Case Study Title: The Montreal Protocol on Substances that Deplete the Ozone layer
Research Project Title: Realizing a carbon neutral economy: A new governance framework
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Executive Summary

The Montreal Protocol on Substances that Deplete the Ozone Layer is the landmark multilateral environmental agreement that regulates the production and consumption of nearly 100 man-made chemicals referred to as ozone depleting substances (ODS). When released to the atmosphere, those chemicals damage the stratospheric ozone layer, Earth's protective shield that protects humans and the environment from harmful levels of ultraviolet radiation from the sun. Adopted on 16 September 1987, the Protocol is to date the only UN treaty ever that has been ratified every country on Earth - all 198 UN Member States.

Introduction

In the late 1980s, there was growing awareness about the dangers some products posed to the ozone layer, compromising its ability to shield human populations from cancer-causing UV radiation. Aerosols in hairspray and deodorant, along with chemicals in refrigerators and air conditioners, were some of the culprits. The Protocol was adopted on September 16, 1987, a date that would set the course for the world to stop manufacturing and using chlorofluorocarbons (CFCs). It included the ability to adjust the agreement according to new evidence and science. The protocol is the only United Nations (UN) treaty to date that has been ratified in all UN member states.

Background

Hydrochlorofluorocarbons (HCFCs) are gases used worldwide in refrigeration, air-conditioning and foam applications, but they are being phased out under the Montreal Protocol since they deplete the ozone layer. HCFCs are both ozone depleting substances (ODS) and powerful greenhouse gases: the most commonly used HCFC is nearly 2,000 times more potent than carbon dioxide in terms of its global warming potential (GWP). Recognizing the potential benefits to the Earth's climate, in September 2007 the Parties decided to accelerate their schedule to phase out HCFCs. Developed countries have been reducing their consumption of HCFCs and will completely phase them out by 2020. Developing countries agreed to start their phase out process in 2013 and are now following a stepwise reduction until the complete phase-out of HCFCs by 2030.

Findings

A significant downside of the protocol was that the new family of chemicals called hyrochlorofluorocarbons (HFCs) were deemed a suitable substitute. Subsequently, however, both CFCs and HFCs were found to be contributing to another growing environmental problem: climate change. Consequently, the 2016 Kigali Amendment phased out HFCs, and efforts to lower the impacts of air conditioning, refrigeration, insulation and other products is continuing.

Discussion

There were several factors that contributed to the success of the implementation of the Montreal Protocol. First, it established a system for CFCs to be gradually phased out and replaced by other chemicals, which lessened private sector resistance. Second, setting clear rules about reducing the production of CFCs nudged companies to start making replacement chemicals. Third, regulating a segment of the chemical industry rather than the entire sector was a critical factor. Fourth, the Protocol focused on equity to get other countries on board, making wealthier countries with a bigger CFC contribution responsible for supporting less wealthy countries by paying the difference for substitute chemicals. Fifth, there was international scientific consensus on the problem and its solutions. Further, the treaty evolves over time in the light of new scientific, technical and economic developments, and it continues to be amended and adjusted.

Lessons Learned

One of the main reasons for the "success" of the protocol was that it dealt with a point source pollutant and involved only one sector of the economy and there were substitutes available so less perceived disruption as opposed to many, diffuse sources with many known and unknown consequences affecting the entire economy. At this time, the intersectionality of the challenges was not appreciated, nor were larger issues of systems perspectives and the need to transition and transform current systems of production were known by a majority of decision-makers, as evidenced by the unanticipated consequences of recommended substitutes. In fact, as of today, the role of the sustainability of the chemical industry has still not achieved a national prominence.

Clearly, focusing more narrowly on an environmental challenge is more 'doable', however, given our enhanced knowledge about the intersectionality of the issues and the ubiquity of the climate change and biodiversity imperatives, has made the need for system-wide perspectives a necessary and sufficient condition more recognized for resolving these challenges. What is important for meaningful resolution and implementation is international scientific consensus and regime formation, as evidenced by the increasing acceptance of IPCC science and recommendations.

One key lesson that could be applied to the climate crisis is the recognition of the importance of equity between developed and developing nation responsibilities. This is evidenced by the latest COP 26 discussions that have emphasized the importance [insert text]

Perhaps another lesson to be applied is from a scientist who was involved in gathering the early evidence, Susan Solomon. She describes three factors that encourage people to act on environmental problems—it needs to be personal, perceptible and the need to have practical solutions.

Post-Script

A recent article in Nature Geoscience (2023) used measurements combined with an atmospheric transport model to show that atmospheric abundances and emissions of five CFCs increased between 2010 and 2020, contrary to the goals of the phase-out. However, the anticipated impact of these emissions on stratospheric ozone recovery is small, although the authors warn that ongoing emissions of the five identified CFCs may negate some of the benefits gained under the Montreal Protocol (Western et al., 2023).

References

About Montreal Protocol https://www.unep.org/ozonaction/who-we-are/about-montreal-protocol

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