

PEMPHIS

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Environmental Newsletter
Ministry of Environment and Energy



**SHORT-LIVED
CLIMATE
POLLUTANTS**



Minister's Note

To successfully slow down the rate of global warming, efforts must go beyond the principal work necessary to reduce the effects of carbon dioxide; and the world has not yet done enough. However, even under the most hopeful scenarios, it will take time to maneuver the worldwide shift away from fossil fuels and towards renewable energy.

So when we discover technically and economically viable means to significantly reduce global warming through Short-Lived Climate Pollutants (SLCPs), it is imperative to act upon it. By simultaneously reducing SLCPs while cutting carbon dioxide emissions; we can reduce the speed of warming.

The reductions of SLCPs do not come at the expense of efforts to reduce carbon dioxide emissions. Nonetheless, by also pursuing SLCP reductions, we can contribute to sustainable development by making livelihoods healthier through improved food security and reductions in air pollution.

The Climate and Clean Air Coalition is a volunteer international framework that works to accelerate and scale up actions to reduce SLCPs. It is a flexible framework for action and governance, and their greatest strength lies in its ability to drive new, action-oriented initiatives forward. There are several CCAC initiatives that could be of interest and benefit to the Maldives.

There are opportunities for enhanced cooperation on SLCP reduction, because the while the challenge is global, it is very local and cross-sectoral. Let us all steadily move towards reducing emissions of short-lived climate pollutants.

Thoriq Ibrahim

Editor's Note

This edition of Pemphis features the impacts of Short-Lived Climate Pollutants (SLCP), which are pollutants that have a relatively short lifespan in the atmosphere compared to carbon dioxide. Black carbon, methane, tropospheric ozone and many hydrofluorocarbons (HFCs) have been identified as the main SLCPs. They are dangerous air pollutants, which can cause complications to human health and detrimental effects on both agriculture and ecosystems. Immediate mitigation of SLCPs is projected to reduce about half a degree Celsius of the amount of global warming we experience between now and 2050. SLCPs are also responsible for millions of cases of respiratory and cardiovascular diseases, and cancer annually.

Maldives, being amongst the most vulnerable to the effects of SLCPs and other atmospheric pollutants, should not consider ourselves passive or impotent. On a global scale our emissions of these pollutants may be irrelevant, however, the air quality of the capital Male' is declining; and the level of black carbon emission is no longer only just detectable with complex instruments but with our own senses as well. The first step in any real change for the better is education and awareness, as it can empower individuals to make informed decisions and understand the causes, consequences and ways to mitigate them.

Feedbacks, comments, articles, photos, etc. are welcome at environment@environment.gov.mv

Climate Pollutants

Carbon dioxide (CO₂) emissions are responsible for 55-60%¹ of anthropogenic radiative forcing; more commonly known as the 'greenhouse effect'. As a result, rapid, deep and persistent cuts in CO₂ are essential to combat climate change. However this is not enough and CO₂ mitigation must be combined with fast and aggressive mitigations of pollutants causing the other 40-45% of climate forcing.

These pollutants include methane, black carbon (soot), hydrofluorocarbons (HFCs), and tropospheric ozone. But because these pollutants have a relatively short atmospheric lifetime of only days to a decade and a half, they are referred to as short-lived climate pollutants or SLCPs.

CO₂, on the other hand, is a long-lived climate pollutant; with 60% remaining in the atmosphere for up to 100 years, while up to 25% remains in the atmosphere greater than 1000 years. Mitigation of CO₂ and other long-lived climate pollutants are necessary to stabilize global temperature rise in the long term.

Whereas mitigation of SLCPs is critical for slowing the rate of climate change over the next several decades and to protect the people and regions most vulnerable to near-term climate impacts through the end of the century.

What are Short-Lived Climate Pollutants?

Short-Lived Climate Pollutants (SLCPs) are substances with a relatively short lifetime in the atmosphere and has a warming influence on the near-term climate. They are powerful climate forcers and dangerous air pollutants, detrimental to human health, agriculture and ecosystems.

¹ Forster P. et al. (2007) *Changes in Atmospheric Constituents and in Radiative Forcing*, in Solomon S. et al. (2007) *Climate Change 2007: Physical Science Basis, Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, Figure 2.21.





Black Carbon

Black carbon, a major component of soot, exists in the atmosphere as potent climate-warming particles and is therefore not a greenhouse gas. Instead, it absorbs sunlight and radiates energy to warm the atmosphere. Black carbon contributes to climate change in several ways:

- Warms the atmosphere directly by absorbing solar radiation and emitting it as heat.
- Contributes to melting by darkening the surfaces of ice and snow when it is deposited on them.
- Affects the microphysical properties of clouds in a manner that can perturb precipitation patterns.

However it remains in the atmosphere for only a few days or weeks. Black carbon results from the incomplete combustion of fossil fuels, wood and other biomass.

Although complete combustion would turn all the carbon contained in the fuel into carbon dioxide, in practice, combustion is never complete and always releases other gases including carbon monoxide, methane, non-methane volatile organic compounds, and particulate black carbon and organic carbon. Some common sources of black carbon include diesel cars and trucks, residential stoves, forest fires, agricultural open burning and some industrial facilities.

Black carbon harms human health and is a primary component of fine particle air pollution. Characterized at $PM_{2.5}$, particles with a diameter less than 2.5 micrometers – 'fine' or 'small-sized' particles which affect the respiratory and cardiovascular systems – its impacts occur due to both outdoor and indoor exposure. It can cause or contribute to a number of adverse health effects including respiratory problems, low birth weight, heart attacks, and lung cancer.

Black carbon is also harmful to plants in such that when black carbon lands on leaves, it increases the temperature and impedes growth. Additionally, black carbon also reduces the amount of solar radiation reaching the earth, subsequently reducing photosynthesis.



Methane

Methane emissions have caused the largest radiative forcing by any greenhouse gas after carbon dioxide. Around 60% of global methane emissions are due to human activities. The main sources of anthropogenic methane emissions are agriculture, including rice cultivation and keeping ruminant livestock; coal mining, oil and gas production and distribution; biomass burning and municipal landfills.

Apart from directly influencing the climate, methane has an indirect effect by being an important precursor to the formation of the powerful air pollutant, tropospheric ozone. Increased methane emissions are responsible for half of the observed rise in tropospheric ozone levels globally. While methane does not cause direct harm to human health or crops, it can be attributed to as much as 15% of premature mortalities due to air pollution, and more than 20% of respiratory mortalities associated with tropospheric ozone in South America, Europe, the Middle East, and Asia.

Hydrofluorocarbons (HFCs)

HFCs were designed to replace stratospheric ozone depleting substances (ODS) used in air conditioning, refrigeration, solvents and aerosols. However, HFCs are potent greenhouse gases which could substantially contribute to radiative forcing in the atmosphere due to a significant growth in their use as a result of an increased demand for refrigeration and air-conditioning. If left unchecked, consumption of HFC is expected to double by 2020.

HFCs are currently included as part of the greenhouse gas emissions to be reduced under the Kyoto Protocol, hence there could be greater scope for collaboration between the United Nations Framework Convention on Climate Change and the Montreal Protocol, where proposals to phase out the production and consumption of HFCs are undergoing discussions.

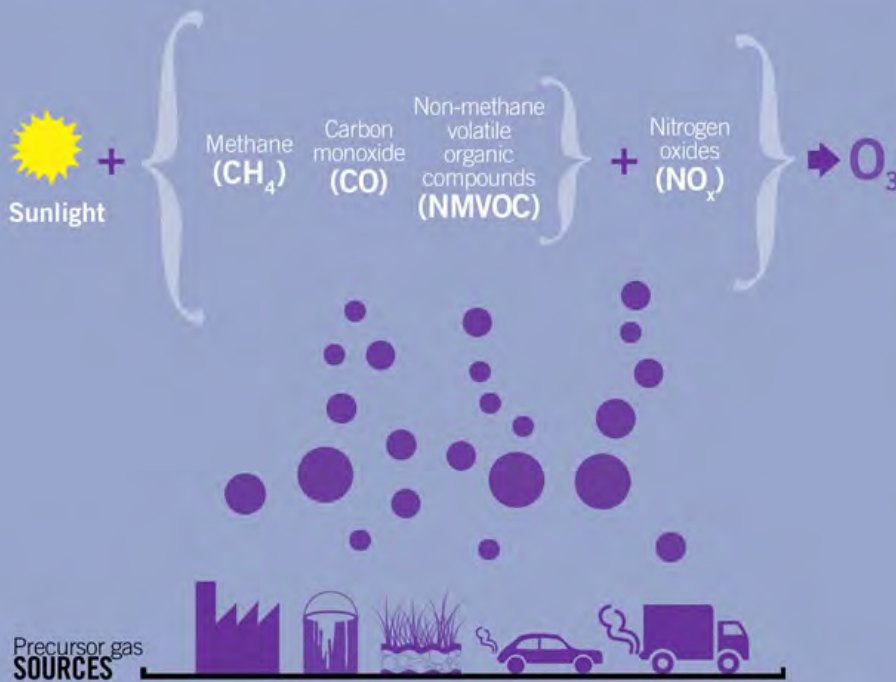


LIFETIME IN
ATMOSPHERE

Weeks

Tropospheric Ozone (O₃)

Tropospheric Ozone (O₃) is a major air and climate pollutant. It causes warming and is a highly reactive oxidant, harmful to crop production and human health. O₃ is known as a 'secondary' pollutant because it is **not emitted directly**, but instead forms when precursor gases react in the presence of sunlight.



Stratosphere 50 km
Troposphere 10 km

IMPACTS

O₃ precursors can be carried round the globe, making it a **transboundary pollution problem**

Tropospheric O₃ **warms the atmosphere**

O₃ damages plants and affects **agricultural production:**

- Reducing photosynthesis
- Reducing the plants ability to sequester carbon
- Reducing health and productivity of crops



O₃ air pollution causes over **150 thousand premature deaths** every year, and **millions more chronic diseases**, particularly in children and the elderly



CCAC

Tropospheric Ozone

Ozone is a reactive gas which exists in two atmospheric layers; the stratosphere (upper layer) and the troposphere (up to 10-20 km above the ground). In the troposphere, ozone is a significant greenhouse gas, where it also affects the yield of many crops and adversely impacts the diversity and growth of plant communities. In addition, tropospheric ozone affects human health due to its action as a powerful oxidizing gas, which for instance, can cause

Unlike the other short-lived climate pollutants, ozone is not directly emitted. It is a secondary pollutant that is formed in the troposphere by sunlight-driven chemical reactions involving carbon monoxide, non-methane volatile organic compounds, methane and nitrogen oxides. These precursors arise from both natural sources and a wide range of anthropogenic activities. Reductions in methane and carbon monoxide emissions have the potential to significantly reduce ozone levels and associated global warming.

SLCP: Control Measures

Residential Sector

01. 

Replace traditional biomass cookstoves with **Modern fuel cookstoves**

02. 

Replace traditional cooking & heating with **Clean-burning biomass stoves**

03. 

Replace wood stoves & burners with **Pellet Stoves**

04. 


Replace lump coal with **Coal briquettes** for cooking & heating

Industry

Transport

05. 


Replace traditional brick kilns with **Improved kilns**

06. 

Replace traditional coke ovens with **Modern recovery ovens**

07. 

Replace Diesel particulate **Filters for road and off-road vehicles (EURO VI)**


08. 

Eliminate **High-emitting diesel vehicles**


Agriculture

09. 


Ban **Open-field burning** of agricultural waste

10. 

Intermittent aeration of continuously **Flooded rice paddies**

11. 

Improve **Manure management & animal feed**

12. 

Pre-mine degasification, recovery, & oxidation of CH₄ from ventilation air from **Coal Mines**

Fossil Fuel


Waste Management

13. 

Recovery and utilization of gas and **fugitive emissions from oil and natural gas production**

14. 

Reduce **leakage from long-distance gas transmission pipelines**

15. 

Separation and treatment of biodegradable **municipal waste** and landfill gas collection

15. 

Upgrade **wastewater treatment** with gas recovery and overflow control

The Climate and Clean Air Coalition

to Reduce Short-Lived Climate Pollutants

In February 2012, after building over a decade of scientific efforts, the Climate and Clean Air Coalition (CCAC) was launched as a partnership of governments, intergovernmental organizations, and representatives of the private sector, environmental community and other members of the civil society.

The Coalition's activities are structured around high-impact initiatives led by the partners:



Reducing Black Carbon Emissions from **Heavy Duty Diesel Vehicles and Engines**



Addressing SLCPs from **Agriculture**



Mitigating SLCPs from **Municipal Solid Waste Sector**



Supporting **National Planning for Action** on SLCPs (SNAP)



Mitigating Black Carbon and Other Pollutants from **Brick Production**



Regional Assessments of SLCPs



Promoting **HFC Alternative Technology** and Standards



Financing of SLCP Mitigation



Accelerating Methane and Black Carbon Reductions from **Oil and Natural Gas Production**



Urban Health Initiative



Reducing SLCPs from **Household Cooking and Domestic Heating**

The Coalition's objectives are to address SLCPs by:

1. **Raising awareness** of SLCP impacts and mitigation strategies
2. Enhancing and developing new **national regional actions**, including by identifying and overcoming barriers, enhancing capacity, and mobilizing support.
3. **Promoting best practices** and showcasing successful efforts
4. **Improving scientific understanding** of SLCP impacts and mitigation strategies

The role of SLCPs in achieving the Sustainable Development Goals

The SDG development process arose from the 2012 Rio+20 UN Conference on Sustainable Development and the final text of the SDGs was adopted by all UN Member States on 25 September 2015. The SDGs clearly recognise the significance of the environmental dimension of sustainable development including its interlinkage and contribution to achieving the social and economic dimensions of sustainable development.

The agreed goals and target draw from diverse aspects of human and planetary needs and challenges, and achieving them by 2030 would require coordinated actions on diverse fronts. One of such needed actions is the mitigation of SLCP emissions. This is because SLCP emissions can impact on many of the goals and targets due to their climate-warming and air-polluting properties. The following highlights some, but not all, the interlinkages between SLCPs and some of the SDGs and argues that actions to reduce SLCPs can directly and indirectly support the achievement of many of the proposed SDGs.

GOAL 2



END HUNGER, ACHIEVE FOOD SECURITY AND IMPROVED NUTRITION AND PROMOTE SUSTAINABLE AGRICULTURE

Target 2.3 of this goal aims to double agricultural productivity and incomes of small-scale food producers while Target 2.4 seeks to ensure sustainable food production systems that increase productivity and production and help maintain the ecosystem. The UNEP/WMO assessment indicates that mitigating SLCPs emissions, in particular tropospheric ozone, can help avoid the loss of 52 million tons of four staple crops – maize, rice, soybean and wheat. Hence reducing SLCP emissions will contribute to increased agricultural productivity. Furthermore, measures aimed at mitigating SLCP emissions, including intermittent aeration of continuously flooded rice paddies and farm-scale anaerobic digestion of manure from cattle and pigs, as well as ban of open field burning of agricultural waste will contribute to achieving sustainable food production systems. Also, reducing SLCP emissions will contribute to improved crop yields through reducing the rate of climate change which is projected to have adverse impacts on crop yields, particularly in low latitude regions.

GOAL 7



ENSURE ACCESS TO AFFORDABLE, RELIABLE, SUSTAINABLE AND MODERN ENERGY FOR ALL

Targets 7.1 of this goal, ensuring universal access to affordable, reliable and modern energy services by 2030 offers major opportunities for integrating SLCP mitigation within the SDGs. SLCP emissions reduction actions can for instance, contribute to improved energy efficiency or vice versa. For example, results from a recent study have show that implementing HFC refrigerant transition and energy efficiency improvement policies in parallel for room air conditioning could save between 340-790 gigawatts (GW) of peak power load globally. This action is also expected to lead to an avoided CO2 emissions of up to approximately 98 billion tonnes of CO2 by 2050, thereby also contributing to Goal 13 on climate change.

GOAL 9



BUILD RESILIENT INFRASTRUCTURE, PROMOTE INCLUSIVE AND SUSTAINABLE INDUSTRIALIZATION AND FOSTER INNOVATION

Measures to reduce SLCP emissions can contribute to achieving Target 9.4 of this goal aimed at upgrading infrastructure and retrofitting industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes by 2030 and therefore offers the potential to integrate SLCP reduction with the SDGs.

GOAL 12



ENSURE SUSTAINABLE CONSUMPTION AND PRODUCTION PATTERNS.

Goal 12 seeks to encourage the sustainable management and efficient use of natural resources. Actions on SLCP are interlinked with achieving this goal. For example, Target 12.3 aims to halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses by 2030. Organic wastes, which are the focus of this target are a major source of SLCP emissions including methane from waste dumps/landfills and black carbon from waste combustion. Policies targeted at mitigating SLCPs from these sources will therefore contribute to achieving this target. Similarly, Target 12.4 aims to achieve environmentally sound management of chemicals and all wastes by 2020 and reduce their release to air, water and soil. HFCs, an SLCP is one of such chemicals; hence, actions geared toward reducing HFCs emission would inevitably contribute to meeting this target. In addition, Target 12.5 hopes to substantially reduce waste generation through prevention, reduction, recycling and reuse by 2030. Success in achieving this target will significantly reduce the emissions of SLCPs from wastes.



Mitigation of two SLCPs, methane and black carbon would help slow down the rate of global warming in the near-term. Furthermore, actions on HFCs would further contribute to reducing the rate of global warming. If quick action to foster SLCP emissions reductions are undertaken with deep reduction in CO₂ emissions, there is an increased chance of meeting the target of keeping the global temperature rise to 2°C or less during the 21st century. Apart from contributing to the reduction in the emissions of greenhouse gases/substances thereby contributing to mitigation efforts, reduction in SLCP emissions would also contribute to climate change adaptation. This is because by slowing down the rate of warming, the ecosystem and living organisms are more able to adapt to the impacts of climate change compared to a situation of rapid warming. Furthermore, recent knowledge has shown that black carbon is a major contributor to increased intensity and frequency of extreme events which is one of the expected impacts of climate change. Hence, black carbon emissions reduction efforts would also contribute to mitigating climate-related extreme events.

What are CCAC's ongoing efforts and activities that can contribute to achieving these SDGs?

As shown above, efforts to reduce SLCP emissions are clearly interlinked with the SDGs and their targets. Hence, ongoing actions and activities of the Climate and Clean Air Coalition (CCAC) targeted at SLCP emissions abatement can contribute to achieving some of the SDG targets, especially when scaled up.

The activities of the CCAC sectoral initiatives which have an ultimate objective of reducing SLCP emissions from agriculture, diesel vehicles and engines, municipal solid waste and from devices using hydrofluorocarbons, would ultimately contribute to achieving the SDGs, especially when scaled up. For example, by promoting alternative and affordable chemicals and technologies in the refrigeration sector, the HFC initiative could help avoid food waste and contribute to food security (Goal 2), while also improving energy efficiency (Goal 7) as well as mitigate climate change (Goal 13).

Furthermore, by promoting black carbon emissions reduction from the diesel engines, through promotion of better emissions standards, the CCAC diesel vehicle and engines initiative contributes to the Goal 3 on healthy lives and wellbeing, as well as Goal 11 on sustainable cities and Goal 13 on climate change.

Also, the activities of the CCAC Urban Health Initiative which aims to empower cities to take effective action on air quality with support from the health sector contributes to Goal 11 on cities and human settlements, in particular, Target 11.6 on reducing per capita environmental impact of cities, through assisting in development of policies that support SLCP emissions reduction and harness the associated multiple benefits in cities; Goal 3 by preventing premature death and non-communicable disease; and Goal 7 by supporting policy development for a wide range of sectors to transition to energy efficient cities.

Additionally, the CCAC's "Supporting National Planning for Action on SLCPs (SNAP) initiative aim to help build capacity for effective national planning as a foundation for rapid and large-scale implementation of SLCP mitigation. The initiative supports countries in embedding SLCP mitigation in on-going activities and policies and in building capacity. It also help foster linkages and collaboration between national SLCP planning and global and regional processes, initiatives and approaches. The SNAP initiative can contribute to the various capacity building targets listed in the SDGs including those related to Target 13.2 on the integration of climate change measures into national policies and strategies, Target 13.3 and 17.9 on human and institutional capacity on climate change and sustainable development, and Target 17.6 and 17.7 on technology and knowledge development, transfer, and dissemination, including for environmentally sound technologies.



THE GLOBAL GOALS
For Sustainable Development

MONTH IN REVIEW

FEBRUARY

02: Landing Craft "SAAFU 1" brought to Maldives

The vessel would be used to transport waste from Noonu, Raa, Baa and Lhaviyani atoll to R.Vandhoo.

07: A.Dh. Dhangethi: Contract awarded for the establishment of Water Supply System

Design and Build, Contractor: Lucky export

07: R. Meedhoo: Contract awarded for the establishment of Water Supply System

Design and Build, Contract awarded: MWSC

08: N. Holhudhoo: Completion of Coastal Protection project

Contractor: MTCC

08: N. Holhudhoo: Sewerage Facility Inaugurated

Contractor: MWSC

11: Th. Thimarafushi: Contract awarded for the establishment of water supply system

Design and Build, Contractor: PURITAS Pvt Ltd.

14: G.Dh. Gahdhoo: Sanitation Facility inaugurated

15: G.Dh. Thinadhoo: Sewerage Facility and coastal protection project inaugurated

Contractor: MWSC

18: Second Stakeholder Consultation Workshop on Third National Report on Implementation of Cartagena Protocol on Biosafety

22: A.A. Ukulhas: Sanitation Facility inaugurated

23: Stakeholder Consultation meeting on Waste Management

23: Training Workshop on LED Light installation

29: H.A. Dhidhdhoo: Contract awarded for the establishment of Water Supply System

Design and Build, Contractor: SIERRA MALDIVES PVT.LTD

MARCH

03: L. Fonadhoo: Contract awarded for the establishment of water supply system

Design and Build, Contractor: SIERRA MALDIVES PVT.LTD

08: Football Match to mark International Women's Day

Ministry of Environment and Energy VS State Trading Organization

09: Distribution of 'LED Lights' extended till the end of March 2016

13: Awareness program held for Hiriya School Students to mark World Meteorological Day

14: Scholarships awarded to 16 Students of Maldives National University

15: MOU Signed: to create awareness on Climate Change and Energy Efficiency with Maldives Girl Guide Association and Scout Association of Maldives

16: A.A. Ukulhas: Sanitation Facility inaugurated

21: Energy Sector Policy and Strategy Stakeholder Consultation Workshop held

21. The 2016-2017 UN Joint Work Plans on Environment and Climate Change gets signed today

22: "As water is essential for life and one of the most basic necessities, we have to make good use of our water resources. We need to protect our groundwater. We must harvest water when it rains, increase storage, and do everything we can to make the best use of the water available to us."

Thoriq Ibrahim – World Water Day 2016

27: Fifth National Report on Biological Diversity Launched

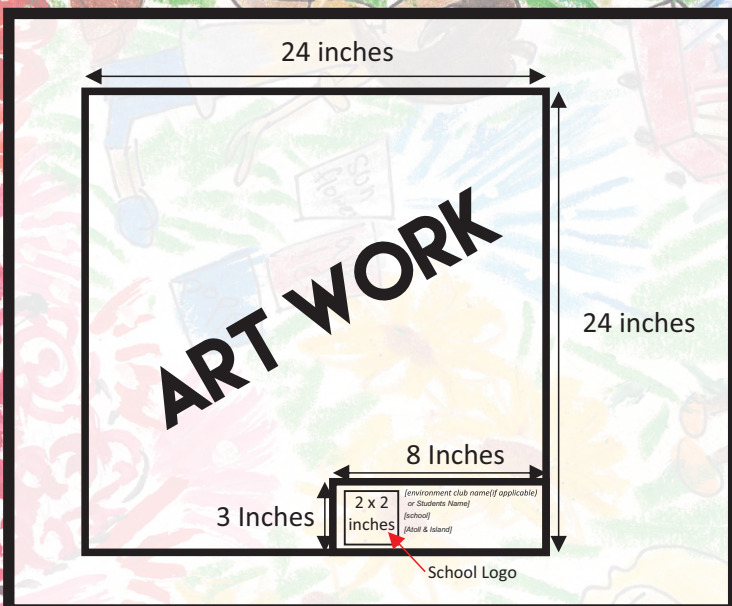
WORLD ENVIRONMENT DAY 2016

ART

EXHIBITION FOR SCHOOL STUDENTS

EXPRESS YOUR ENVIRONMENTAL VIEWS THROUGH ART. MAKE YOUR VOICE HEARD.

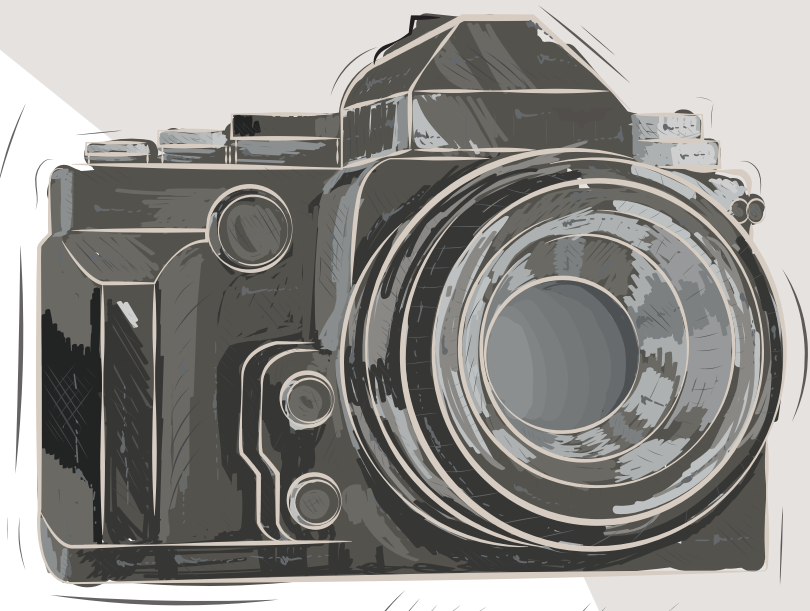
SUBMISSION DEADLINE MAY 5TH 2016



MINISTRY OF ENVIRONMENT AND ENERGY
MINISTRY OF EDUCATION



WORLD ENVIRONMENT DAY



PHOTOGRAPHY COMPETITION

GRADES
6-7,
8-10,
11-12.

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MINISTRY OF ENVIRONMENT & ENERGY
IN ASSOCIATION WITH
MALDIVES PHOTOGRAPHERS ASSOCIATION
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IMADUDDIN SCHOOL

CATEGORIES
WATER/ ENERGY
WASTE/ POLLUTION
BIODIVERSITY AND LIVELIHOOD

PRIZES WORTH OVER MVR 100,000
DEADLINE 5TH MAY 2016

CIRCULAR

environment.gov.mv/vt/download/1105

APPLICATION FORMS

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IMADUDDIN SCHOOL

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