and climate and damaging to household prosperity, were actively being marketed in developing countries rather than more energy-efficient models. Keep in mind that much of the extra summer peak power made necessary by inefficient ACs is produced by fossil fuel.⁶⁴ This is the case even in markets like Brazil's, which supply a large portion of electricity from low-carbon sources like hydroelectric and nuclear facilities (biomass, though renewable, is not often low carbon).⁶⁵ The proper calculation of carbon savings from energy efficiency is made by comparing the total system carbon with and without the added electric load of inefficiency.

The case study exemplifies how environmental dumping of RACs with high-GWP refrigerants and low energy efficiency: 1) exacerbates

equivalent to 2.2 mb/d—equal to almost one-third of China's total oil imports in 2016. Import savings were also achieved in the six major emerging economies analysed. However, due to lower import reliance, total savings (in energy terms) were only one quarter of those in IEA member countries.

See id. Further, domestic policies, including domestic production promotion policies, should be reviewed as part of the toolkit to assess potential for these policies to impact access to higher performing technologies. *See Technical and Economic Feasibility Study for a High Efficiency Compressor Market in Brazil*, CLASP (2018).

62. Andersen et al., *supra* note 57.

63. *Id.*

64. *See, e.g.*, Maggie Koerth-Baker, *We Use A Whole Bunch Of Energy Every Summer (And A Lot Of It Goes To Waste)*, FIVETHIRTYEIGHT (Aug. 25, 2018, 10:50 AM), <https://fivethirtyeight.com/features/we-use-a-whole-bunch-of-energy-every-summer-and-a-lot-of-it-goes-to-waste/>.

65. *See* Slade Johnson & Kirstin Berndt, *Hydroelectric Plants Account for more than 70% of Brazil's Electric Generation*, U.S. ENERGY INFORMATION ADMINISTRATION (Aug. 11, 2016), <https://www.eia.gov/todayinenergy/detail.php?id=27472> ("Hydroelectricity provides over 70% of Brazil's generation.").

climate change as a consequence of greater GHG emissions, 2) damages local air quality as a consequence of fossil fuel and biomass combustion for electricity generation, and 3) harms local prosperity by forcing consumers to pay more for air-conditioned comfort than would be necessary with highly efficient RACs that rapidly pay back incremental up-front costs through energy savings.

Fortunately, Brazil has had energy efficiency legal mechanisms in place since 2001 that can be immediately strengthened to achieve climate protection, increase Brazilian prosperity, and reduce energy demand.⁶⁶ In 2007, Brazil approved a specific regulation on RACs, setting MEPS.⁶⁷ In 2011, MEPS were strengthened.⁶⁸ Revisions aimed at further strengthening MEPS were proposed in 2017.⁶⁹ MEPS for larger AC equipment, such as chillers, have yet to be set.⁷⁰ Despite this trend of strengthened MEPS, companies from China, the Republic of Korea, Japan, and the US continue to sell RACs in their own countries with much higher efficiency than the best available in Brazil, even though Brazil is the fifth largest market for window and split RACs in the world.⁷¹

It is important to note that it is often difficult for governments in developing countries to decide what is in their environmental and financial interests and then subsequently implement effective policy.⁷² Rather, they are subject to pressure from domestic and foreign business stakeholders to maintain the status quo and are often disadvantaged by corporate interests that sponsor effective public relations campaigns to sway public opinion and delay environmental protection.⁷³ Of course, this is also true in developed countries.⁷⁴

66. *Brazil Savings Policy Assessment*, UNITED FOR EFFICIENCY, <https://united4efficiency.org/country-assessments/brazil/>.

67. Andersen et al., *supra* note 57.

68. *Id.*

69. *Id.*

70. *Id.*

71. See Won Young Park et al., ASSESSMENT OF COMMERCIALY AVAILABLE ENERGY-EFFICIENT ROOM AIR CONDITIONERS INCLUDING MODELS WITH LOW GLOBAL-WARMING POTENTIAL (GWP) REFRIGERANTS, EOL BERKLEY NATIONAL LABORATORY (2017), https://eta.lbl.gov/sites/default/files/publications/assessment_of_racs_lbnl_2001047.pdf (documenting the availability of high efficiency air conditioners in international markets).

72. See, e.g., Artur Rahman Belal et al., *Corporate environmental responsibility and accountability: What chance in vulnerable Bangladesh?*, 33 CRITICAL PERSPECTIVES ON ACCOUNTING 44, 46 (2015).

73. See *id.* at 52.

74. See John Vidal, *Many Treaties to Save the Earth, but Where's the Will to Implement Them?*, THE GUARDIAN: ENVIRONMENT BLOG (June 7, 2012), <https://www.theguardian.com/environment/blog/2012/jun/07/earth-treaties-environmental->

Literature reviews and consultations with experts have verified that some manufacturers in both developed and developing countries regionally or globally engage in practices defined in this paper as environmental dumping, similar to the case in Brazil. These practices include: selling RACs in export markets that use considerably more electricity, and/or employ more damaging GHG refrigerants than the products sold in the manufacturer's country of origin and that do not take into account the interests of the consumers and citizens in the export market;⁷⁵ selling RACs in export markets that are more expensive to own and operate than RACs from the same manufacturer that have higher energy efficiency, which would rapidly pay back the higher purchase price;⁷⁶ and/or withholding the most efficient RACs from sale in export markets on the implied presumption that developing countries are less worthy of lower ownership costs and good local air quality.⁷⁷ Withholding may also be affected by the false notion that developing countries are less committed to climate protection, despite evidence that these countries are often the most vulnerable to sea level rise, storms, droughts, wild fires, disease, and other consequences of climate change.⁷⁸

A study is underway by the Lawrence Berkeley National Laboratory (LBNL), in partnership with the Institute of Climate and Society (iCS) and the Energy Research Company (EPE), focusing on the Brazilian RAC market.⁷⁹ Among other objectives, the study will bring additional market information and update the findings of

agreements.

75. See UN ENVIRONMENT, CLIMATE-FRIENDLY AND ENERGY-EFFICIENT REFRIGERATORS 22 (2017), <https://united4efficiency.org/wp-content/uploads/2017/11/U4E-RefrigerationGuide-201801-Final-R1-1.pdf>.

76. See Stephen O. Andersen et al., AFFORDABLE SUPER-EFFICIENT ROOM AIR CONDITIONERS: ALL PARTIES AND REGIONS 3 (2017), <http://conf.montreal-protocol.org/meeting/oewg/oewg-39/events-publications/Observer%20Publications/Bulk%20Procurement%20Side%20Event%20as%20Delivered%20Final.pdf>.

77. This implication comes from the many instances of developed nations exporting air pollution to developing countries in other sectors like vehicles and fuels. See, e.g., UN Environment, *Exporting Pollution: Dumping Dirty Fuels and Vehicles in Africa* (Sep 15, 2015), <https://www.unenvironment.org/news-and-stories/story/exporting-pollution-dumping-dirty-fuels-and-vehicles-africa>.

78. See, e.g., Shyam Saran, *Paris Climate Talks: Developed Countries Must do More than Reduce Emissions*, THE GUARDIAN (Nov. 23, 2015), <https://www.theguardian.com/environment/2015/nov/23/paris-climate-talks-developed-countries-must-do-more-than-reduce-emissions>.

79. Stephen Andersen et al., *Case Study of Room Air Conditioners Available for Purchase vs. Tested for Energy Efficiency Under the Brazilian Labelling Law*, THE 38TH MEETING OF THE OPEN-ENDED WORKING GROUP (OEWG) OF THE PARTIES TO THE MONTREAL PROTOCOL (2016). ”

Andersen et al. (2016).⁸⁰ A recent study by LBNL of RACs in China, Europe, India, Japan, South Korea, and the United States confirmed that fixed-speed RACs using high-GWP and ozone-depleting HCFC-22 refrigerant still dominate the market in many emerging economies.⁸¹ This study also found that RACs that surpass the highest efficiency levels recognized by national labeling programs are available in some countries in most regions worldwide, suggesting considerable opportunity to strengthen such availability.⁸²

For more detail, *see* Appendix A – Lawrence Berkeley National Laboratory Brazil Room AC Study.

III. OPPORTUNITY TO UPGRADE ROOM AIR CONDITIONER ENERGY EFFICIENCY UNDER THE MONTREAL PROTOCOL

Developed countries (Montreal Protocol non-A5 Parties) have already phased out the production and consumption of HCFC-22 in RACs.⁸³ However, A5 Parties (generally developing countries) are just beginning the phase out of these refrigerants.⁸⁴ Almost all non-A5 Parties transitioned first from HCFC-22 to HFC-410A, which is an ozone-safe GHG that has poor energy efficiency at the high ambient temperatures and humidity that is typical in many developing countries.⁸⁵ Now, developed countries are making a second transition from HFC-410A to more energy-efficient refrigerants, such as HFC-32 or hydrocarbon (HC)-290.⁸⁶

On 15 October 2016, Parties to the Montreal Protocol adopted the Kigali Amendment to phase down the production and consumption of HFCs, a historic decision to significantly reduce GHG emissions by transitioning to lower GWP refrigerants.⁸⁷ The transition provides the opportunity to increase the energy efficiency of replacement technology.

80. *Id.*

81. Park et. al., *supra* note 71.

82. *Id.*

83. Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol, *Final Report on the Evaluation of HCFC Phase-out Projects in the Refrigeration and Air-Conditioning Manufacturing Sector* (2016), <http://www.multilateralfund.org/77/English/Forms/AllItems.aspx>.

84. *Id.*

85. *Id.*

86. *Id.*

87. Park et. al., *supra* note 71.

HFCs were once necessary to rapidly replace ODSs in applications in which environmentally superior alternatives were not available. Many HFCs are now technically obsolete and increasingly subject to national regulation and global controls. Regulations in countries including Australia, Canada, the European Union (EU), Japan, and the US prohibit HFCs in specific uses and create incentives for environmentally superior alternatives.⁸⁸ The Kigali Amendment, together with efforts to improve energy efficiency, complement the UN Framework Convention on Climate Change (UNFCCC). Emission reductions accomplished pursuant to countries' Montreal Protocol obligations also count toward their "nationally determined contributions" (NDCs) of GHG mitigation commitments under the Paris Climate Agreement.⁸⁹

Refrigerant Choices for RACs

Refrigerant	Montreal Status	ODP	GWP ⁹⁰	Efficiency	Affordability ⁹¹
HCFC-22	Phaseout	0.2	1760	Excellent	Lower cost
HFC-410A	Phasedown	0.0	1924	Poor ⁹²	Medium cost
HFC-32	Phasedown	0.0	677	Excellent	Lower cost up to 4 tons cooling capacity
HC-290	Not Controlled	0.0	~3	Excellent	Lower cost up to 1.5 tons cooling capacity

88. DUNCAN BRACK, NATIONAL LEGISLATION ON HYDROFLUOROCARBONS, IGSD (2015), http://www.igsd.org/documents/NationalLegislationonHydrofluorocarbons_9.11.151.pdf.

89. *Paris Agreement - Status of Ratification*, UNFCCC, <https://unfccc.int/process/the-paris-agreement/status-of-ratification>.

90. INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, ASSESSMENT REPORT FIVE (2014), <http://www.ipcc.ch/report/ar5/>.

91. Affordability accounts for the cost of purchase, installation, energy, service and disposal at the end of product lifetime.

92. HFC-410A has particularly poor energy efficiency at high ambient temperature. See OMAR ABDELAZIZ ET AL., ALTERNATIVE REFRIGERANT EVALUATION FOR HIGH-AMBIENT-TEMPERATURE ENVIRONMENTS: R-22 AND R-410A ALTERNATIVES FOR ROOFTOP AIR CONDITIONERS, OAK RIDGE NAT'L LAB 23 (2016), <https://www.energy.gov/sites/prod/files/2016/09/f33/ORNL%20High%20Ambient%20RTU%20Testing%20Report.pdf>.

IV. NATIONAL AND GLOBAL CONSEQUENCES OF ENERGY INEFFICIENCY

Companies are guilty of the traditional practice of injurious dumping when they export products to foreign markets at prices below the established domestic market price or when they ship quantities that cannot be explained by normal market competition.⁹³ Antidumping duties are imposed on imported goods at a rate calculated to counteract the dumping margin.⁹⁴

Companies are guilty of injurious environmental dumping when they export products to foreign markets at energy efficiencies below established domestic market levels, or when they unexplainably ship products containing more damaging ozone-depleting or greenhouse gas refrigerants than products sold in their domestic markets.⁹⁵

There are several generalized impacts of dumping imported or locally manufactured energy-inefficient room ACs in developing countries and the rest of the world. First, the life-cycle AC ownership costs are unnecessarily high, depriving citizens of the added prosperity that would be realized if savings in electricity cost were spent locally.⁹⁶ Increased energy demand during the high ambient-temperature season forces expansion of electricity-generation capacity and increases in fuel consumption, both of which would be avoided with the alternative of high-efficiency equipment.⁹⁷ Increased electricity generation, if from fossil fuel and biomass, emits carbon dioxide (CO₂) and other hazardous pollutants that damage human health, agriculture, and natural ecosystems.⁹⁸ Air pollution damage to human health decreases

93. BRUCE A. BLONIGEN AND THOMAS J. PRUSA, DUMPING AND ANTIDUMPING DUTIES 1 (2016) (Prepared for THE HANDBOOK OF COMMERCIAL POLICY 1, Kyle W. Bagwell and Robert W. Staiger eds.), <http://econweb.rutgers.edu/prusa/cv/blonigen-prusa%20dumping%20-%20final.pdf>.

94. *Id.*

95. See Andersen et al., *supra* note 76.

96. AMERICAN COUNCIL FOR AN ENERGY-EFFICIENT ECONOMY, FACT SHEET, ENERGY EFFICIENCY AND ECONOMIC OPPORTUNITY (2012), <https://aceee.org/sites/default/files/pdf/fact-sheet/ee-economic-opportunity.pdf>.

97. See Gabrielle B. Dreyfus et al., *Primer on Energy Efficiency*, (Institute for Governance & Sustainable Development Working Paper, Nov 13, 2017).

98. EMANUELE MASSETTI ET AL., ENVIRONMENTAL QUALITY AND THE U.S. POWER SECTOR: AIR QUALITY, WATER QUALITY, LAND USE AND ENVIRONMENTAL JUSTICE 3 (2017), <https://www.energy.gov/sites/prod/files/2017/01/f34/Environment%20Baseline%20Vol.%20-%20Environmental%20Quality%20and%20the%20U.S.%20Power%20Sector%20-%20Air%20Quality%20-%20Water%20Quality%20-%20Land%20Use%20-%20and%20Environmental%20Justice.pdf>.

productivity and quality of life and increases healthcare costs.⁹⁹ Air pollution damage to agricultural productivity increases hunger with consequences of malnutrition.¹⁰⁰ Lastly, air pollution damage to natural ecosystems reduces global photosynthesis and carbon sequestration in soils with consequences for climate change.¹⁰¹

Energy inefficiency harms the customer through higher cost of ownership, especially in climates with long, hot cooling seasons.¹⁰² Inefficiency harms the country by requiring investment in new power plants that, more often than desirable, burn coal, which damages human health, agricultural crops, and natural ecosystems.¹⁰³ Worse still, money paid for imported power plants and fuel could otherwise be spent locally, which generates jobs and improves the quality of life.¹⁰⁴ People outside of the nation's borders are also harmed. Transboundary air pollution reduces quality of life everywhere it goes, and CO₂ emitted to generate electricity drives climate change for everyone in the global commons.

It is also true that consumers purchase low-quality and energy-inefficient appliances because they often do not realize that the product with the lower purchase price will end up having ownership costs much higher than energy efficient models.¹⁰⁵ In addition, consumers worldwide often lack sufficient wealth or access to affordable lending to purchase the more efficient but also more expensive air conditioners. Governments, under pressure from manufacturing companies and political situations, can fail to act fast to adopt energy-efficiency regulations needed to foster economic growth, prosperity, and quality of life, including better health and a cleaner environment.¹⁰⁶

99. RANA ROY ET AL., ECONOMIC COST OF THE HEALTH IMPACT OF AIR POLLUTION IN EUROPE: CLEAN AIR, HEALTH AND WEALTH 1 (2015), http://www.euro.who.int/__data/assets/pdf_file/0004/276772/Economic-cost-health-impact-air-pollution-en.pdf.

100. WORLD BANK GROUP, THE COST OF AIR POLLUTION: STRENGTHENING THE ECONOMIC CASE FOR ACTION (2016), <https://openknowledge.worldbank.org/bitstream/handle/10986/25013/108141.pdf?sequence=4&isAllowed=y>.

101. *Id.* at 4.

102. *See* AMERICAN COUNCIL FOR AN ENERGY-EFFICIENT ECONOMY, *supra* note 96.

103. WORLD BANK GROUP, *supra* note 100.

104. AMERICAN COUNCIL FOR AN ENERGY-EFFICIENT ECONOMY, *supra* note 96.

105. *See, e.g.*, UN ENVIRONMENT, ACCELERATING THE GLOBAL ADOPTION OF ENERGY-EFFICIENT AND CLIMATE-FRIENDLY AIR CONDITIONERS 15 (2017), <https://united4efficiency.org/wp-content/uploads/2017/06/U4E-ACGuide-201705-Final.pdf>.

106. *Id.*

Analysis of appliance purchases has shown that higher efficiency is paid back in savings on electricity bills at a high rate of return.¹⁰⁷ For example, consumers can typically recover the higher cost of an efficient AC in less than one year, depending on the cooling season, electricity price, and appliance price, with savings continuing to accrue after that.¹⁰⁸

Analysis of energy efficiency improvements between 2000 and 2016 in countries that rely on imports to meet domestic energy demand has shown that it is less costly for governments to compel energy efficiency than to purchase new power plants and fuel to power inefficient appliances.¹⁰⁹

Analysis of climate change has warned that the cost of sea-level rise, increased violent storms, humanitarian relief, and civil unrest caused by displaced environmental refugees from resultant destruction is so high that national prosperity is threatened as surely as from war.¹¹⁰

V. INTERNATIONAL AND NATIONAL LAW AND POLICY “TOOLKIT” TO STOP ENVIRONMENTAL DUMPING

Existing international agreements, national law, and related guidance already provide effective “tools” for policymakers and other stakeholders to stop environmental dumping. The key is for policymakers and other stakeholders to understand and coordinate the employment of these tools, and to improve upon the tools for the public environmental good.

Tool 1: Prior Informed Consent (voluntary and traditional, treaty-based)

Prior Informed Consent (PIC) for environmentally harmful product imports, as the phrase suggests, involves accurate disclosure to the prospective importing country’s competent authority of the intended environmentally harmful product prior to that product’s shipment. Effective application of this tool requires that the prospective importing country’s competent authority is sufficiently informed to act on—or to refrain from acting on—the import based on the information provided. In this manner, a voluntary PIC procedure

107. See N. ABHYANKAR ET. AL., ACCELERATING ENERGY EFFICIENCY IMPROVEMENTS IN ROOM AIR CONDITIONERS IN INDIA: POTENTIAL, COST-BENEFITS, AND POLICIES (2017).

108. *Id.*

109. See INT’L ENERGY AGENCY, *supra* note 61.

110. US DEP’T OF DEFENSE, 2014 CLIMATE CHANGE ADAPTATION ROADMAP (2014), https://www.acq.osd.mil/eie/Downloads/CCARprint_wForward_e.pdf.

could be tailored to request information on product imports containing particular environmentally harmful constituents. Existing country trade data and import/export coding systems can complement a PIC procedure.¹¹¹ Further, import prohibitions on particular products based on information received through the PIC system would need to be implemented via domestic law.

PIC procedures have a deep history in multilateral environmental agreements.¹¹² For example, the Rotterdam Convention establishes the PIC as its main mechanism to implement its objectives.¹¹³ The Convention promotes shared responsibilities in relation to importation of hazardous chemicals, with PIC required for the import of listed chemicals.¹¹⁴ In this way, importing countries are given sufficient information to make informed choices, similarly to how doctors provide patients with information before performing a medical procedure. Another example of PIC use in multilateral agreements is within the Basel Convention, which seeks to reduce the creation of hazardous wastes and to control and reduce their trade across borders through research and information sharing.¹¹⁵

111. For example, India's Ministry of Commerce and Industry (MCI) establishes policy for the import of goods into India. MCI periodically develops, through its Director General of Foreign Trade (DGFT) Foreign Trade Policy (FTP), which specifies policies and procedures for import of goods into India. Every individual/importer desiring to bring goods into or export goods from India is required to obtain an importer-exporter code (IEC) from the DGFT. Federation of Indian Export Organisations, *Guide to Obtaining IEC Code*, https://www.fieo.org/view_section.php?lang=0&id=0,30,1703. No goods can be imported into or exported out of India without mentioning the IEC. *Id.* An IEC allotted to an applicant has permanent validity unless cancelled by the competent authority. *Id.* Only one IEC can be issued to a person or entity. Further, India trade policy conditions for each good for import or export is based on a system that is harmonized with international customs coding (ITC (HS)). See India Directorate General of Foreign Trade, ITC HS Code List or India Harmonised Code System Code, http://www.dgft.org/itc_hs_code.html. The ITC (HS) provides import policy and policy conditions for the listed items. Policy conditions may stipulate that the import of certain goods into India is subject to certain laws and regulations. Such laws and regulations may require an importer to obtain prior approval (for the import) from the concerned Ministry of department. Hence, for example, under the ITC (HS) chapter on "Products of the Chemical or Allied Industries," for a particular chemical, the listing may indicate that the chemical imports are subject to the provisions of India's Manufacture, Storage and Import of Hazardous Chemicals Rules formulated by the Ministry of Environment and Forests (Central Government) under the Environmental Protection Act, 1986. *With this in mind, we can see how trade data and import/export coding systems can complement prior informed consent programs.*

112. See BASEL CONVENTION, *supra* note 5.

113. Rotterdam Convention On the Prior Informed Consent Procedure For Certain Hazardous Chemicals and Pesticides in International Trade, Sep 10, 1998, revised in 2015, <file:///Users/c.jones/Downloads/UNEP-FAO-RC-CONVTEXT-2015.English.pdf>.

114. *Id.*

115. *Id.*

More pertinent to addressing HFCs and energy efficient products, the Parties to the Montreal Protocol (MP) recognize a voluntary and informal PIC mechanism for helping countries meet their MP obligations and reduce non-compliance with domestic legislation.¹¹⁶ This voluntary and informal mechanism allows for information exchange between countries for potential trade of ODS and ODS-containing mixtures, products, and product components. Expanding the scope of this voluntary and informal mechanism to report HFCs or even product minimum energy-performance specifications would be beneficial. It would facilitate government notice of, and action on, intended shipments of products and components containing unwanted HFCs and/or not meeting required energy-performance criteria.¹¹⁷

Tool 2: Green Supply Chain Guidelines or Government-Industry Accords

Green supply chain programs can employ the power of a company's economic and contractual relationships with its component and raw-material suppliers to encourage practices to counter production and import/export of environmentally harmful products. Countries can develop green supply chain or corporate green-procurement guidelines in consultation with individual industry members with local operations and through review of progressive examples from other jurisdictions that capture best green supplier practices. A green supply chain practice might impose, for example, a supplier contractual commitment to ban from its procurement and production processes those substances that are banned under multilateral agreements. Government-industry accords, or memoranda of understanding, can coordinate and aggregate practices reflected in individual companies' progressive green supply chain programs.

Another example is China's Guidelines on Green Corporate Procurement, issued by the Ministry of Commerce, Ministry of

116. See UNEP, *Informal Prior-Informed Consent (iPIC) – Supporting compliance through prevention of illegal and unwanted trade in ozone depleting substances*, 3 (2014) (“iPIC has been recognised by the Parties of the Montreal Protocol as a useful tool which can be used to reduce discrepancies between import and export data, to identify and reduce illegal trade and cases of noncompliance with domestic legislation.”).

117. See *Primer on Energy Efficiency*, Institute for Governance & Sustainable Development Working Paper (Draft) (13 November 2017), 24–5 (describing trade-related mechanisms for managing the efficiency and environmental performance of imports); see also Appendix C, 148 (provides a list of indicative questions that might be asked and answered for voluntary PIC regarding RACs.).

Environmental Protection (now Ministry of Ecology and Environment), and Ministry of Industry and Information Technology in December 2014.¹¹⁸ These Guidelines set forth criteria for green procurement from suppliers of raw materials, products, and services, and specifies that companies should prioritize the selection of suppliers that meet green criteria indicated in the Guidelines, including when procuring from suppliers outside of China.

Examples from China's Guidelines follow below:

Guidelines on Green Corporate Procurement (Provisional), at Article 16:

Green raw materials shall be selected, giving precedence to those that comply with environmental protection standards and energy-saving requirements and that possess a multitude of excellent properties such as being low energy-consumption, low-pollution, non-toxic, having a high resource use-rate and being recyclable and reusable, among other things.¹¹⁹

Guidelines on Green Corporate Procurement (Provisional), at Article 20:

Companies are not to select suppliers with any of the following characteristics: Suppliers that do not meet national or regional standards for polluting emissions, total pollutant control targets or energy conservation targets.¹²⁰

It might also be possible for a company to impose contractual commitments on its foreign suppliers that prohibit the export of products that fall below the supplying country's mandatory minimum product-performance standards. In this regard, it is important to understand that a company's influence over any one of its suppliers increases or decreases depending on the percentage of total business it represents. This is why green supply chain tools are best used in combination with other tools that reflect more binding commitments, including mandatory product performance standards, and that can be aimed at stopping environmental dumping.

Tool 3: Government Bulk Procurement and Buyers Clubs

Governments and private organizations can improve the environmental attributes of imports through government procurement

118. MINISTRY OF COMMERCE, MINISTRY OF ENVIRONMENTAL PROTECTION (now MINISTRY OF ECOLOGY AND ENVIRONMENT), AND MINISTRY OF INDUSTRY AND INFORMATION TECHNOLOGY, PEOPLE'S REPUBLIC OF CHINA, GUIDELINES ON GREEN CORPORATE PROCUREMENT (PROVISIONAL) [企业绿色采购指南(试行)] (Dec 2014).

119. *Id.*

120. *Id.*

specifications or trade-related incentives that encourage high environmental performance products and product constituents. A country's existing minimum product performance standards (MPPS), such as minimum energy performance standards (MEPS), where relevant, can be complemented by government procurement specifications that specify higher environmental performance attributes than required by law for imported or locally manufactured products.¹²¹ Bulk government procurement and private buyers clubs can also negotiate favorable and affordable prices of imports that satisfy contracted life-cycle climate performance (LCCP) requirements. LCCP is an analytical tool that accounts for direct refrigerant, indirect energy, and embodied GHGs.¹²² The first government bulk procurement of super-efficient room ACs was pioneered by Energy Efficiency Services Limited (EESL) in India.¹²³

Tool 4: Registration of Exporters and Importers

This tool focuses on key parties in the transboundary trade of environmentally harmful products: importers and exporters acting on their own or as agents for individuals and organizations with no presence in the country doing the importing or exporting. A registration system: 1) records key information on these entities, 2) can require that the registered entities meet certain criteria (e.g., standardized and compliant accounting systems, no record of customs violations), and 3) can ask, where mandatory product performance standards are in place, that the registered entities certify that they will be held liable for violation of such standards and customs requirements. This type of registration system could also ask that the registered entity certify that the environmental performance of the imported product or product constituent not fall below the performance of similar products for sale in the country of export.

Illustrating the exporter and importer registration tool, China's Ministry of Ecology and Environment, Ministry of Commerce,

121. See Dreyfus et al., *supra* note 97 at 24–25 (describing trade-related mechanisms for managing the efficiency and environmental performance of imports).

122. *Id.* at 12.

123. See IGSD & OzonAction UNE, *Buyers Club Handbook* (2018). <http://www.igsd.org/wp-content/uploads/2018/01/Buyers-Club-Handbook-2018.pdf>. EESL is a joint venture company of the Government of India's Ministry of Power and Public Service Undertakings (PSUs). *Id.* at 20. The successful February 2017 tender was for: "Design, manufacture, supply, installation, and provision for after-sales warranty and customer support for 5.28 kW (1.5 TR) RACs with ISEER [India Seasonal Energy Efficiency Ratio] of 5.2 (or higher) including three-year comprehensive warranty." *Id.*

National Development and Reform Commission, and General Administration of Customs (which is the government agency responsible for the import and export inspection and quarantine authorities of the former Administration for Quality Supervision, Inspection and Quarantine (AQSIQ)) administer rules governing pre-import and pre-shipment registration of overseas exporters.¹²⁴ They also administers rules governing domestically based importers of certain solid wastes intended for use as raw materials that are allowed to be imported into China.¹²⁵ Importers and exporters are subject to registration under these rules prior to signing supply contracts, per these rules.¹²⁶ This registration requires that registrants meet certain criteria, certify legal responsibility, etc., so that these entities and their responsible directors can be held responsible for any noncompliance or harms arising from their actions.¹²⁷

Tool 5: Minimum Product Performance Standards

MPPS, such as MEPS, can prevent environmental dumping by placing performance requirements on the sale of both domestically-manufactured and imported products, and can form the basis for several other tools, including labeling and pre-shipment verification of conformity (PVoC). MPPSs are even more effective anti-dumping tools if they include a prohibition against the production, sale, and

124. CPC Central Committee, *Plan for Deepening the Reform of the Party and State Institutions* (March 2018). Note that the import and export inspection and quarantine functions of China's AQSIQ were transferred to the General Administration of Customs as a result of the 2018 government reorganization. Other AQSIQ functions were transferred to the State Administration for Market Regulation. In addition, these rules are undergoing revision as part of China's solid waste import management system reform plan, although we note from our personal experience with these programs that it is highly likely the import restriction and registration rules will be strengthened over time. General Office of the State Council, People's Republic of China, *Implementation Plan for the Prohibition of Entry of Foreign Garbage and Promotion of the Reform of [China's] Solid Waste Import Management System*, 18 July 2017.

125. See, e.g., Ministry of Environmental Protection (now Ministry of Ecology and Environment), Ministry of Commerce, National Development and Reform Commission, General Administration of Customs, and AQSIQ, People's Republic of China, *Solid Waste Import Management Measures*, 8 April 2011, effective 1 Aug 2011, Art. 16 (original Chinese) (establishing, among other things, a registration system for domestic consignees importing solid waste that can be used as raw materials and for foreign suppliers that export solid waste that can be used as raw materials).

126. See, e.g., Administration for Quality Supervision, Inspection and Quarantine, People's Republic of China, *Inspection, Quarantine and Supervision, Management Rules for Solid Wastes Imported as Raw Materials*, 8 December 2017, effective 1 Feb 2018, Art. 4 (original Chinese).

127. See *id.*; see also General Administration of Customs, People's Republic of China, *Implementation Regulations on the Management of Registration for Domestic Consignees of Solid Waste Imported as Raw Materials*, 15 June 2018, effective 1 Aug 2018 (original Chinese).

export of non-conforming products after the MPPS's effective date. This "export issue" should be clearly addressed in local legislation associated with MPPS to avoid export loopholes that enable environmentally harmful product dumping in other countries.

MEPS can be combined with environmental protection-focused regulations prohibiting importation or local refurbishment of second-hand and resale products, such as products made with or containing ODSs and GHGs, including high-GWP HFCs.

Tool 6: Product Labeling Requirements

Governments can require labeling of products to disclose energy consumption, environmentally harmful content, or other attributes. This can be a very effective method for communicating product ownership costs and environmental performance to organizational and individual consumers and government inspectors.¹²⁸ This is particularly relevant for cases in which the energy consumption, ODSs, HFCs, or other environmentally harmful contents cannot be discerned from visual inspection of a product. Labeling can provide a ready means for communicating MPPS (Tool 5) conformity. When combined with a PIC program (Tool 1), labeling forms a key part of the "information" that tells government inspectors whether a trade partner is complying with their government's decision to stop the export of environmentally harmful or economically damaging products.

Tool 7: Pre-Shipment Verification of Conformity (PVoC)

The PVoC process allows governments to ensure products destined for import meet all importing country standards and requirements.

For instance, the Kenyan Bureau of Standards (KEBS) appointed SGS, a multinational corporation specializing in inspection, verification, testing, and certification, to provide PVoC services to all regulated products imported into Kenya. SGS also ensures that imported products meet relevant Kenyan standards and technical regulations.¹²⁹ Tanzania and Haiti have implemented similar programs.¹³⁰

128. See Dreyfus et al., *supra* note 97 at 22–23.

129. See *Kenya – PVoC Program*, SGS, <https://www.sgs.com/en/public-sector/product-conformity-assessment-pca/kenya-pvoc-program> (last visited Oct. 27, 2018).

130. See *Tanzania – PVoC Program*, SGS, <https://www.sgs.com/en/public-sector/product-conformity-assessment-pca/tanzania-pvoc-program> (last visited Oct. 27, 2018); see also *Pre-Shipment Inspection – Haiti*, SGS, <https://www.sgs.com/en/logistics/transportation/containers/pre-shipment-inspection-haiti>.

Policymakers may consider establishing a process similar to those of these countries or may take advantage of existing PVoC processes. They may also want to incorporate energy efficiency standards into the process.

Tool 8: Environmental Taxes and Incentives

Environmental taxes levied on environmentally harmful products, sometimes referred to as “eco-taxes,” have been applied in a number of countries. Such taxes, along with related pricing instruments, have been described as “a central pillar of green growth policy.”¹³¹ As such, they “provide incentives for further efficiency gains, green investment and innovation and shifts in consumption patterns.”¹³²

That said, developing countries should keep in mind particular benefits of environmental taxation approaches. For instance, to the extent that developing countries lack administrative expertise in environmental policy and related monitoring and enforcement budgets, taxes on polluting inputs to production (e.g., a particular ODS), as opposed to enforcement of an emissions standard, requires less monitoring and may be an attractive tool.¹³³

Nonetheless, the downsides of environmental taxes on production inputs should be considered: their use does not necessarily mean that substitutes for the taxed inputs will be environmentally beneficial, nor does it mean that such a tax will result in the least-cost means of reducing pollution.¹³⁴ Considering the substitutes that may be encouraged when a particular production input is taxed, as well as managing the market implications of environmental taxes with other tools, is key to optimizing environmental tax policies.

In addition to levying taxes, governments may also consider tax incentives to promote high efficiency, such as through reduced or nil import duties and value-added taxes.

shipment-inspection-psi/pre-shipment-inspection-haiti (last visited Oct. 27, 2018).

131. OECD, *Environmental taxation*, <http://www.oecd.org/env/tools-evaluation/environmentaltaxation.htm>.

132. *Id.*

133. Neil Bruce & Gregory M. Ellis, *Environmental Taxes and Policies for Developing Countries* 57 (The World Bank, Working Paper, WPS 1177, 1993).

134. *See id.* (citing Alan Krupnick, *Urban Air Pollution in Developing Countries: Problems and Policies*, prepared for UNU/WIDER Conference on the Environment and Emerging Development Issues, Helsinki, September 3–7, 1990).

Tool 9: Environmental Dumping Duties

An anti-dumping duty is a protective tariff that a government imposes on foreign imports that are sold in local markets below fair market value.¹³⁵ This duty regime, and related safeguards, can be used to address large-scale imports of goods sold below market value that bring economic harm to the importing country's industry and accompanying environmental harm to the importing country.

Simply described, the following elements are necessary to implement dumping tariffs under most current anti-dumping laws and global trade rules:

- (a) calculation of fair market value of the dumped goods, and
- (b) investigation confirming that dumping has taken place and that the corresponding domestic industry has suffered "material injury."¹³⁶

Of course, multilateral and national rules elaborate on factors that can be used to determine "material injury," specify procedures and timing, and provide for opposing parties to present evidence defending their positions.

At the multilateral level, the World Trade Organization (WTO) develops and enforces a set of international trade rules on how governments can or cannot "act against dumping where there is genuine (material) injury to the competing domestic industry."¹³⁷ These rules are set forth in the Agreement on Implementation of Article VI of the General Agreement on Tariffs and Trade 1994 (WTO "Anti-Dumping Agreement" or "Agreement").¹³⁸

135. Blonigen & Prusa, *supra* note 93.

136. *Id.*

137. *Anti-dumping, subsidies, safeguards: contingencies, etc.*, WTO, https://www.wto.org/english/thewto_e/whatis_e/tif_e/agrm8_e.htm (last visited Oct. 27, 2018). See also *Technical Information on anti-dumping*, WTO, https://www.wto.org/english/tratop_e/adp_e/adp_info_e.htm (last visited Oct. 27, 2018).

Dumping is defined in the Agreement on Implementation of Article VI of the General Agreement on Tariffs and Trade (GATT) 1994 (The Anti-Dumping Agreement) as the introduction of a product into the commerce of another country at less than its normal value. Under Article VI of GATT 1994, and the Anti-Dumping Agreement, WTO Members can impose anti-dumping measures, if, after investigation in accordance with the Agreement, a determination is made (a) that dumping is occurring, (b) that the domestic industry producing the like product in the importing country is suffering material injury, and (c) that there is a causal link between the two. In addition to substantive rules governing the determination of dumping, injury, and causal link, the Agreement sets forth detailed procedural rules for the initiation and conduct of investigations, the imposition of measures, and the duration and review of measures.

Id.

138. Agreement on Implementation of Article VI of the General Agreement on Tariffs and Trade, WTO, 1994, https://www.wto.org/english/docs_e/legal_e/19-adp_01_e.htm.

The Anti-Dumping Agreement guides parties on how they may address imports below fair market value by means such as imposing an additional duty on the imports to bring them to their “normal value.”¹³⁹ The Agreement provides a number of options for assessing what is normal value. These include determining a product’s price in the exporting country’s domestic market, or, when that determination cannot be obtained, assessing the exporter’s price charged in another country, or even reaching a price based on the exporter’s production costs, other expenses, and normal profit margins.¹⁴⁰

The Agreement also sets forth details on how anti-dumping cases are initiated, including how investigations verify dumping details, such as the volume of dumped goods and whether that volume reaches an actionable level. Further, the Agreement specifies parameters for allowing all interested parties in an anti-dumping action to present evidence. The Agreement indicates that anti-dumping measures must cease after five years of the date of imposition, unless an investigation confirms that ending such measures would cause injury.¹⁴¹

One possibility to explore would be to amend the trading system rules to extend this duty regime to address large-scale imports of goods that negatively affect the importing country’s air quality and exacerbate global climate change. “Material injury” could be defined to also include diminished air quality and/or exacerbation of climate change. Those harmed from such imports could also include: 1) the citizens purchasing the inferior and harmful equipment; 2) the local citizens not purchasing the equipment but nevertheless experiencing reduced air quality and prosperity; and 3) citizens across the globe suffering from climate change.

Tool 10: Prohibitions on Import and Local Manufacture

This tool would be used for banning the import, production, and sale of a particular product and/or product constituent. Such bans usually can be justified and lawfully implemented within a country’s legal system, provided they are also consistent with that country’s obligations under international trade rules (e.g., under the WTO or a bilateral trade agreement).¹⁴²

139. *Id.*

140. *See id.*

141. *See id.*

142. *See id.*

Consider that national mandatory MEPS specify minimum performance requirements for products within the MEPS scope, effectively prohibiting the sale of non-conforming products regardless of whether they are imported or locally produced.¹⁴³

To be most effective, such bans should be expanded to include the import and domestic sale of second-hand and resale products or combined with local measures to control local refurbishment of imported products. Without such expanded bans, governments may find that prohibitions may be undermined, for example, through surges in similarly environmentally harmful second-hand product imports.¹⁴⁴

A recent successful example of the use of this tool is China's laws prohibiting the import of certain waste raw materials and products. These include the Implementation Plan for the Prohibition of Entry of Foreign Garbage and Promotion of the Reform of [China's] Solid Waste Import Management System.¹⁴⁵ China notified the WTO Technical Barriers to Trade Committee of the proposed implementation of these prohibitions prior to their promulgation.¹⁴⁶ The "foreign garbage" imports within the scope of this Implementation Plan include "daily life"-originating plastic wastes, textile wastes, and waste paper, etc. Notably, "waste air conditioner" imports are also prohibited pursuant to China's solid waste import control regime.¹⁴⁷ Historically, China has also banned trade of household appliance imports if such appliances use substances that are phased out under the Montreal Protocol and its amendments.¹⁴⁸

143. See *supra* Tool 5.

144. See Appendix B, "Ozone-Depleting Substance and Product Bans: An Indicative List", 144.

145. See CPC Central Committee, *supra* note 124.

146. See WTO COMMITTEE ON TECHNICAL BARRIERS TO TRADE, NOTIFICATION (17-3880) (2017).

147. See *Catalogue of Prohibited Solid Waste Imports*, Item 102, issued under Solid Waste Import Management Measures (Item 102 of this Catalogue includes "waste air conditioners," as well as waste refrigeration equipment, dishwashers, clothes washing machines, water heaters, and microwaves) (original Chinese).

148. See MINISTRY OF ENVTL. PROT. (now MINISTRY OF ECOLOGY AND ENVT.), NAT'L DEV. & REFORM COMM'N, MINISTRY OF COMMERCE, GEN. ADMIN. OF CUSTOMS, & ADMIN. OF QUALITY SUPERVISION, INSPECTION & QUARANTINE, PEOPLE'S REPUBLIC OF CHINA, ANNOUNCEMENT ON THE PROHIBITION OF PRODUCTION, SALE, IMPORT AND EXPORT OF HOME APPLIANCES CONTAINING CFCs AS REFRIGERANTS AND FOAMING AGENTS (May 28, 2007) (original Chinese).

Tool 11: Multilateral Environmental Agreements (MEAs) Phasing Out Production and Consumption

The most powerful tools to address environmental dumping are global and binding commitments to prevent the resulting harms. This can happen through coordinated action among countries or within regions using tools described elsewhere in this section. It can also, very powerfully, occur by forging global agreements on actions to phase out production and consumption of environmentally harmful goods.

A successful example of this most powerful tool is the Montreal Protocol. The Montreal Protocol has phased out 99% of the production and consumption of almost 100 manufactured substances that are controlled to protect stratospheric ozone and climate.¹⁴⁹ As the chemical supply is phased out, industry has the opportunity to invent and market environmentally superior replacement technology. The Montreal Protocol includes its own trade provisions aimed at compelling compliance by every nation and uses a simple accounting framework to track and reconcile export and import of controlled substances to assure compliance.¹⁵⁰

Synergy Among the 11 Tools

In many national situations, there may be an opportunity to implement combinations of the tools to achieve faster and longer-lasting results. For example, one could combine PIC (Tool 1) with pre-shipment verification of conformity (Tool 7) and registration of exporters and importers (Tool 4); PIC (Tool 1) with product labeling requirements (Tool 6), minimum product performance standards (Tool 5), and pre-shipment verification of conformity (Tool 7); product labeling requirements (Tool 6) with minimum product performance standards (Tool 5); and government bulk procurement and buyers clubs (Tool 3) with green supply chain guidelines or government-industry accords (Tool 2).

149. See EUROPEAN ENV'T AGENCY, PRODUCTION AND CONSUMPTION OF OZONE-DEPLETING SUBSTANCES (Dec. 13, 2017), <https://www.eea.europa.eu/data-and-maps/indicators/production-and-consumption-of-ozone-2/download.pdf>.

150. See DUNCAN BRACK ET AL., INTERNATIONAL TRADE AND CLIMATE CHANGE POLICIES (1996).

VI. KEY CONSIDERATIONS FOR POLICYMAKERS AND OTHER STAKEHOLDERS AIMED AT PROTECTING ENVIRONMENTAL ANTI-DUMPING TOOLS FROM INTERNATIONAL TRADE CHALLENGES

Governments have the sovereign right to establish health and environmental rules and standards governing all products (whether produced domestically or abroad) in or entering their territory for the purpose of protecting their environment and people's health.¹⁵¹ These rights are enshrined in various agreements and decisions developed under or within the WTO.¹⁵²

Nonetheless, for government members of the WTO, in particular, but also in most bilateral or regional trade agreements, rules and standards such as those focused on environmental protection may be subject to certain restrictions intended to prevent discriminatory protection of domestic production.¹⁵³ Governments should incorporate consideration of these restrictions and principles into the design and application of tools to prevent environmental dumping, regardless of whether or not the government in question is a WTO member. Such practices and related considerations can help inoculate these tools against needless trade friction and associated delays, not to mention legal challenges and costly trade retaliations. Key trade principles include:

Non-discrimination – Between Countries and Territories. Tools applied to environmentally harmful product imports should be applied even-handedly across all countries and territories.¹⁵⁴ For example, this

151. “The WTO agreements are interpreted to say among other things that one country cannot reach out beyond its own territory to impose its standards on another country.” WTO, *The Environment: A Specific Concern*, https://www.wto.org/english/thewto_e/whatis_e/tif_e/bey2_e.htm (last visited Oct. 29, 2018) (this includes the Marrakesh Agreement Establishing the World Trade Organization, Apr. 15, 1994, 1867 U.N.T.S. 154 [hereinafter Marrakesh Agreement]).

152. See Marrakesh Agreement, *supra* note 151 (Preamble, “[The Parties to this Agreement] recognizing that their relations in the field of trade and economic endeavor should be conducted with a view to raising the standard of living, ensuring full employment and a large and steadily growing volume of real income and effective demand, and expanding the production of and trade in goods and services, *while allowing for optimal use of the world’s resources in accordance with the objective of sustainable development. . .*” (emphasis added)).

153. See WTO, *supra* note 151.

154. It is important in assessing trade agreements affecting environmental protection rules and standards to differentiate between “environmentally harmful products” and “process and production methods” (PPM) which may be environmentally harmful, but which are used to produce “clean” products. The compatibility of import restrictions on products produced via environmentally harmful PPM remains a subject of controversy in WTO trade and environment jurisprudence. See 6.4.2 INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, WORKING GROUP III: MITIGATION, CLIMATE CHANGE (2001), *Conflicts with International Environmental*

means an importing country that applies a standard, tax, or prohibition addressing RAC inefficiency to United Kingdom RAC imports should apply the same measure to France RAC imports. This is known as the “most favored nation” principle.¹⁵⁵

Non-discrimination – Between Domestic and Foreign Products.

Not only should tools addressing environmentally harmful products be applied consistently to imports from all countries, but they should also be applied equally to both domestic products and imported products. This means that MEPS or other rules affecting the internal sale, offering for sale, purchase, transportation, distribution, or use of products, and internal quantitative regulations requiring the mixture, processing, or use of products in specified amounts or proportions, should not be differently applied to imported or domestic products in a manner that protects domestic production.¹⁵⁶ Practically speaking, this means that MEPS governing RACs should apply to both domestically produced and imported RACs, or similarly, that a market ban on below-MEPS RACs should apply to both imported and domestically produced RACs. This is known as the “national treatment” principle.¹⁵⁷

An example is the Republic of Ghana’s energy efficiency standards for refrigerators, which apply to both appliances manufactured in Ghana and imports.¹⁵⁸

Transparency and Notice. Environmental dumping can wreak costly and sometimes irrevocable harm on the environment and human health, which increases the sense of urgency to apply anti-environmental dumping tools. Nevertheless, governments should

Regulation and Trade Law (“However, more debatable is whether GATT permits a government to place restrictions or bans on the import of goods or services, themselves not dangerous or polluting, that are produced outside its borders through PPMs that do not meet its national environmental regulations or standards. PPM issues may be characterized as “clean products produced through dirty processes.”).

155. See *Principles of the Trading System*, WORLD TRADE ORG., https://www.wto.org/english/thewto_e/whatis_e/tif_e/fact2_e.htm#mf (last visited Oct. 29, 2018).

156. See General Agreement on Tariffs and Trade, Oct. 30, 1947, 61 Stat. A-11, 55 U.N.T.S. 194 [hereinafter GATT].

157. See *Principles of the Trading System*, *supra* note 155.

158. See, e.g., ENERGY COMM’N, ENERGY EFFICIENCY STANDARDS AND LABELLING (HOUSEHOLD REFRIGERATING APPLIANCES) REGULATIONS, 2009 LI 1958 (Ghana) (“Duty to comply with requirements, 3. A person who manufactures, or imports an appliance for use in this country shall ensure that the appliance complies with: (a) the minimum energy efficiency star rating prescribed in Table 1 of the first schedule and Table 4 of the fifth schedule and measured in accordance with the Ghana Standard GS IEC 62552: 2007; (b) the labelling requirements prescribed in the Second Schedule; and (c) an ST or T Climate Class requirement as specified in the Standards.”).

publish draft rules and standards embodying the anti-environmental dumping tools for stakeholder comment. Such notifications should employ means such as media and relevant agency websites that provide meaningful announcement of the proposed rules and standards. In this manner, stakeholders are put on notice and can provide input that can be considered in the process of developing the rule or standard.

For government members of the WTO, transparency and notice practices linked to technical regulations (such as MEPS) are obligated under the Agreement on Technical Barriers to Trade.¹⁵⁹ In particular, such obligations include: 1) notifying members of the technical regulation, the products covered, the objective, and rationale of the technical regulation; 2) identifying, whenever possible, where the technical regulation deviates from relevant international standard; 3) seeking member comments in writing; and 4) providing members with copies of the technical regulation upon request.¹⁶⁰

Disputes Involving Goods Linked to Multilateral Environmental Treaties. Disputes are likely to arise over tools aimed at stopping environmental dumping where the products (including the product constituents) at issue are governed under multilateral environmental treaties. In those cases, the country whose tool has been challenged should seek to resolve those disputes under the dispute resolution provisions set out under the relevant treaties and not under the broader WTO or another relevant trade agreement. For example, if the environmental dumping tool under dispute prohibits import of equipment containing particular refrigerants that have been phased out per the universally adopted Montreal Protocol, it is suggested that such disputes should be resolved under the Protocol's dispute resolution processes.¹⁶¹

VII. CONCLUSION

Policymakers and other stakeholders can draw the following six key takeaways from this paper. First, environmental dumping is a reality that can be defined, identified, and stopped. Second, such dumping damages the receiving country while generating anomalous

159. See Agreement on Technical Barriers to Trade, Apr. 15, 1994, Marrakesh Agreement Establishing the World Trade Organization, Annex 1A, 1868 U.N.T.S. 120, Art. 2 [hereinafter TBT Agreement].

160. See *id.*

161. See Montreal Protocol on Substances That Deplete the Ozone Layer, Sept. 16, 1987, 1522 U.N.T.S. 29, Art. 11 (entered into force Jan. 1, 1989) [hereinafter Montreal Protocol] (on the Settlement of Disputes).

profits for the exporters. Third, there are important development benefits from the prevention of environmental dumping that are realized immediately in the jurisdiction that acts to stop or prevent such dumping. Fourth, the Montreal Protocol's Kigali Amendment offers a unique opportunity to prevent environmental dumping of high GWP and energy-inefficient appliances in the cooling sector. Fifth, policymakers and their advisors have a variety of tools at their disposal to prevent environmental dumping. These tools can be deployed in a manner that is consistent with the various agreements and decisions developed under or within the WTO. Some of these tools have already been used under the Montreal Protocol, such as Prior Informed Consent (PIC) procedures, and can be applied quickly. Finally, each country or jurisdiction can decide which tool or combination of tools it will use to stop or prevent environmental dumping while harnessing the maximum sustainable development benefits.

**APPENDIX A – LAWRENCE BERKELEY NATIONAL LABORATORY
BRAZIL ROOM AC STUDY.**

According to a 2015 study by the US Department of Energy’s Lawrence Berkeley National Laboratory (LBNL) in Brazil, the peak gigawatt (GW) load reduction in 2030 from a 30% improvement in room air conditioning (RAC) energy efficiency, added to the use of lower GWP refrigerants, would avoid, in terms of generation capacity, the equivalent to 31-72 power plants of 500 MW capacity.¹⁶² Energy efficiency improvement alone (determined under ISO 5151 T1 test conditions) would avoid 14-32 power plants of 500 MW each.¹⁶³ Refrigerant transition impact will depend on the refrigerant choice, but it is clear that energy efficiency will be the main driver in power plant energy savings. Improved energy efficiency together with the lower GWP refrigerant choice will offer the best overall climate benefits overall climate benefit. Brazilian room air conditioning energy efficiency labeling program established prior to December 2017 has four classes of products, A through D, as in Table 1 below:¹⁶⁴

Table 1: Brazilian Labeling Program

Label Class	Minimum Efficiency (W/W)	Maximum Efficiency (W/W)
A	>3.23	n.a.
B	3.02	3.23
C	2.81	3.02
D	2.60	2.81

From 16 August 2014, the EER A Class split AC MEPS is 3.23 W/W and 2.6 W/W for class D, which is inefficient, damaging to the climate, and costly to AC owners. These numbers do not consider the lower direct climate impact of refrigerant emissions. China has air conditioners with values greater than 6.0 W/W. In Japan this ratio exceeds 6.5 W/W.¹⁶⁵

162. NIHAR SHAH ET AL., ERNEST ORLANDO LAWRENCE BERKELEY NAT’L LAB., BENEFITS OF LEAPFROGGING TO SUPER EFFICIENCY AND LOW GLOBAL WARMING POTENTIAL REFRIGERANTS IN ROOM AIR CONDITIONING (2015).

163. *Id.*

164. NBR 5151: Methodology AHRI –A; Test temperature 19°C (room), 27°C (ambient). ACs with inverters are tested on the same apparatus as ACs without inverters. ANDERSEN ET AL., *supra* note 57.

165. NATIONAL INSTITUTE OF METROLOGY STANDARDIZATION AND INDUSTRIAL QUALITY (INMETRO), TABELA DE E ENERGÉTICA (2015) (extracted from C. D. PEREIRA ET

With the aim of implementing changes to the Program in December 2017, the following actions were undertaken:¹⁶⁶

- New MEPS were proposed by the Brazilian governmental Committee on Energy Efficiency Indicators (CGIEE) in October 2017.
- A public consultation process involving the MEPS occurred during October and November 2017.
- A public hearing on the MEPS was held in December 2017.
- After the public hearing, CGIEE decided to prescribe MEPS with an energy efficiency ratio of 3.02 W/W for split ACs.

As of April 2018, the rule that formalizes this decision has not been published. These newly proposed MEPS are low when considering the potential for improved efficiency worldwide.

Previous research undertaken in 2017 by the Brazil National Institute of Metrology, Quality and Technology (INMETRO), in a test of 1,989 window and split ACs, determined that the average energy efficiency ratio (EER) is only 3.07 W/W, with a sample of 1,242 split ACs averaging 3.08 W/W.¹⁶⁷ The most energy efficient AC was the split high wall type, which averaged 3.15 W/W in a separate study (1,242 units tested).¹⁶⁸

The data from INMETRO also indicates that the highest efficiency of room AC equipment labelled in Brazil is only 5.09 W/W.¹⁶⁹ However, a market survey determined that ACs with efficiency greater than 4 W/W are not available for purchase in the Brazilian market.¹⁷⁰ This shows that next generation products can be up to two times more energy efficient than average products sold today.

AL., CENTRO BRASILEIRO DE EFICIÊNCIA ENERGÉTICA EM EDIFICAÇÕES, TECHNICAL NOTE ON MINIMAL LEVELS OF ENERGY EFFICIENCY OF AIR CONDITIONERS IN BRAZIL (2013) (Braz.).”

166. See E-mail from Suely Carvalho to author (Oct. 17, 2018, 05:00 EST) (on file with author); *Technical and Economic Feasibility Study for a High Efficiency Compressor Market in Brazil*, CLASP (2018).

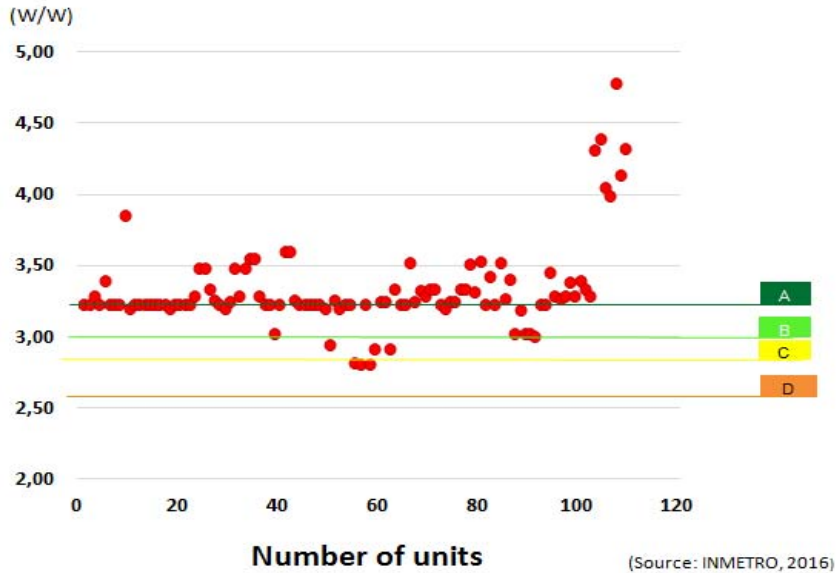
167. See *id.*

168. *Tabelas de consumo/eficiencia energética*, INMETRO, <http://www.inmetro.gov.br/consumidor/tabelas.asp> (last accessed Oct. 29, 2018).

169. *Id.*

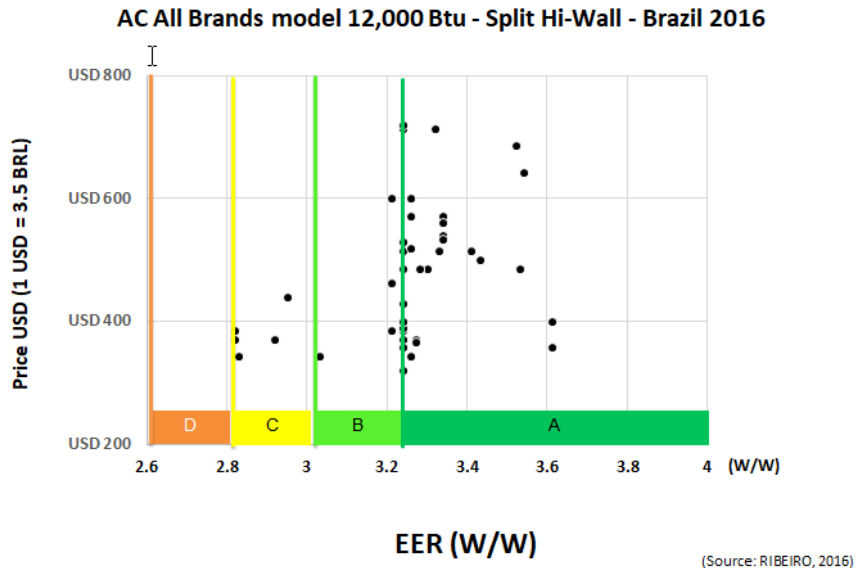
170. ANDERSEN ET AL., *supra* note 57.

Table 2: Split Hi-Wall AC Models Tested in Brazil (All brands: 9000, 12000 and 18000 BTU cooling capacity)



It is significant that the efficiency offered in Brazil is lower than levels that would be in the consumer and public's best interest based on energy savings and social cost, respectively. It is also significant that at most efficiency levels, ACs can be purchased at a wide range of prices. For example, ACs clustering around the minimum necessary to qualify for an "A" label can be purchased for as little as US\$300 or as much as US\$500, as in Table 3.

Table 3: Energy Efficiency Ratio versus costs of Hi-Wall split AC¹⁷¹



171. Costs were collected by Mr. Marcio Ribeiro of the Institute of Energy and Environment from the internet sites of selling companies, shopping centers and other open-market commercial sites, and are limited to the City of São Paulo. Available data from INMETRO at the time of the research was used for official testing results.

APPENDIX B – OZONE-DEPLETING SUBSTANCE AND PRODUCT
BANS: AN INDICATIVE LIST.

Ozone-Depleting Substance and Product Bans: An Indicative List		
Year	Jurisdiction	Action Taken
1977	Sweden	Sweden announces in December 1977 a ban on the manufacture and import of aerosols made with CFCs, except for medical products, to take effect in June 1979. ¹⁷²
1978	Norway	Norway announces in December 1978 a ban on the manufacture and import of aerosols made with CFCs, except for medical products, to take effect in July 1981. ¹⁷³
1978	US	US bans the manufacture of CFCs for use as aerosol propellants effective 15 October 1978. ¹⁷⁴
1996	US	US bans import and production of all CFCs starting 1 January 2006 (along with other developed countries under the Montreal Protocol). ¹⁷⁵
2001 and 2002	Denmark (later overturned by EU)	Denmark taxes (in 2001) and bans (in 2002) the use of F-gases for certain purposes. The tax (DKK 195 (~26 Euro) per kg) is imposed on the most frequently used F-gas refrigerant (HFC- 134a). Denmark implements a general ban on new products with F-gases starting 1 January 2006, with some exceptions. ¹⁷⁶

172. EDWARD A. PARSON, PROTECTING THE OZONE LAYER: SCIENCE AND STRATEGY (2003).

173. *Id.*

174. ENVTL. PROT. AGENCY, TOXICS INFORMATION SERIES: CFCs, OZONE, AND HEALTH (Aug. 1980).

175. *Phaseout of Class I Ozone-Depleting Substances*, ENVTL. PROT. AGENCY <https://www.epa.gov/ods-phaseout/phaseout-class-i-ozone-depleting-substances> (last visited Oct. 29, 2018) (“Section 604 of the Clean Air Act establishes the phaseout targets for Class I ODS. The ban on production and import of halons took effect on January 1, 1994. The ban on production and import of other Class I ODS—excluding methyl bromide—took effect on January 1, 1996.”).

176. DANISH MINISTRY OF THE ENVIRONMENT, ENVIRONMENTAL PROTECTION AGENCY, GOING NATURAL: THE DANISH ROAD TO NATURAL REFRIGERANTS 4 (2012), <https://www.thepmr.org/system/files/documents/Going%20Natural-Danish%20Experience%20>

Year	Jurisdiction	Action Taken
2003	US	US bans production and import of HCFC-141b. ¹⁷⁷
2004	EU	EU bans HCFC foam from January 2004 under the EU regulation covering ozone-depleting substances. ¹⁷⁸
2010	EU	EU bans from 1 January 2010 the use of virgin HCFCs to service RAC equipment. ¹⁷⁹
2013	Bhutan	Bhutan bans from 2013 the import of HCFC-based equipment. ¹⁸⁰
2013	Mauritius	Mauritius bans from 1 January 2013 the import of appliances containing HCFCs (Consumer Protection Regulations). ¹⁸¹

with%20natural%20refrigerants.pdf (“In Denmark, taxation was implemented in 2001 and a ban on certain applications was introduced in 2002. . . That means that a tax amounting to DKK 195 (app. 26 Euro) per kilogram is now imposed on the most frequently used F-gas refrigerant (HFC-134a). . . . In the Danish Statutory Order, no. 552, on regulation of certain industrial greenhouse gases from 2002 there is a general ban on new products containing or using F-gases from 1 January 2006. There are some exemptions from this general ban. For instance, the use of HFCs in refrigeration systems is still allowed for cooling equipment with HFC charges of between 0.15 kg to 10 kg and the use of HFC for service purposes is exempt from the Statutory Order. The export of HFC containing products is also exempt from the ban.”).

177. *Phaseout of Class II Ozone-Depleting Substances*, ENVTL. PROT. AGENCY <https://www.epa.gov/ods-phaseout/phaseout-class-ii-ozone-depleting-substances> (last visited Oct. 29, 2018).

178. Montreal Protocol, *supra* note 161 (“The CFC gases in the foam were replaced by hydrochlorofluorocarbons (HCFCs) one year ahead of Montreal Protocol commitments which lead to a tenfold reduction in potential ozone-depletion and a substantial decrease in global warming. But, HCFCs also destroy ozone, albeit less than CFCs. Their use in foams was banned from January 2004 under the EU regulation covering ozone-depleting substances (ODS).”).

179. ENVTL. PROT. AGENCY, *COMPLYING WITH REGULATIONS CONTROLLING FLUORINATED GREENHOUSE GASES AND OZONE DEPLETING SUBSTANCES: A GUIDANCE NOTE FOR CONTRACTORS IN THE REFRIGERATION, AIR-CONDITIONING AND HEAT PUMP SECTOR* (2010) (Ir.) (“From 1 January 2010 it is illegal to use virgin HCFCs to service RAC equipment. This ban applies even if HCFC was purchased before the ban date. It is illegal to use any supplies of virgin HCFCs that were stockpiled before the end of 2009. Such stockpiles are considered hazardous waste.”).

180. *HCFC Phase out Management Plan for Bhutan*, UN DEVELOPMENT PROGRAMME BHUTAN, <http://www.bt.undp.org/content/bhutan/en/home/operations/projects/ccmprojectlist/hcfcpaseout.html> (last visited Oct. 29, 2018) (“[T]he country has committed to phase-out HCFCs by 1 January 2015. The plan will impose an import ban of HCFC based equipment by 2013. The decision on phasing out of HCFC by 2025 is based on the country’s determination to maintain the negative carbon emission status.”).

181. Republic of Mauritius (14 September 2016), *Mauritius marks International Day for the Preservation of the Ozone Layer 2016* (“Consumer Protection Regulations have been amended to ban the import of appliances containing HCFCs as from 1st January 2013.”).

Year	Jurisdiction	Action Taken
2014	India	India passes a regulation in 2014 banning the import of HCFCs and limiting their use in various applications. ¹⁸²
2014	Maldives	Republic of Maldives bans HCFC-based equipment imports effective June 2014. ¹⁸³
2014	South Africa	South Africa bans from 1 July 2014 the import of new or used AC equipment and refrigerants containing HCFCs. ¹⁸⁴
2015	EU	EU bans from 1 January 2015 the use of recycled or reclaimed HCFCs to service RAC equipment. ¹⁸⁵
2015	Indonesia	Indonesia bans from 1 January 2015 the use of HCFCs in various appliances and all imported goods. ¹⁸⁶

182. 2017 REPORT OF THE TECHNOLOGY AND ECONOMIC ASSESSMENT PANEL, UNEP (2017) (“Now no new halon systems are being installed in the civil sector, however, dry powders and clean agents such as HFC and CO₂ are being reported in both portables and fixed systems. The use of HCFC and its blends has been decreasing drastically and is now less than 5% of the installations. Additionally, a regulation was passed in 2014 banning the import of HCFCs and limiting their use in many applications.”).

183. *Import ban on Hydrochlorofluorocarbons (HCFC) based equipment to commence from June 2014*, MINISTRY OF ENVIRONMENT AND ENERGY, REPUBLIC OF MALDIVES (Mar. 21, 2013), <http://www.environment.gov.mv/v1/news/import-ban-on-hydrochloroflourocarbons-hcfc-based-equipment-to-commence-from-june-2014/> (“Ministry of Environment and Energy today held a press conference to brief the media about the planned import ban on HCFC based equipment from June 2014,” confirming a plan set out in Republic of Maldives Ministry of Housing Transport and Environment in 2010 (HCFC PHASE-OUT MANAGEMENT PLAN, REPUBLIC OF MALDIVES MINISTRY OF HOUSING TRANSPORT AND ENVIRONMENT (Apr. 15, 2010) (“This will lead to gradual reductions and complete HCFC phase-out by 2020 and HCFC based equipment import ban by 2013 or 2015 at the latest.”))).

184. SOUTH AFRICAN HYDROFLUOROCARBONS PHASE OUT MANAGEMENT PLAN NEWSLETTER, SOUTH AFRICA DEPARTMENT OF ENVIRONMENTAL AFFAIRS (2015) (“Ban of import of any new or used air conditioning systems or equipment fitted with a compressor and pre charged or partially charged with HCFC-22 or any refrigerant or refrigerant blend containing any HCFC.”).

185. ENVTL. PROT. AGENCY, *supra* note 179 (“From 1 January 2015 it will be illegal to use recycled or reclaimed HCFCs to service RAC equipment.”).

186. *Hydrofluorocarbons Phase Out Management Plan (HPMP)*, UN DEVELOPMENT PROGRAMME INDONESIA, http://www.id.undp.org/content/indonesia/en/home/operations/projects/environment_and_energy/hydrofluorocarbons-phase-out-management-plan—hmp.html (last visited Oct. 29, 2018) (“Indonesia will ban the use of HCFC in refrigeration and AC production process, blowing agent in domestic refrigeration, freezer thermo-ware, refrigerated trucks and integral skins, and imported goods that contain such substance as of 1 January 2015 through the issuance of (1) Decree of Minister of Trade Number 55/M-DAG/PER/9/2014 concerning the Terms and Conditions of Imported Cooling System-based Goods and (2) Decree of Minister of Industry Number 41/M-IND/PER/5/2014 concerning the Prohibition of HCFCs in

Year	Jurisdiction	Action Taken
2015	US	US bans production and import of all HCFCs except in refrigerants manufactured before 1 January 2020. ¹⁸⁷
2016	South Africa	South Africa bans from 1 January 2016 the import of HCFC-141b either in pure form or as a component of blended chemicals. ¹⁸⁸
2018	Sri Lanka	Sri Lanka bans from 1 January 2018 the import of household electric appliances containing HCFCs. ¹⁸⁹

Industrial Sector.”).

187. ENVTL. PROT. AGENCY, *supra* note 175 (“No production or import of any other HCFCs, except as refrigerants in equipment manufactured before January 1, 2020.”).

188. SOUTH AFRICA DEPT. ENVTL. AFFAIRS, SOUTH AFRICAN HYDROFLUOROCARBONS PHASE OUT MANAGEMENT PLAN NEWSLETTER (2015) (“Ban on import of HCFC-141b either in pure form or as a component of blended chemicals; for the purpose of placing on the market or use in the production of polyurethane foams or as solvents or any other application.”).

189. Sandun A. Jayasekera, *Household electric appliances that contain HCFC to be banned*, DAILY MIRROR (Dec. 12, 2017, 8:36 AM), <http://www.dailymirror.lk/article/Household-electric-appliances-that-contain-HCFC-to-be-banned-142028.html> (“Mahaweli Development and Environment Ministry will ban importing of household electric appliances that contain Hydrochlorofluorocarbon (HCFC) effective from January 1st, 2018 as the use of HCFC is extremely harmful to the environment and to the ozone layer, a senior official of the Ministry said yesterday.”).

APPENDIX C – INDICATIVE QUESTIONS THAT MIGHT BE ASKED
AND ANSWERED FOR VOLUNTARY PRIOR INFORMED CONSENT
REGARDING ROOM ACS.

What is the model number, voltage, and cycles?

What is the refrigerant?

HCFC-22

HFC-410A

HFC-32

HC-290

Other (please specify)

What is the energy efficiency and how was it calculated?

Coefficient of Performance (COP)

Seasonally Adjusted Energy Efficiency (SEER)

What environmental standards have been satisfied?

Listing as acceptable by the United States Environmental
Protection Agency Significant New Alternatives Policy Program
(USEPA SNAP)

What safety standards have been satisfied?

Electrical safety?

Refrigerant safety?

Installation and service best practices?

In which countries does it satisfy safety standards?

List country and relevant safety standards satisfied.

In which countries does it satisfy energy efficiency standards?

List country and relevant energy efficiency standards.