



MINISTRY OF ENVIRONMENT

OzoNews BULLETIN

A NEWS UPDATE ON IMPLEMENTATION OF MONTREAL PROTOCOL OBLIGATIONS TO PROTECT OZONE LAYER - BROUGHT YOU BY NATIONAL OZONE UNIT



31 December 2020

LARGE OZONE HOLE RECORDED OVER ANTARCTIC FOR 2020, BUT MONTREAL PROTOCOL EFFORTS HAVE MINIMIZED THE DAMAGE

Cold temperatures and strong winds combined to create one of the deepest and largest holes in the ozone layer in recent years, but efforts to phase down ozone-depleting chemicals mean the hole is much smaller than it could have been, scientists from NASA and the National Oceanic and Atmospheric Administration (NOAA) said today.

NASA and NOAA track the ozone layer throughout the year and determine when the hole reaches its annual maximum extent. The annual ozone hole for 2020 reached its peak at

about 9.6 million square miles (or 24.8 million square kilometres), roughly three times the size of the United States, on 20 September. Similarly, measurements from the European Space Agency confirm the same as of 2 October this year.

This is the 12th-largest hole in 40 years of satellite records, with the 14th-lowest ozone readings in 33 years. The measurements stand in stark comparison to 2019, which saw the smallest ozone hole to date over the Antarctic. In 2019, the hole hit 6.3 million square miles (16.4 million square kilometres) in early September, then shrank to under 3.9 million square miles (10 million square kilometres) during September and October.

The small hole in 2019 came as a result of warm temperatures in the stratosphere and a weak polar vortex. These conditions stopped the formation of polar stratospheric clouds, within which ice crystals catalyse the destruction of ozone, with

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NATIONAL CEREMONY OF WORLD OZONE DAY 2020



The National ceremony of the 'World Ozone Day –2020' was organized by the National Ozone Unit of the Ministry of Environment on 16.09.2020 at the 'Apegama' premises to mark the 33rd anniversary of the Montreal Protocol and 35th Anniversary of the Vienna Convention on the theme of 'Ozone for Life'. Around

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MECHANISM TO PREVENT ILLEGAL IMPORTS OF OZONE DEPLETING SUBSTANCES IN SRI LANKA

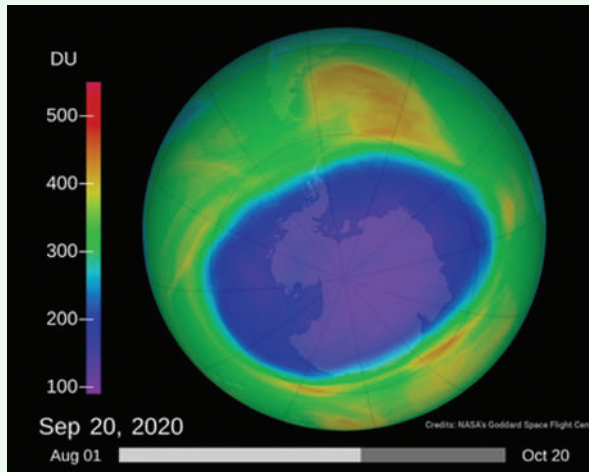
Following the report in the 1970s that the ozone layer was being depleted due to human activities, the Vienna Convention and the Montreal Protocol to the Environmental Charter were adopted with the contribution of the global community to protect it. A technical committee affiliated with the Montreal Protocol has identified 96 ozone depleting substances that are harmful to the ozone layer, of which the consumption (production, import and export) of 55 potent ozone depleting substances has been banned globally. In parallel, the Montreal Protocol has introduced appropriate alternatives. The Montreal Protocol has approved the use of methyl bromide which is one of the ozone depleting substances for quarantine and pre-shipment purposes only.

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Large Ozone Hole....



the help of sunlight. However, declines in levels of ozone-depleting chemicals controlled by the Montreal Protocol prevented the 2020 hole from being as large as it could have been.

"From the year 2000 peak, Antarctic stratosphere chlorine levels have fallen about 16 per cent towards the natural level," said Paul A. Newman, chief scientist for Earth Sciences at NASA's Goddard Space Flight Center in Greenbelt, Maryland. "The hole would have been about a million square miles larger if there was still as much chlorine in the stratosphere as there was in 2000."

The Montreal Protocol was set up in 1987 to protect human health and the environment by closing the hole in the ozone layer. With the universal support of 198 nations, the Montreal Protocol led to the phase-out of almost 99 per cent of ozone-depleting substances.

While the measurements this year may seem worrying, the overall trend is towards the ozone hole slowly closing. Estimates say that it will return to pre-1980 levels by mid-century.

Annual fluctuations in ozone levels, within the downward trend, are predominantly due to weather conditions.

During the Southern Hemisphere spring season (August - October) the ozone hole over the Antarctic increases in size, reaching a maximum between mid-September and mid-October. When temperatures high up in the atmosphere (the stratosphere) start to rise in late Southern Hemisphere spring, ozone depletion slows, the polar vortex weakens and finally breaks down, and by the end of December ozone levels have returned to normal.

So, while the current ozone hole area is one of the largest ones recorded to date, the

atmospheric abundances of anthropogenic ozone-depleting substances continue to decline. Parties implementing the Montreal Protocol have also positively impacted ozone levels, with upper stratospheric ozone levels increasing 1 to 3 per cent every ten years since 2000.

However, levels of ozone depleting substances in the stratosphere remains high enough to produce significant ozone loss, demonstrating their long life and the need for continued vigilance and efforts under the Montreal Protocol to prevent any illegal emissions of ozone-depleting substances.

SRI LANKA DEVELOPS NATIONAL COOLING PLAN FOR AN EFFICIENT ECONOMY

Global warming and related climate change have created serious problems throughout the world and its effect is drastically felt in developing countries like Sri Lanka in the tropics. Temperature increase and erratic weather events are leading to flash floods, landslides and associated natural disasters in some parts of the country while droughts and water scarcity creating enormous hardships in other places. The United Nations Framework Convention on Climate Change (UNFCCC) 1992 was negotiated and accepted by the global community to stabilize Greenhouse Gases (GHGs) in the atmosphere at a level that will not adversely influence the living conditions on planet earth. Paris agreement under UNFCCC demanded that emission of GHGs be reduced to mitigate climate change. It requires to control the increase of temperature to 2 °C from pre- industrial value and further to take all efforts to limit the increase to 1.5 °C. It is well known that fossil fuel burning for energy generation and transportation, and deforestation are the primary sources of GHG emission.

National Cooling Plan

National Cooling Plan (NCP) is a proposed solution for keeping human comfort under above conditions and to fulfil obligations under international conventions. It is also to keep air-condition and refrigeration needs at a manageable level and in an efficient manner by using latest available energy efficient methods in order to reduce GHG emission. Other options, such as use of fans, and energy efficient and environment friendly building designs, etc., are part and parcel of the cooling plan.



The specific objective of developing a national cooling plan for Sri Lanka is to achieve energy efficiency, and to succeed in HCFC phase out and HFC phase-down strategies, thereby reducing direct and indirect GHG emission. Moreover, the cooling will integrate with existing climate resilient energy generation and sustainable development plans of the country. The NCP can benefit the country via improved energy efficiency for businesses and consumers.

It is a national need under increasing temperature, urbanization, population growth and economic development which demand added and increased cooling. Therefore, when space cooling and refrigeration are considered, it is necessary to be concerned about energy efficient equipment and a well-developed energy generation plan. It has become a global need and an international obligation to develop a cooling plan for the country. For preparation and implementation of the plan, the help of all stakeholders which include experts in the cooling industry, equipment manufacturers, refrigerants importers and end users, as well as authorities dealing with energy, transport, agriculture, housing and urban development etc. is needed.

Further, it is necessary to develop this cooling plan for the country taking into consideration all aspects of the problems associated with ozone layer depletion and requirements under the Kigali amendment of the Montreal protocol and the Paris agreement. Actions may include, and not limited to, National Determined Contributions for mitigating climate change, long-term energy generation plan, maximum use of renewable alternative energy and relevant sustainable development goals. **The cooling plan will have effects mainly on power generation and distribution, passenger and goods transport, agriculture, fisheries, industries, tourism and hospitality sectors, housing, health and socio-economic development.** While globally developed solutions would be useful it is necessary to conduct research locally, make modification to old systems and development of new systems, incorporation of indigenous knowledge, in developing a suitable cooling plan for the country.

The development of this cooling plan was initiated with gathering available documents on the subject and relevant data. Since it is a futuristic plan for about two decades, projection had to be done with baseline data with realistic assumptions on areas such as population growth, economic development etc. Several stakeholder meetings and workshops were held and their ideas were incorporated.

Specific areas that are considered in preparation of the cooling plan are: space cooling, cold chain & refrigeration, transport sector, refrigerant and air-conditioning (RAC) sector, indigenous knowledge and research: cooling and refrigeration.

The NCP will explore more sustainable energy systems, clean air opportunities and other additional benefits in terms of food waste, improving health, and increasing productivity through improved access to cooling aligned with Sustainable Development Goals (SDG) Good health well-being (SDG- 3), Decent work and Economic growth (SDG- 8), Sustainable cities and communities (SDG-11), Climate action (SDG-13) and, especially, on Affordable and clean energy (SDG-7), ensuring the access to affordable, reliable and modern energy for all. **Sri Lanka has to identify and prioritize energy efficiency measures, particularly based on renewable and indigenous resources of the country to meet energy supply, to be responsive to increasing demand while enhancing climate benefits. The NCP provides an overview of the cooling requirement of the country in current context, future perspectives and recommendations towards achieving sustainable cooling solutions.**

No plan will be successful without the participation of the general public and the help of decision makers, national planners, experts in energy generation and planning, and refrigeration and air-condition sectors. It is hoped that incorporation of renewable energy and indigenous knowledge in areas like food preservation building design will help to overcome some of the difficulties.





TRAIN TRAINERS AND TECHNICIANS TO USE REFRIGERANTS IN ECO FRIENDLY MANNER

Refrigerants are widely used in the service of refrigerators and air conditioners, which may contribute to the depletion of the ozone layer as well as high global warming. Scientists have discovered that the refrigerants used in this process are often not used properly and adding the refrigerants to the environment cause these global environmental problems.

The United Nations Environment Program (UNEP), in cooperation with the Air-Conditioning, Heating & Refrigeration Institute (AHRI) has conducted a 5 day English Medium Workshop from 25/05/2019 to 29/05/2019 at University of Vocational Technology, Ratmalana to train the Trainers (TOT) on the proper use of refrigerants for the instructors and technicians in refrigeration/air conditioning sector. UNEP sponsored to obtain the services of an International Consultant in the field of Refrigeration and Air Conditioning during the first three days of the five day workshop, the theoretical facts on the proper use of refrigerants were presented, the practical

training session was held on the fourth day and on the last day an examination was held. A multiple choice question paper consisting of 100 questions was given. The question papers were prepared and evaluated by the AHRI. Refrigeration and Air conditioning sector instructors attended the workshop and many of them have qualified for the Refrigerant Driving License.

Another 5 day workshop was also conducted at the National Vocational Training Authority, Orugodawatta (15/12/2019 to 20/12/2019) for the refrigeration and air conditioning service technicians from various parts of the country with the participation of the instructors who passed the final examination as trainers. The structure of this workshop was similar to the Train the Trainer Model, which was sponsored by UNEP with the participation of an international consultant to oversee it.

The awarding of certificates and Refrigerant Driving License to the trainers who have passed this final examination was held on 16th September 2020 at the World Ozone Day celebrations held at "Ape Gama" premises under the patronage of the Minister of Environment, Hon. Mahinda Amaraweera.





LATEST DECISIONS OF 31ST MEETING OF THE PARTIES TO THE MONTREAL PROTOCOL

Rome, 13 November 2019 – Delegates representing 171 parties to the Montreal Protocol concluded their 31st Meeting of the Parties in Rome, Italy, agreeing to a number of key decisions, including actions to discover and prevent any illegal production or consumption of controlled, ozone-depleting substances, including CFC-11.

1. Unexpected emissions of CFC – 11 and institutional processes to be enhanced to strengthen the effective implementation and enforcement of the Montreal Protocol

At the meeting, an update from the Scientific Assessment Panel (SAP) highlighted new preliminary data showing reductions in emissions of trichlorofluoromethane (CFC-11) in 2018 and 2019. The issue of unexpected emissions of CFC-11 was brought to the attention of the parties in 2018, revealing that global emissions of CFC-11 had increased in the period after 2012.

2. Terms of reference for the study on the 2021-2023 replenishment of the Multilateral Fund for the implementation of the Montreal Protocol

The parties also agreed on the terms of reference for a study to be carried out by the Technology and Economic Assessment Panel on the 2021-2023 replenishment of the Multilateral Fund for the Implementation of the Montreal Protocol.

3. Potential areas of focus for the 2022 quadrennial reports of the Scientific Assessment Panel, the Environmental Effects Assessment Panel and the Technology and Economic Assessment Panel

The three Assessment Panels to the Montreal Protocol were requested to prepare quadrennial assessment reports – assessing the state of the ozone layer, the interactions between ozone and climate, the effects of

changes in the ozone layer to human health and ecosystems, as well as alternative technologies to the controlled substances – to be submitted by the end of 2022 for consideration by the parties.

4. Critical-use exemptions for methyl bromide for 2020 and 2021

For the laboratory and analytical uses of ozone-depleting substances, Parties were agreed to extend the global exemption beyond 2021 with monitoring. Critical-use exemptions were granted to a few parties that requested to continue using small amounts of methyl bromide in agriculture.

5. Status of ratification of the Kigali Amendment to the Montreal protocol

Parties also memorialized that 88 parties have ratified the Kigali Amendment, which came into force on 1 January 2019. The Amendment is expected to avoid 0.4°C of future global warming by the end of this century by cutting hydrofluorocarbons (HFC) by more than 80 per cent over the next 30 years.

6. Rome Declaration on the Contribution of the Montreal Protocol to Food Loss Reduction through Sustainable Cold Chain Development

The synergies between the Montreal Protocol, the Kigali Amendment and Sustainable Development Goals (SDG) were further underlined by the high-level roundtable discussion on the contribution of the Montreal Protocol to the development of sustainable cold chains and the reduction of food loss. The same issue was underscored in the Rome Declaration. Signed by 76 parties to date, the Declaration recognizes the importance of the Protocol and its Kigali Amendment in raising awareness for developing sustainable and efficient solutions in the cold chain.

NATIONAL CEREMONY OF WORLD OZONE DAY 2020



300 students from the technical colleges across the island and together with nearly 200 senior government officials and stakeholders from inter-governmental organizations, private sector and non-governmental organizations graced the occasion. The event was held under the distinguished patronage of Hon. Mahinda Amaraweera, Minister of Environment of Sri Lanka, and others including Hon. C.B. Rathnayake, Minister of Forestry and Wildlife.

Prof. Leelananda Rajapakse, Professor of Mechanical Engineering, University of Peradeniya and Chairman of the National Engineering Research and Development Center of Sri Lanka who delivered the keynote speech on 'Refrigerants : Status Quo and the Way Forward'.



ONLINE COMPETITION AND EXHIBITION OF WINNING ENTRIES

Considering the situation prevailed due to Covid 19 pandemic, an island wide Art, Cartoon and Poetry competitions were conducted online by the National Ozone Unit of the Ministry of Environment. An exhibition of winning entries was conducted simultaneously in the National



Event and it was declared to open by the Honourable Minister of Environment.

THE WINNING ENTRIES



DISTRIBUTION OF PRIZES, CERTIFICATES AND EQUIPMENTS



He has also awarded three recovery machines with three recovery cylinders and one reclaim machine to the Department of Police, National Youth Council and Ceylon Electricity Board to promote green technology and environmentally friendly practices in the country. Moreover, Certificates were awarded to the trainers who achieved the Refrigerant Driving License (RDL) offered by UNEP together with AHRI.

AWARENESS PROGRAMMES CONDUCTED AT SCHOOLS IN COLLABORATION WITH MINISTRY OF EDUCATION



In collaboration with Ministry of Education, the National Ozone Unit had instructed the schools to conduct awareness creation campaigns in all the schools across the island. 4.5 million student population was able to get awareness on the 'importance of protecting ozone layer and the harmful effects of its depletion' at the same time.

MECHANISM TO PREVENT ILLEGAL IMPORTS OF OZONE DEPLETING SUBSTANCES IN SRI LANKA



Mr. B.A.S.P.I. Balasooriya
Director - Social Protection Directorate
Sri Lanka Customs

The role of Sri Lanka Customs in preventing the illegal importation of these ozone depleting substances is significant. Following is an interview with Mr. B.A.S.P.I. Balasooriya the Director Social Protection Division of Sri Lanka Customs in this regard.

1. What are the measures taken to control the import of hydrochlorofluorocarbons (HCFCs), ozone depleting substances?

An Import Control License is issued by the Sri Lanka Department of Import and Export Control to restrict the entry of harmful substances into the country, and it is mandatory to obtain an import control license when importing hydrochlorofluorocarbons. Sri Lanka Customs will release the import after checking the license and other relevant documents.

2. What action will be taken by your institution if these refrigerants are imported without such a legal import control license?

In the absence of a legal import control license, it is considered as an illegal import and acts in accordance with the Customs Ordinance, ordering the importer to re-export the imported hydrochlorofluorocarbon gas and regulate whether it is being carried out properly.

3. What is the procedure followed to identify ozone depleting substances such as hydrochlorofluorocarbons (HCFCs) and other refrigerants (HFC, HC, HFO)?

Officers have been trained to identify the gases through awareness programs run by the National Ozone Unit and the identification

is done through testing with the help of the equipment provided.

4. What is the legal action to be taken if it is revealed that the ozone depleting substances have been imported illegally?

If it is revealed at a later stage of importation, the Customs Ordinance will be enforced in such a case as well, ordering the importer for re-exports and regulating till the end of the re-export process. Information on such imports is also reported to the National Ozone Unit.

5. As the Government of Sri Lanka has a legal obligation to report the import data of ozone depleting agents and other alternative refrigerants (HFC, HFO) to the Montreal Protocol and the Ozone Secretariat under Article 07, if Sri Lanka Customs is unaware of any illegal imports, how do you guarantee the accuracy of the data so provided?

If the Customs becomes aware of such illegal imports, it will conduct formal Customs investigations and keep a proper record of the data. However, if the Sri Lanka Customs is not aware of any illegal imports, it will not be included in the database of the Sri Lanka Customs Department. However, we would like to emphasize that the data provided by us are accurate.

6. Is the data cross-checked with the relevant government stakeholders?

As the Customs Department of Sri Lanka has a limited number of data, that data will not be cross-checked with the relevant government agencies.

BENEFITS OF USING NATURAL REFRIGERANTS IN DOMESTIC REFRIGERATION AND HIGH CAPACITY COMMERCIAL AND INDUSTRIAL REFRIGERATION SYSTEMS

Since synthetic refrigerants (CFCs and HCFCs) which are used in the refrigeration / air conditioning production and service industry are greenhouse gases, their addition to the environment contributes for depletion of the ozone layer as well as for the increase of global warming (global temperature). In this context, 197 countries (parties) including Sri Lanka have agreed with the Montreal Protocol to phase out of using these chemicals and for timeline to complete phase out.

Accordingly, refrigerator / freezer manufacturers have introduced alternative natural refrigerants which do not contribute to the depletion of the ozone layer and global warming for this sector. Hence, refrigerator manufacturers in many parts of the world, including Sri Lanka, have started using R-600a and R-290 as refrigerant and also cyclopentane for insulation production. Since these chemicals are natural, the products are considered as 100% environment friendly (green refrigeration) equipment and this sector has taken steps to maintain a stable position.

Currently, imports of R-134a based refrigerators and freezers to Sri Lanka are being gradually declined. A 90% of the domestic industry in developed countries are used refrigerators working on R-600a or R-290. The use of R-134a and R-141 b in refrigerator manufacturing is discontinuing.

The R-600a refrigerant is flammable, but the content of R-600 a in refrigerator or freezer is very small in quantity (approximately 100 gm). Therefore, the probability of happening a fire hazard in the event of refrigerant leak is very remote. However, R-134a refrigerators are still widely used in Sri Lanka and sales of R-600a refrigerators and R-290 freezers are growing. It is



expected that, all households in Sri Lanka will be using R-600a refrigerators by 2030.

At present, the refrigerants used in most Large capacity refrigeration systems in commercial and industrial sector are used artificial refrigerants (such as R-134a, R-410A, R-404A, R-407A, R-32 and R-407C). According to the Kigali amendment to the Montreal Protocol, these refrigerants will have to be phased down by 2045. It will be unaffordable for the relevant institutions that use equipment working on these refrigerants to replace with new technology equipment. To address these issues, low-capacity split air conditioners powered by the R-32 refrigerant with zero ozone depleting potential and low global warming potential have already been introduced on a commercial scale. Due to the chemical properties of the refrigerant (R-32), manufacturers are reluctant to manufacture split air conditioners with high capacity due to their flammability. However, technologies have already been introduced to reduce the risk of flammability when using appliances with refrigerants (R-600a, R-32).

Ammonia is a natural refrigerant, but it is toxic in terms of its chemical properties.

According to the Kigali Amendment to the Montreal Protocol, HFC refrigerants which have higher global warming potential is being phasing down. Ammonia is used for different refrigeration and air conditioning applications.

Furthermore, ammonia as a natural refrigerant has been used in commercial and industrial sector (fisheries, dairy, food processing from the beginning with the mechanical refrigeration about 2 centuries ago for refrigerated systems with high capacity. In future too, ammonia will be a promising refrigerant for high-capacity refrigeration systems.

As ammonia is a natural refrigerant, there is a growing trend in high-capacity refrigeration systems in the commercial and industrial sectors. Therefore, public as well as private sector engineers, policy makers and financiers will have to make decisions to promote ammonia refrigeration systems in this field. The National Ozone Unit has planned to implement the programmes for capacity building of refrigeration instructors / trainers in the field of vocational training on ammonia refrigeration systems, for improving infrastructure in those training institutes, and for providing training of apprentices as well as technicians who are currently employed in the maintenance of ammonia refrigeration systems. The modern techniques have already been introduced to minimize the dangers from the toxicity by exposing to ammonia refrigerant.

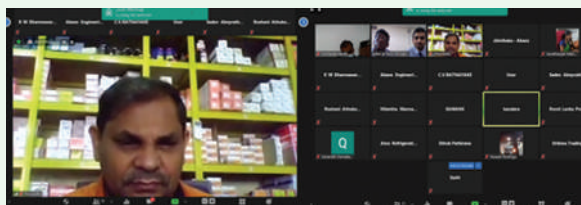
These programs are expected to focus on the use of eco-friendly refrigerant equipment in domestic refrigeration industry as well as commercial and industrial industry.

BENEFITS TO CONSUMERS

1. The consumer benefits economically by reducing the electricity bill through reducing the electricity consumption
2. Commercial and industrial sector will have the economic benefits by using R-600a and ammonia (which has long useful life) in refrigerators and high-capacity refrigeration systems
3. A secured future for next generations to come by moving towards global eco-friendly technology

LOCAL WORKSHOPS AND MEETINGS HELD DURING THE YEAR 2020

1. The National Ozone Unit of the Ministry of Environment has conducted an online discussion for the importers of refrigerants and refrigeration and air conditioning equipment and accessories in the field of refrigeration and air conditioning on 09.12.2020. During the discussion, a briefing was provided on the implementation of the Montreal Protocol (MP) and its commitment to the implementation of the Kigali Amendment; the latest amendment to the MP and the role of importers and their business entities in the future. In doing so, they focused on the issues and challenges they faced and the remedial actions to be taken to overcome them.



2. A three day workshop (from 25.09.2020 to 27.09.2020) was conducted by a panel of experts who is having expertise and experience in the field of Ref & AC sector for the technicians and trainees at Lanka Ashok Leyland. It has been introduced Good Services Practices and alternative refrigerants according to technological transitions and imparting practical knowledge on its usage and servicing.



3. A round table discussion was held on 03.09.2020 at the Center for Banking Studies, Sri Lanka to educate large scale end users on the use of alternative refrigerants having zero Ozone Depleting Potential (ODP) and Low Global Warming Potential (GWP). The program focused on analyzing the Country Assessment Report on HFC, minimizing the use of HFC by 2030, and discussing the

future of the refrigeration and air conditioning services and maintenance sector and energy efficiency and the refrigeration and air conditioning services industry.



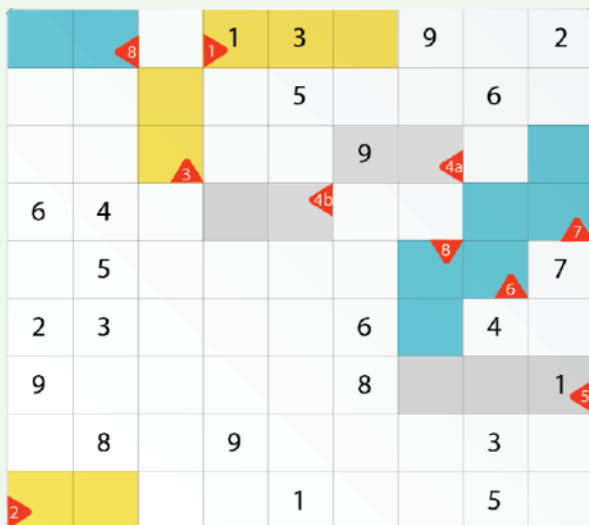
- Sri Lanka agreed to the Kigali Amendment in 2016 and ratified it in 2018. As a first step towards this process, the Country Assessment Report on Country Readiness for Kigali Amendment and strategy for its effective implementation was prepared and technical knowledge was obtained from the University of Moratuwa. A workshop was conducted on 31.07.2020 to obtain the views and suggestions of the stakeholders in the report and to validate the implementation of the recommendations contained in this report.



- HFCs Phase Out Management Plan (Phase II) for the period from 2021 to 2030 was prepared and a workshop was held on 07.07.2020 to obtain the views and suggestions from local and foreign stakeholders on the implementation of the recommendations contained in the report.



Puzzle



Relevant years and figures

- 20 ____, is the year that the Kigali Amendment entered into force.
- High Ambient Temperature (HAT) countries are those with a peak monthly average temperature above __ degrees Celsius for an average of at least 2 months per year, over 10 consecutive years.
- Baseline formula for group 01, Article-5 countries in Kigali Amendment is the average of HFC consumption for 2020-2022 plus __% of HCFC baseline.

Substances

- HFC __ __ a is a pure substance used in many applications, included in Annex F of Kigali Amendment.
- HFC- __ __ used in industrial refrigeration, stationary air conditions and having a GWP of 675.
- HFC- __ __ is a controlled substance under group II of Annex F of Kigali Amendment.

Global Warming Potential (GWP)

- GWP of R-507A is (__ 9)(__ __); it is used commonly in industrial and commercial refrigeration.
- GWP of HFC-152a is __ __ __, used in foam and aerosol sector

* GWP values for 100-year time horizon (based on Annex F of the KA)

6. The National Apprentice and Industrial Training Authority has conducted the Recognition of Prior Learning (RPL) system for service sector technicians who are experienced but not having a proper qualification in the field of refrigeration and air conditioning services and maintenance. This year, the National Ozone Unit provided financial and technical support for the programme.

A workshop was held on 27th August 2020 to provide technical knowledge for 30 technicians in the field of refrigeration and air conditioning to obtain certification through RPL system.



7. The National Ozone Unit of the Ministry of Environment has organized a three day technical workshop for technicians in refrigerant and air conditioning section of the Police Department from 15th July 2020 to 17th July 2020. Theoretical and practical knowledge and alternative technologies have been introduced to service air conditioners in an environmentally friendly manner.



Answers for the Puzzle

5	6	8	1	3	4	9	7	2
7	9	3	8	5	2	1	6	4
4	1	2	6	7	9	3	8	5
6	4	7	5	8	1	2	9	3
8	5	9	2	4	3	6	1	7
2	3	1	7	9	6	5	4	8
9	7	5	3	6	8	4	2	1
1	8	4	9	2	5	7	3	6
3	2	6	4	1	7	8	5	9

Relevant years and figures

6. **2019**, is the year that the Kigali Amendment entered into force.
7. High Ambient Temperature (HAT) countries are those with a peak monthly average temperature above **35** degrees Celsius for an average of at least 2 months per year, over 10 consecutive years.
8. Baseline formula for group 1, Article-5 countries in Kigali Amendment is the average of HFC consumption for 2020-2022 plus **65%** of HCFC baseline.

Substances

1. HFC **134a** is a pure substance used in many applications, included in Annex F of Kigali Amendment.
2. HFC-**32** used in industrial refrigeration, stationary air conditions and having a GWP of 675.
3. HFC-**23** is a controlled substance under group II of Annex F of Kigali Amendment.

Global Warming Potential (GWP)

4. GWP of R-507A is **(39)(85)**; it is used commonly in industrial and commercial refrigeration.
5. GWP of HFC-152a is **124**, used in foam and aerosol sector.