

**Before the Committee on Foreign Relations
United States Senate**

Hearing on the Kigali Amendment to the Montreal Protocol

**Testimony of
Stephen R. Yurek
President and CEO
Air-Conditioning, Heating, and Refrigeration Institute (AHRI)
2311 Wilson Blvd., Suite 400
Arlington, Virginia 22201
Phone: (703) 600-0306
E-mail: syurek@ahrinet.org**

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1. INTRODUCTION

Chairman Menendez, Ranking Member Risch, and Members of the Committee, thank you for inviting me to testify on this important topic. My name is Stephen Yurek, and I am the President and CEO of the Air-Conditioning, Heating, and Refrigeration Institute (AHRI).

AHRI has 320 member companies that manufacture quality, safe, efficient, and innovative residential, commercial, and industrial air conditioning, space heating, water heating, and commercial refrigeration equipment and components for sale in North America and in export markets around the world.

It is an internationally recognized advocate for the heating, ventilation, air conditioning, and refrigeration (HVACR) industry and certifies the performance of many of the products manufactured by its members. In North America, the annual economic activity resulting from the HVACR industry is approximately \$256 billion. In the United States alone, AHRI's members, along with distributors, contractors, and technicians, employ more than 1.3 million people.

I am here to testify as to the importance of the Kigali Amendment to the Montreal Protocol and to urge the United States Senate to exercise its duty under Article II of the Constitution to provide its advice and consent and approve the Kigali Amendment, paving the way for its ratification by the United States.

2. AMERICAN MANUFACTURERS STRONGLY SUPPORT KIGALI RATIFICATION

AHRI and its member companies strongly support U.S. ratification of the Kigali Amendment. Numerous other major U.S. trade and industry associations similarly support ratification,

including the Alliance for Automotive Innovation, the Alliance for Responsible Atmospheric Policy, the American Chemistry Council, the Association of Home Appliance Manufacturers, the Heating, Air-conditioning & Refrigeration Distributors International, the National Association of Manufacturers, the Plumbing-Heating-Cooling Contractors—National Association, the Semiconductor Industry Association, and the U.S. Chamber of Commerce.

Ratification serves critical business needs for American manufacturers and workers. There is no credible scenario where the failure of the United States to ratify the Kigali Amendment helps American manufacturers and workers. To the contrary, failure to ratify materially harms their interests and compromises their future.

The Kigali Amendment will drive the growth of U.S. businesses, stimulate investment in the U.S. economy, sustain U.S. technology leadership, open export markets to U.S. products, protect U.S. workers and consumers, and ensure U.S. interests will shape future international agreements.

3. KIGALI RATIFICATION STRENGTHENS U.S. COMPETITIVENESS IN KEY EXPORT MARKETS

a. Hydrofluorocarbons (HFCs)

Hydrofluorocarbons (HFCs) are compounds used as refrigerants, foam-blowing agents, etchants, solvents, propellants, and fire suppressants. HFCs were commercialized in the 1990s as substitutes for ozone depleting substances (ODSs) including chlorinated and brominated chemical compounds such as chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs), and halons which were phased out under the Montreal Protocol.

In the United States, an estimated 230,000 tons of HFCs are produced and imported each year. Of this amount, the U.S. heating, ventilation, air conditioning, and refrigeration (HVACR) industry uses an estimated 70 percent for refrigeration and air conditioning applications in American homes and businesses.

The Kigali Amendment provides for a global phase down of the production (*i.e.*, manufacture) and the consumption (*i.e.*, imports net of exports) of HFCs.

b. HFC Substitutes & Export Markets

The market for next generation products and equipment (*i.e.*, HFC substitutes), is globally integrated, highly competitive, and rapidly growing.

To sustain its technological advantages and expand its share of the global market, U.S. manufacturers have invested billions in next generation technologies and – beginning in the mid-2000s – spent more than a decade advocating for a worldwide phase down of HFC production and consumption. This culminated in the adoption of the Kigali Amendment to the Montreal Protocol in October 2016.

Today, American factories now manufacture market-leading next generation equipment and refrigerants, and federal law is phasing down domestic HFC production and consumption under the American Innovation and Manufacturing Act of 2020 (AIM Act). These are unambiguous wins for American manufacturing and pro-business domestic policymaking.

Ratifying the Kigali Amendment extends the commercial advantages of the AIM Act to U.S. HVACR products and equipment in export markets around the world, while U.S. manufacturers lead in new technology development. These advantages are necessary to expanding the U.S.

share of these markets, the largest of which are projected to grow by at least six percent per year between now and 2030.¹ These export markets represent the most significant growth opportunity for U.S. manufacturers of HVACR equipment.

With Kigali ratification, the U.S. share of these export markets is projected to increase from 7.2 percent to 9 percent.² This translates to an increase in net exports worth \$6 billion annually, supporting approximately 17,000 of the 33,000 new manufacturing jobs created by the AIM Act.³ Failure to ratify Kigali risks shrinking the U.S. share of export markets to 6.2 percent.⁴

This is because, while many of the fastest growing export markets still use HFCs or HFC predecessors, U.S. ratification will draw these markets into the Kigali Amendment and drive them out of HFCs and toward next generation technologies, many of which are made in the United States.

c. U.S. Leadership in Multilateral Forums

The Kigali Amendment represents a successful effort by the United States, with the support of American HVACR manufacturers, to establish the policy platform for international trade in HFCs and HFC substitutes. If the United States does not ratify the Kigali Amendment, these opportunities for market growth will be lost and the next round of international trade practices will be more heavily influenced by foreign competitors – to the detriment of American economic, trade, and competitive interests.

U.S. ratification also prevents foreign governments and international institutions from favoring HFC substitutes made by foreign competitors. Indeed, failure to ratify means foreign

competitors can tilt the playing field toward next generation technologies made outside the United States.

That is, as transitions in refrigerant technologies occur, U.S. ratification allows the United States to use its standing within the Montreal Protocol and related international forums to maintain a technology neutral policy landscape for next generation technologies. This creates and maintains a level playing field in the global HVACR market, which favors superior-performing American-made products and equipment.

d. Prohibition on Trade with Non-Parties

The Montreal Protocol prohibits trade with countries not party to the Protocol or its amendments. This applies to countries not party to the Kigali Amendment after 2032, meaning U.S. manufacturers could lose access to export markets in about a decade.

However, as a practical matter, because importing countries want to be assured continuous access to Kigali-compliant products and services, continued uncertainty associated with U.S. ratification could cause U.S. manufacturers to lose market share sooner.

Ratifying the Kigali Amendment eliminates the risks of trade disruption and loss of market access for U.S. manufacturers.

e. Protecting American Investments in Innovation

American companies hold patents both in the United States and abroad on next generation refrigerant technologies. Foreign competitors have benefitted from the delay in U.S. ratification of the Kigali Amendment, as they know the clock is running for intellectual property protection on American-made products and equipment. Their enthusiasm for a global HFC phase down will

increase significantly once the HFC substitutes made by American companies lose their patent protection.

The failure to ratify the Kigali Amendment – and thereby ensure its enforcement beyond U.S. borders – serves to undermine American investment in innovation and proprietary technologies. Conversely, U.S. ratification of Kigali signals support for U.S. technology leadership, encourages global competitors to follow our lead, and assures capture of the projected economic benefits U.S. industry, workers, and the overall U.S. economy.

4. THE MONTREAL PROTOCOL CONSISTENTLY ATTRACTS BROAD BIPARTISAN SUPPORT

a. Overview

For the past three decades, the U.S. HVACR industry has benefited from the unwavering bipartisan support of presidential administrations and leadership in Congress in the development, implementation, and administration of sensible federal policies involving refrigeration and air conditioning products and equipment.

Indeed, there are few areas where American companies can make multi-billion-dollar investments in research and development fully confident the policy landscape will evolve in step with American innovation and technology leadership.

Fortunately, the U.S. HVACR industry has significant experience with refrigerant transitions. In the 1980s, the issue of stratospheric ozone depletion led to our industry making substantial investments in R&D to develop new classes of refrigerants that had no effect on the ozone layer – largely, HFCs.

In transitioning to HFCs in the 1990s and early 2000s, we introduced improvements in equipment design and performance, especially greater energy efficiency.

By leading the way with innovation and technology, we addressed an important environmental issue, expanded our market share at home and abroad, and provided American consumers with world-leading refrigeration and air conditioning equipment without meaningful increases in cost. Indeed, new equipment generally costs less to operate, due to energy efficiency gains made in conjunction with the transition, and also less to service and maintain, due to smaller refrigerant charge sizes and fewer leaks.

The transition from HFCs into next generation refrigerant technologies – many of which are made in the United States – represents an opportunity to continue to lead the world in these technologies and reap the benefits this leadership affords to American manufacturers, workers, consumers, and economy.

b. The Montreal Protocol

In the 1980s, the U.S. HVACR industry worked constructively with the Reagan Administration and the George H.W. Bush Administration to develop policies capable of guiding an orderly transition into next generation refrigerant technologies.

These policies took the form of the Montreal Protocol on Substances that Deplete the Ozone Layer, negotiated by President Reagan in 1987 and ratified by the United States Senate in 1988 by a vote of 83-0.⁵ The Montreal Protocol was implemented in the United States under Title VI of the Clean Air Act, which was signed into law by President George H.W. Bush as part of the Clean Air Act Amendments of 1990.⁶

All four prior amendments to the Montreal Protocol were ratified by the United States with broad bipartisan support. The London Amendment of 1990 was ratified by the United States in November 1991 and entered into force in 1992. The Copenhagen Amendment of 1992 was ratified by the United States in November 1993 and entered into force in 1994. The Montreal Amendment of 1997 was ratified by the United States in October 2002 after having entered into force in 1999. The Beijing Amendment of 1999 was ratified by the United States in October 2002 after having entered into force in 2002.

c. The Kigali Amendment

The origins of the Kigali Amendment date to the George W. Bush Administration in the mid-2000s, in response to multi-billion-dollar investments by the U.S. HVACR industry in the development of next generation refrigerant technologies. These technologies had the potential to replace the HFCs, with the promise of performing better in equipment and facing fewer and less stringent regulatory requirements. At that time, HFCs were regulated under the Kyoto Protocol and included in proposed cap-and-trade bills before Congress, which would have saddled HVACR manufacturers with disproportionately costly compliance obligations and potentially undermined the competitiveness of our domestic manufacturing base.

By contrast, phasing down the production and consumption of HFCs under the Montreal Protocol represents a practical, common sense regulatory approach that could be modeled on the successful transitions from earlier generations of refrigerant technologies, including CFCs, HCFCs, and halons. At the time, this was a radical idea. The Bush Administration, in partnership with our industry, was an early champion of this approach and after a decade of multilateral

negotiations spanning both a Republican and a Democratic administration culminated in the Kigali Amendment to the Montreal Protocol.

5. KIGALI RATIFICATION HELPS PROTECT AMERICAN CONSUMERS

a. Overview

For decades, consumers and business owners have benefitted from the technological innovation of the U.S. HVACR industry. Fears of higher costs accompanied past transitions from CFC and HCFC refrigerants, but in fact refrigerant and equipment prices did not increase materially over the course of those transitions.⁷ Indeed, such fears proved to be unfounded.

b. Past Transitions Produced Innovation in Equipment Design and Improved Performance

Consumers and business owners rarely noticed the CFC and HCFC transitions, as the refrigerant represents less than one percent of the overall cost for air conditioning systems in homes⁸ and chiller systems for commercial buildings.⁹ In addition, supplies of CFC and HCFC refrigerants remain available to this day for servicing older equipment.¹⁰

The next generation of equipment is more energy efficient, uses smaller amounts of refrigerant, and has fewer leaks – meaning it costs less to run and to service. Indeed, we anticipate that many consumers and business owners will choose to replace older equipment due to improvements in energy efficiency, irrespective of the type of refrigerant used.

c. Predictions of Consumer Harm in Past Refrigerant Transitions Proved Totally Wrong

When HFC-134a was introduced in the early 1990s, the predictions for its long-term pricing were between \$4 and \$12 per pound (\$7 to \$20 per pound in today's dollars, adjusted for inflation).¹¹ Today, bulk HFC-134a is priced at approximately \$3 per pound in today's dollars.¹²

Also, in the early 1990s, some predicted the cost of recharging an automobile's AC system would be \$200 by the middle of the decade (\$318 in today's dollars, adjusted for inflation).¹³

Today, that cost is between \$123 and \$156 in today's dollars.¹⁴

d. Consumers and Small Business Owners Benefit from an Orderly Transition Out of HFCs

Many U.S. manufacturers have already announced new product and equipment lines using next generation refrigerants, such as HFOs. With an orderly transition from HFCs, the average price among all refrigerants is expected to be approximately \$7 per pound.¹⁵ HFO refrigerants are currently priced 2 percent to 7 percent higher than HFCs but are expected to be priced approximately the same early in the transition.¹⁶

Experience with past transitions has shown that as a transition progresses, manufacturing costs and consumer prices are reduced due to economies of scale, with larger facilities coming online to produce new classes of refrigerants to meet growing demand. Plus, some next generation refrigerants are simpler versions of current products, which also yields reductions in cost.

Moreover, new hydrofluoro-olefin (HFO)-based products and equipment can be up to 18 percent more energy efficient, which further lowers operational costs.¹⁷ New products and equipment will have smaller refrigerant charge sizes and lower leak rates, which also lowers maintenance and servicing costs.¹⁸

Because refrigerants comprise such a small part of overall system cost, estimates show no significant increases in equipment prices even if substitute refrigerants costs are multiples of current HFC costs.¹⁹

6. CONCLUSION

The AIM Act phases down HFCs in the United States. The Kigali Amendment phases down HFCs around the world. The world's leading producers of substitutes for HFCs are in Louisiana, New Jersey, Texas, and elsewhere in the United States. The world's fastest growing markets for refrigerators and air conditioners are overseas. U.S. ratification of the Kigali Amendment forces those markets into HFC substitutes. This is a viciously competitive, globally integrated industry, and ratification increases the U.S. share of overseas markets and benefits U.S. manufacturers.

The AIM Act helps U.S. manufacturers within our borders. The Kigali Amendment helps U.S. manufacturers overseas. Both are essential to sustaining U.S. competitiveness and technology leadership.

¹ Economic Impacts of U.S. Ratification of the Kigali Amendment." *Industry Forecasting at the University of Maryland (INFORUM) and JMS Consulting, 2018.*

² *Id.*

³ *Id.*

⁴ *Id.*

⁵ "The Montreal Protocol on Substances that Deplete the Ozone Layer, done at Montreal on September 16, 1987, to the Vienna Convention for the Protection of the Ozone Layer." *United States, Congress, Senate.* Government Printing Office, 1988, 100th Congress.

⁶ "S.1630 - Clean Air Act Amendments of 1990." *United States, Congress.* Government Printing Office, 1990, 101st Congress.

⁷ "Refrigerants: Market Trends and Supply Chain Assessment." *Clean Energy Manufacturing Analysis Center, 2020.* <https://www.nrel.gov/docs/fy20osti/70207.pdf>. See also "The High Cost of Cool: The Economic Impact of the CFC Phaseout." Lieberman, Ben. *Competitive Enterprise Institute, 1994,* <https://cei.org/sites/default/files/Ben%20Lieberman%20->

[%20The%20High%20Cost%20of%20Cool%20The%20Economic%20Impact%20of%20the%20CFC%20Phaseout%20i
n%20the%20United%20States.pdf.](#)

⁸ “TECHNICAL SUPPORT DOCUMENT: ENERGY EFFICIENCY PROGRAM FOR CONSUMER PRODUCTS: Residential Central Air Conditioners and Heat Pumps.” Docket No. EERE-2014-BT-STD-0048-0098. *Department of Energy*, 2016, Table 8.2.39.

“Consumer Life-Cycle Cost Impacts of Energy-Efficiency Standards for Residential-Type Central Air Conditioners and Heat Pumps.” Rosenquist et. al. *Lawrence Berkeley National Laboratory*, 2001, <https://eta.lbl.gov/publications/consumer-life-cycle-cost-impacts>.

⁹ “Purchasing Energy-Efficient Water-Cooled Electric Chillers.” *Department of Energy, Office of Energy Efficiency & Renewable Energy*, <https://www.energy.gov/eere/femp/purchasing-energy-efficient-water-cooled-electric-chillers>. “Purchasing Energy-Efficient Air-Cooled Electric Chillers.” *Department of Energy Office of Energy Efficiency & Renewable Energy*, <https://www.energy.gov/eere/femp/purchasing-energy-efficient-air-cooled-electric-chillers>.

¹¹ “The High Cost of Cool: The Economic Impact of the CFC Phaseout.” Lieberman, Ben. *Competitive Enterprise Institute*, 1994, [https://cei.org/sites/default/files/Ben%20Lieberman%20-
%20The%20High%20Cost%20of%20Cool%20The%20Economic%20Impact%20of%20the%20CFC%20Phaseout%20i
n%20the%20United%20States.pdf](https://cei.org/sites/default/files/Ben%20Lieberman%20-%20The%20High%20Cost%20of%20Cool%20The%20Economic%20Impact%20of%20the%20CFC%20Phaseout%20i
n%20the%20United%20States.pdf).

¹² “How Much is R-134a Refrigerant Per Pound in 2019?” Johnson, Alex. *RefrigerantHQ*, 2019, <https://refrigeranthq.com/how-much-is-r-134a-per-pound-in-2019/>.

¹³ *Id.* at 15.

¹⁴ “AC Recharge Costs – Know what price you should pay to get your vehicle fixed.” *Repair Pal*, 2019, <https://repairpal.com/estimator/air-conditioning-recharge-cost>.

¹⁵ “Consumer Cost Impacts of U.S. Ratification of the Kigali Amendment.” *Industry Forecasting at the University of Maryland (INFORUM) and JMS Consulting*, 2018.

¹⁶ *ibid.*

¹⁷ A comparative study on the performance of HFO-1234yf and HFC-134a as an alternative in automotive air conditioning systems.” Daviran et. al. *Applied Thermal Engineering*, Volume 110, 2017, <https://doi.org/10.1016/j.applthermaleng.2016.09.034>. pp. 1091-1100.

¹⁸ Decision XXIX/10 Task Force Report on Issues Related To Energy Efficiency While Phasing Down Hydrofluorocarbons. *Report of the Technology and Economic Assessment Panel. Montreal Protocol on Substances that Deplete the Ozone Layer*, May 2018. [https://ozone.unep.org/sites/default/files/2019-04/TEAP_DecisionXXIX-
10_Task_Force_EE_May2018.pdf](https://ozone.unep.org/sites/default/files/2019-04/TEAP_DecisionXXIX-10_Task_Force_EE_May2018.pdf)

¹⁹ *Id.* at 11.