

Chapter 1 : Ozone Layer Protection | US EPA

The stratospheric ozone layer is Earth's "sunscreen" - protecting living things from too much ultraviolet radiation. The emission of ozone depleting substances has been damaging the ozone layer. But through domestic and international action, the ozone layer is healing and should fully recover by about

Although CFCs have been banned or reduced in many applications, the only way to be sure is to check the label on all your hairsprays, deodorants and household chemicals. Opt for pump spray products over pressurized cans, to further reduce your chance of buying CFCs. Dispose of pre refrigerators, freezers, and air conditioning units properly. These devices use chlorofluorocarbons to function, so leaks release the chemical into the atmosphere. Call your local utility company to see if there is a bounty program in your area that your appliance qualifies for. All pallets or crates carry a stamp that shows how they were treated: HT indicates they were heat treated while MB means methyl bromide was used. Organic and inorganic fertilizers are by far the largest human source of nitrous oxide production, and this gas is now the prime culprit in depleting the ozone layer. Fertilizers are of course important, but to limit their impact on our atmosphere, suggest these practices that both save money and reduce emissions: Using fertilizer formulations and additives that reduce emissions. Improving fertilizer timing to assure maximum nitrogen absorption. Using precision fertilizer placement to minimize nitrogen loss to the atmosphere. Write to your local or national representative. The majority of man-made ozone depleting chemicals now come from agriculture. Encourage your representative to put forth laws governing fertilizer use. Be sure to point out that by using fertilizer more effectively, these laws can save farmers money while also protecting the environment. Talk to your friends about how they can protect the ozone layer. Shrinking the hole in the ozone layer will take all of us working together. Encourage your friends to drive less, eat less meat, buy local, and to properly dispose of old fire extinguishers or cooling appliances containing ozone depleting substances. Nitrous oxide is now the largest ozone-depleting substance released by human activities as well as a potent greenhouse gas , [8] and it is produced in the internal combustion that powers most cars.

Chapter 2 : Protection for the ozone layer – sugar molecules bind harmful CFCs

How to Protect the Ozone Layer In this Article: Article Summary Avoiding Ozone-Depleting Products Advocating For Ozone Protection Changing Habits to Protect the Ozone Layer Community Q&A Stratospheric ozone, otherwise known as the ozone layer, is a layer of gas (O₃) that partially shields the earth from the sun's ultraviolet (UV) radiation.

C₂F₅Cl CFC The provisions of the Protocol include the requirement that the Parties to the Protocol base their future decisions on the current scientific, environmental, technical, and economic information that is assessed through panels drawn from the worldwide expert communities. To provide that input to the decision-making process, advances in understanding on these topics were assessed in , , , and in a series of reports entitled Scientific assessment of ozone depletion , by the Scientific Assessment Panel SAP [16]. In a Technology and Economic Assessment Panel was also established as the technology and economics advisory body to the Montreal Protocol Parties [17]. The Technology and Economic Assessment Panel TEAP provides, at the request of Parties, technical information related to the alternative technologies that have been investigated and employed to make it possible to virtually eliminate use of Ozone Depleting Substances such as CFCs and Halons , that harm the ozone layer. The TEAP is also tasked by the Parties every year to assess and evaluate various technical issues including evaluating nominations for essential use exemptions for CFCs and halons, and nominations for critical use exemptions for methyl bromide. They also agreed to start reducing its consumption and production in The time of freezing and reducing HCFCs is then known as The HCFCs are transitional CFCs replacements, used as refrigerants, solvents, blowing agents for plastic foam manufacture, and fire extinguishers. Hydrofluorocarbons HFCs [edit] This section needs to be updated. Please update this article to reflect recent events or newly available information. October Hydrochlorofluorocarbons, commonly known as HCFCs, are a group of man-made compounds containing hydrogen, chlorine, fluorine and carbon. They are not found anywhere in nature. HCFC production began to take off after countries agreed to phase out the use of CFCs in the s, which were found to be destroying the ozone layer. Unlike the CFCs however, most HCFCs are broken down in the lowest part of the atmosphere, and pose a much smaller risk to the ozone layer. Unfortunately HCFCs are also very potent greenhouse gases, despite their very low atmospheric concentrations, measured in parts per trillion million million. A group of developing countries including China, Brazil and South Africa are mandated to reduce their HFC use by 85 per cent of their average value in by the year India and some other developing countries – Iran, Iraq, Pakistan, and some oil economies like Saudi Arabia and Kuwait – will cut down their HFCs by 85 per cent of their values in by the year On 17 November , ahead of the 29th Meeting of the Parties of the Montreal Protocol, Sweden became the 20th Party to ratify the Kigali Amendment, pushing the Amendment over its ratification threshold ensuring that the Amendment will enter into force 1 January They discovered that CFC molecules were stable enough to remain in the atmosphere until they got up into the middle of the stratosphere where they would finally after an average of 50 – years for two common CFCs be broken down by ultraviolet radiation releasing a chlorine atom. Rowland and Molina then proposed that these chlorine atoms might be expected to cause the breakdown of large amounts of ozone O₃ in the stratosphere. Their argument was based upon an analogy to contemporary work by Paul J. Crutzen and Harold Johnston, which had shown that nitric oxide NO could catalyze the destruction of ozone. Several other scientists, including Ralph Cicerone , Richard Stolarski, Michael McElroy, and Steven Wofsy had independently proposed that chlorine could catalyze ozone loss, but none had realized that CFCs were a potentially large source of chlorine. Crutzen, Molina and Rowland were awarded the Nobel Prize for Chemistry for their work on this problem. The environmental consequence of this discovery was that, since stratospheric ozone absorbs most of the ultraviolet-B UV-B radiation reaching the surface of the planet, depletion of the ozone layer by CFCs would lead to an increase in UV-B radiation at the surface, resulting in an increase in skin cancer and other impacts such as damage to crops and to marine phytoplankton. But the Rowland-Molina hypothesis was strongly disputed by representatives of the aerosol and halocarbon industries. The chair of the board of DuPont was quoted as saying that ozone depletion theory is "a science fiction tale After publishing their pivotal paper in June , Rowland and Molina testified at a hearing before the U. House of

Representatives in December As a result, significant funding was made available to study various aspects of the problem and to confirm the initial findings. In , the U. National Academy of Sciences NAS released a report that confirmed the scientific credibility of the ozone depletion hypothesis. They speculated that this was connected to increased levels of CFCs in the atmosphere. It took several other attempts to establish the Antarctic losses as real and significant, especially after NASA had retrieved matching data from its satellite recordings. After the discovery of the ozone hole by SAGE 2 it only took 18 months to reach a binding agreement in Montreal, Canada. But the CFC industry did not give up that easily. In , DuPont testified before the US Congress that "We believe there is no imminent crisis that demands unilateral regulation. Heckert would write in a letter to the United States Senate, "we will not produce a product unless it can be made, used, handled and disposed of safely and consistent with appropriate safety, health and environmental quality criteria. At the moment, scientific evidence does not point to the need for dramatic CFC emission reductions. There is no available measure of the contribution of CFCs to any observed ozone change Currently, of the Parties to the Montreal Protocol meet these criteria they are referred to as Article 5 countries. It embodies the principle agreed at the United Nations Conference on Environment and Development in that countries have a common but differentiated responsibility to protect and manage the global commons. The Fund is managed by an Executive Committee with an equal representation of seven industrialized and seven Article 5 countries, which are elected annually by a Meeting of the Parties. The Committee reports annually to the Meeting of the Parties on its operations. The work of the Multilateral Fund on the ground in developing countries is carried out by four Implementing Agencies, which have contractual agreements with the Executive Committee:

Chapter 3 : Montreal Protocol - Wikipedia

The ozone layer is a natural layer of gas in the upper atmosphere that protects humans and other living things from harmful ultraviolet (UV) radiation from the sun. Although ozone is present in small concentrations throughout the atmosphere, most (around 90%) exists in the stratosphere, a layer 10 to 50 kilometres above the Earth's surface.

Sources[edit] The photochemical mechanisms that give rise to the ozone layer were discovered by the British physicist Sydney Chapman in 1930. The ozone molecule is unstable although, in the stratosphere, long-lived and when ultraviolet light hits ozone it splits into a molecule of O₂ and an individual atom of oxygen, a continuing process called the ozone-oxygen cycle. Chemically, this can be described as: Blue line shows DNA sensitivity. Red line shows surface energy level with 10 percent decrease in ozone Levels of ozone at various altitudes and blocking of different bands of ultraviolet radiation. UV-A does not primarily cause skin reddening, but there is evidence that it causes long-term skin damage. Although the concentration of the ozone in the ozone layer is very small, it is vitally important to life because it absorbs biologically harmful ultraviolet UV radiation coming from the sun. UV-B radiation can be harmful to the skin and is the main cause of sunburn ; excessive exposure can also cause cataracts, immune system suppression, and genetic damage, resulting in problems such as skin cancer. Ozone is transparent to most UV-A, so most of this longer-wavelength UV radiation reaches the surface, and it constitutes most of the UV reaching the Earth. This type of UV radiation is significantly less harmful to DNA, although it may still potentially cause physical damage, premature aging of the skin, indirect genetic damage, and skin cancer. Please help improve this article by adding citations to reliable sources. Unsourced material may be challenged and removed. February Learn how and when to remove this template message The thickness of the ozone layer varies worldwide and is generally thinner near the equator and thicker near the poles. The reasons for these variations are due to atmospheric circulation patterns and solar intensity. The majority of ozone is produced over the tropics and is transported towards the poles by stratospheric wind patterns. In the northern hemisphere these patterns, known as the Brewer-Dobson circulation , make the ozone layer thickest in the spring and thinnest in the fall. Then, the ozone-rich air is carried to higher latitudes and drops into lower layers of the atmosphere. While the total amount of ozone increases moving from the tropics to higher latitudes, the concentrations are greater in high northern latitudes than in high southern latitudes, due to the ozone hole phenomenon. Ozone depletion NASA projections of stratospheric ozone concentrations if chlorofluorocarbons had not been banned. The ozone layer can be depleted by free radical catalysts, including nitric oxide NO , nitrous oxide N₂O , hydroxyl OH , atomic chlorine Cl , and atomic bromine Br. While there are natural sources for all of these species , the concentrations of chlorine and bromine increased markedly in recent decades because of the release of large quantities of man-made organohalogen compounds, especially chlorofluorocarbons CFCs and bromofluorocarbons. Each radical is then free to initiate and catalyze a chain reaction capable of breaking down over , ozone molecules. By 1990, nitrous oxide was the largest ozone-depleting substance ODS emitted through human activities. The breakdown of ozone in the stratosphere results in reduced absorption of ultraviolet radiation. Ozone levels have dropped by a worldwide average of about 4 percent since the late 1970s. Ozone depletion and climate change To support successful regulation attempts, the ozone case was communicated to lay persons "with easy-to-understand bridging metaphors derived from the popular culture" and related to "immediate risks with everyday relevance". The European Community rejected an analogous proposal to do the same. After negotiation of an international treaty the Montreal Protocol , CFC production was capped at levels with commitments to long-term reductions. Since that time, the treaty was amended to ban CFC production after in the developed countries, and later in developing countries. Beginning January 1, 1996, only recycled and stockpiled CFCs were available for use in developed countries like the US. This production phaseout was possible because of efforts to ensure that there would be substitute chemicals and technologies for all ODS uses. In a study organized by the American Geophysical Union , three satellites and three ground stations confirmed that the upper-atmosphere ozone-depletion rate slowed down significantly during the previous decade. Some breakdown can be expected to continue because of ODSs used by nations which have

not banned them, and because of gases which are already in the stratosphere. It has been estimated that the ozone layer will recover to levels near the middle of the 21st century. These replacement compounds are more reactive and less likely to survive long enough in the atmosphere to reach the stratosphere where they could affect the ozone layer. The residual effects of CFCs accumulating within the atmosphere lead to a concentration gradient between the atmosphere and the ocean. This tracer helps scientists study ocean circulation by tracing biological, physical and chemical pathways [22] Implications for astronomy[edit] As ozone in the atmosphere prevents most energetic ultraviolet radiation reaching the surface of the Earth, astronomical data in these wavelengths have to be gathered from satellites orbiting above the atmosphere and ozone layer. Most of the light from young hot stars is in the ultraviolet and so study of these wavelengths is important for studying the origins of galaxies. This GALEX image of the Cygnus Loop nebula could not have been taken from the surface of the Earth because the ozone layer blocks the ultra-violet radiation emitted by the nebula.

The ozone layer protects the earth from the sun's harmful ultraviolet rays. Over time, the ozone layer has begun depleting due to man-made chemicals and emissions from vehicles and large appliances. Because of the damage to this extremely important atmospheric shield, Congress passed the Clean Air Act in

The ozone layer acts as a filter for the shorter wavelength and highly hazardous ultraviolet radiation UVR from the sun, protecting life on Earth from its potentially harmful effects. That is, the lower the ozone levels, the higher the solar UVR. Australia has high levels of solar UVR, due mainly to its geographical position. The southern hemisphere generally has higher levels of solar UVR than the northern hemisphere, because the Earth is approximately 1. The intensity of solar UVR is proportional to the square of the distance, so this means solar UVR levels are already 3. Measured solar UVR data versus latitude for a number of locations in different countries. Australians are predominantly descended from fair-skinned individuals used to European conditions, so exposure to these high levels of solar UVR has resulted in very high rates of skin cancer within the population. Generally the higher the sun is in the sky, the shorter the path through the atmosphere and the higher the solar UVR levels. The maximum height of the sun in the sky changes slowly from day to day, but ozone over a location can change considerably from one day to the next due to natural variability. Levels can rise or fall by up to Dobson Units DU in 24 hours. For consecutive clear sky days, large but natural changes in ozone levels in the stratosphere above cities can affect the solar UVR at the surface significantly. The ozone hole - discovered in the early s - and its effects on solar UVR levels over the Antarctic and possibly further north could only add to the problem of population UVR exposures. The southern hemisphere has been affected more by ozone depletion than the northern hemisphere due to several geophysical and atmospheric factors which have led to the annual appearance of the ozone hole over Antarctica. Measurements of the solar UVR levels at the Australian Stations in the Antarctic Casey, Davis and Mawson show as the ozone hole passes overhead each spring, the annual levels of solar UVR at the stations have increased significantly. They are now equivalent to that received at numerous places in Europe. Interestingly, Macquarie Island, which is outside the reach of the Antarctic ozone hole, shows little in the way of increased annual solar UVR levels. Because the annual ozone hole breaks up in spring, pockets of ozone-depleted air sometimes move northwards and pass over Australia adding slightly to the solar UVR levels there this was first observed in the late s. Recently there have been incidents of low ozone over Australia due to other atmospheric processes dragging low-ozone upper-atmospheric air down from equatorial regions ozone is generally lower over the equator than at mid-latitudes. In such cases UV index levels at the ground are elevated and increase the potential for adverse health effects for populations living in these areas. If not for the success of the Montreal Protocol it is very likely that the more densely populated areas of the globe would be subject to increased solar UVR with potentially severe consequences for human health.

Enquiries concerning the Ozone Layer Protection Ordinance and any other general information on the registration and licensing provisions may be made to the Air Policy Group of Environmental Protection Department at the following address.

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you for reading.

Protecting the Ozone Layer Science and Strategy Edward A. Parson. *The first comprehensive history of international efforts to protect the ozone layer, this book chronicles the greatest success yet achieved in managing human impacts on the global environment.*

Protecting the ozone layer: The draft convention was first presented to the international community that year. A lack of understanding about the true extent of the environmental risks from ozone depletion made early negotiations very difficult. There were also questions about the validity of the science, and doubts about the technology to respond to the challenge. Perseverance, however, resulted in the Vienna Convention on the Protection of the Ozone Layer, a multilateral environmental agreement. On June 4, 1985, Canada was the first nation to ratify the treaty, which entered into force in 1989. Countries could not agree on specific control measures, making the Vienna Convention a framework treaty for controls development that also facilitated cooperation on research. This called for international monitoring and scientific assessment. However, it does not include legally binding reduction goals. Whereas in the last century, the term convention was regularly employed for bilateral agreements, it is now generally used for formal multilateral treaties with a broad number of parties. A protocol, in the context of treaty law and practice, has the same legal characteristics as a treaty. The term protocol is often used to describe agreements of a less formal nature than those entitled treaty or convention. Generally, a protocol amends, supplements or clarifies a multilateral treaty. A protocol is normally open to participation by the parties to the parent agreement. Find Out About International Treaties United Nations Treaty Handbook Montreal Protocol on Substances that Deplete the Ozone Layer In the two years that followed the creation of the Vienna Convention there was incredible progress in reaching a global scientific consensus on the nature of the threat from ozone loss. Agreement was also reached on other outstanding scientific and technological matters. By September 1988, the disagreements and lack of understanding had given way to substantial trust among the international community. And so it was on September 16, 1989, that the Montreal Protocol on Substances that Deplete the Ozone Layer was negotiated and signed by Canada along with 23 other countries. As of September 16, 1989, it has been signed and ratified by 107 countries, achieving universal participation. Main goal The most significant commitments in the Montreal Protocol are the schedules for phasing out ozone-depleting substances ODSs. There are different phase-out schedules for developed and developing countries. Depending on the substance, developing countries have additional years to meet phase-out targets. There are essential and critical use exemption provisions in which a Party is permitted to produce and consume a given ODS if specific stringent criteria are met. It requires all Parties to eliminate the production and import of nearly substances that deplete the ozone layer, in accordance with agreed timelines. It includes special provisions for developing countries. These countries are given a 10 to 15 year grace period beyond the agreed dates to completely phase out a substance. It includes a Multilateral Fund which is a financial mechanism to help qualifying developing countries to phase out their consumption of ozone-depleting substances. Canada contributes to the administration of the Multilateral Fund through contributions to the Fund, its bilateral program and by hosting the Fund secretariat in Montreal. It requires Parties to report annually on the production, import and export of each of the controlled ozone-depleting substances. It established an Implementation Committee to review the reports on production and consumption of ozone-depleting substances. This committee assesses the compliance status of countries and makes recommendations to the decisional body of the Protocol, the Meeting of the Parties, regarding Parties in non-compliance. It precludes Parties from trading ozone-depleting substances with non-parties. It requires regular assessments to enable Parties to make informed decisions with the most up-to-date information on science, environmental effects, technology and economics. It has flexibility designed into it to allow for its further development. It includes an adjustment provision to accelerate the phase-out of ozone-depleting substances without going through the lengthy formal process of national ratification. It also includes an amendment provision to facilitate the addition of new chemicals. Substances covered by the Montreal Protocol The Montreal Protocol controls nearly chemicals that are grouped in the following categories:

Chapter 7 : Protecting the Ozone Layer - Edward A. Parson - Oxford University Press

The theme has two connotations - that our work of protecting the ozone layer also protects the climate and that the Montreal Protocol is a "cool" treaty, as exemplified by its outstanding achievements as the world's most-successful international environmental agreement.

Chapter 8 : Ozone layer - Wikipedia

Less ozone-layer protection from ultraviolet (UV) light UVUltraviolet radiation is a portion of the electromagnetic spectrum with wavelengths shorter than visible light. The sun produces UV, which is commonly split into three bands: UVA, UVB, and UVC.

Chapter 9 : Protecting the Ozone Layer: The United Nations History - Ebook pdf and epub

The team started with the Goddard Earth Observing System Chemistry-Climate Model, an earth system model of atmospheric circulation that accounts for variations in solar energy, atmospheric chemical reactions, temperature changes and winds, and interactions between the stratosphere, where ozone is found, and the troposphere, the layer of atmosphere closest to Earth.