



## CONSUMPTION OF OZONE-DEPLETING SUBSTANCES

<sup>1</sup> **Almira Daulbayeva A,** <sup>2</sup> **Margarita Filipova**

<sup>1</sup> NARXOZ UNIVERSITY, ALMATY, KAZAKHSTAN

*E-mail: almira\_geo@mail.ru*

<sup>2</sup> BULGARIAN ACADEMY OF SCIENCES RUSE UNIVERSITY "ANGEL KANCHEV", RUSE, BULGARIA

**Abstract:** *The destruction of the ozone layer, it is an extremely serious problem for mankind. Therefore, a number of international agreements were adopted to reduce the production and use of particularly aggressive halocarbons and finding replacement by other substances. The article describes the trend of consumption of ozone-depleting substances in Kazakhstan over the past fifteen years.*

**Keywords:** *ozone layer, ozone-depleting substances, hydrochlorofluorocarbon, methyl bromide.*

### Introduction

The ozone layer in the stratosphere is an essential component of the Earth's atmosphere. It protects human, fauna and flora from damaging by the shortwave ultraviolet (UV) radiation. Ozone is destroyed by reactions with certain ozone-depleting substances (ODS) under the influence of UV radiation. ompounds that cause significant ozone depletion include chlorofluorocarbons (CFCs), carbon tetrachloride, methyl chloroform, halons, hydrochlorofluorocarbons (HCFCs), hydrobromofluorocarbons (HBFCs) and methyl bromide. They are used as solvents, refrigerants, blowing agents, degreasing agents, aerosol propellants, fire extinguishers (halons) and agricultural pesticides (methyl bromide). The degree of impact of ODS on the ozone layer depends on its chemical characteristics [1].

Ozone absorbs a significant portion of ultraviolet radiation from the Sun, thus protecting all life on Earth and simultaneously heating the respective layers of the stratosphere, that are the parts of the atmosphere. Halocarbons destruction of atmospheric ozone, therefore, leads to a cooling effect on the atmosphere. However, halocarbons have their own absorption bands in the infrared spectrum and therefore, are greenhouse gases. Most halocarbons have a twofold impact on the atmosphere: destroying the ozone layer, cool it, but

absorbing the outgoing long-wave radiation of the Earth and the atmosphere, it is heated. The second effect - heating of the atmosphere is considerably stronger than cooling [2, 3].

### **Methodology**

The object of study is the consumption of ozone-depleting substances in Kazakhstan over the last decade. For the main research methods are selected physical-statistical, comparative - analytical, mathematical treatment of empirical data.

In the capacity of the initial data were used the materials of statistical collections ARKS "Environmental protection and sustainable development of Kazakhstan" [4].

### **Results and Discussion**

In October 2001, at the meeting of the Parties to the Montreal Protocol with respect to Kazakhstan, it was decided to reduce the consumption of CFCs, to create a system for licensing the import and export of ODS, to introduce a ban on imports of ODS-using equipment, stop the consumption of carbon tetrachloride and methyl chloroform, etc. [5]

For the implementation of the commitments was accepted the decree by the Government of the Republic of Kazakhstan dated January 8, 2004 № 19 "On approval of the list of environmentally dangerous economic activities and the Rules for their compulsory state licensing" on the basis of which introduced the licensing of import / export of ozone-depleting substances and products which contain them in connection with the implementation of the Republic of Kazakhstan obligations under the Vienna Convention for the protection of the ozone layer and the Montreal Protocol on substances that deplete the ozone layer. Also, by this decree were introduced the licensing works using ozone-depleting substances, as well as repair, installation, equipment maintenance, operating on ozone-depleting substances [6].

Then, by the Decree dated June 22, 2005 № 617 "On amendments to the Decree of the Government of Kazakhstan dated June 10, 2003 № 681" was introduced a ban on the import of ozone-depleting substances (CFCs, halons, cherehloristogo hydrocarbon, metilhloforma) on the territory of Kazakhstan and the goods if they contain ozone-depleting substances (refrigerators, freezers, air conditioners, heat pumps, aerosol products) [1].

It should be noted that out of all ozone-depleting substances which are consumed, the largest part belongs to methyl bromide and hydrochlorofluorocarbons (Figure 1-2).

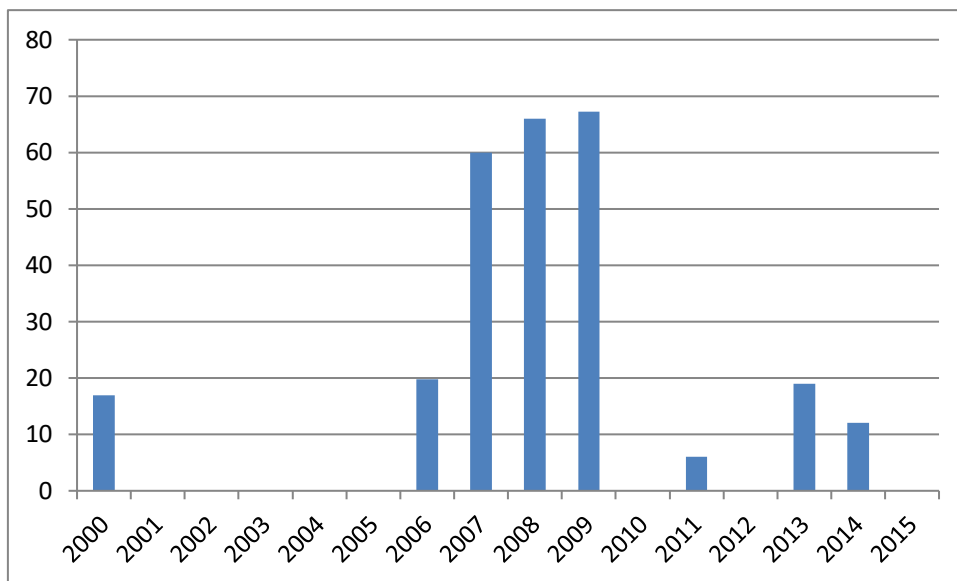


Figure 1 - Consumption of methyl bromide (calculated level of the substance in tonnes) from 2000 to 2015

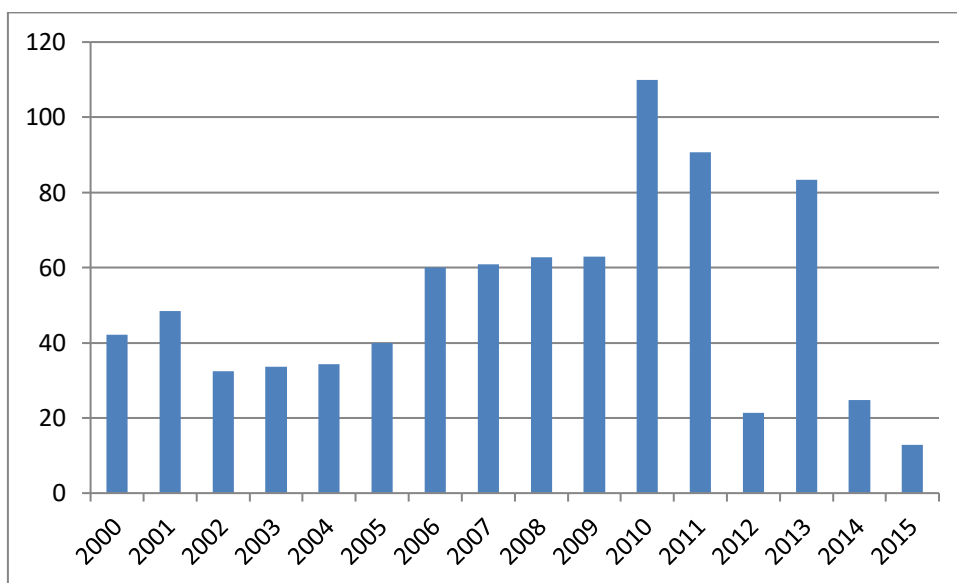


Figure 2 - Consumption of hydrochlorofluorocarbons (calculated level of the substance in tonnes) from 2000 to 2015.

As can be seen from figures 1-2 the highest is the consumption of methyl bromide, falls on 2007-2009 to 67.2 tonnes, followed by a sharp decrease. A somewhat different picture can be observed with hydrochlorofluorocarbons where its the largest consumption falls on 2006 -2011, with a peak of 110 tonnes in 2010. Then comes a decrease, and a fairly high increase in 2013 to 83.3 tons.

In general, the total consumption of ozone-depleting substances from 2000 to 2015., you can look at the following picture (Figure 3).

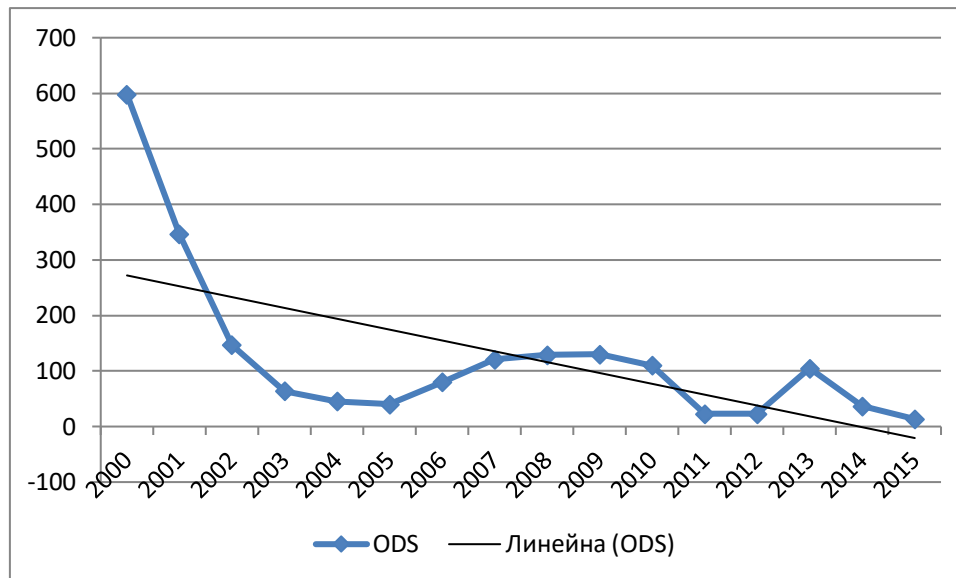


Figure 3. Consumption of ozone-depleting substances (calculated level of the substance in tonnes) from 2000 - 2015.

Since 2000, it has been a significant decrease in the consumption of ozone-depleting substances.

If in 2000 was consumed 597,9 tons of ODS , while in 2005 this figure amounted to 40 tons. Then from 2005 to 2010 there was a slight increase to 128 tonnes and then decline again, which showed the volume of ODS consumption was reduced to 31.5 times.

### Conclusion

The result of the researches revealed the consumption of ozone-depleting substances on the territory of Kazakhstan.

In 2015, the volume of consumption of ozone-depleting substances in the Republic amounted to 13.5 tonnes of ODS. Since 2000, there has been a significant reduction in the consumption of ozone-depleting substances. If in 2000 were consumed 597.9 tonnes of ODS , then in 2015 the volume of consumed ODS was reduced to 44.3 times.

### References

- [1]. United Nations European Economic Commission "Environmental performance and based on their evaluation reports" Eastern Europe, Caucasus and Central Asia, New York and Geneva, 2007
- [2]. Tiedtke M.A comprehensive mass Них Scheme for cumulus parametrization on large scale models. M. Wea. Rev. 117, 1, 1989, pp. 779-800.

- [3]. Forster C, Stohl A., Wind P. and Benedictow A. Intercontinental air pollution transport.// Transboundary acidification, eulrophication and ground level ozone in Europe/ MSC-W status Report №1, Oslo, Norway, 2005, 49 p.
- [4]. Collection "Environmental protection and sustainable development of Kazakhstan" , 2015
- [5]. National report on the Vienna convention for the protection of the ozone Layer and the Montreal protocol on substances that deplete the ozone layer in 2008 MEP RK. Astana, 2009. - 27 p.
- [6]. The Coordination Centre for Climate Change  
<http://www.climate.kz/rus/?m=html&cid=21>