GOVERNMENT OF MONGOLIA

MINISTRY OF ENVIRONMENT AND TOURISM

CLIMATE & CLEAN AIR COALITION TO REDUCE SHORT-LIVED CLIMATE POLLUTANTS

Opportunities from taking integrated actions on air pollution and climate change in Mongolia
Executive Summary

January 2020

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This executive summary introduces the key messages of the report entitled Opportunities from taking integrated actions on air pollution and climate change in Mongolia.

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Executive Summary

Opportunities from taking integrated actions on air pollution and climate change in Mongolia

Needs for reducing GHGs and air pollutants emissions in Mongolia

The sustainable development of Mongolia faces numerous challenges and risks associated with the adverse impacts of climate change on natural ecosystems and socio-economic sectors of the country. In short-term perspective, air pollution has reached dangerous levels in cities in the cold season due to rapid urbanization and a significant increase coal combustion in the energy sector. Exposure to air pollution has serious toxicological and economic impacts on human health and the environment.

According to UNICEF[1], children living in Ulaanbaatar have a high risk of getting lower respiratory infections than those living in rural areas. Altogether, the age-standardized mortality rate from the joint effects of both ambient and household air pollution account for 132 deaths per 100,000 capita, which places Mongolia among the high-impacted countries (the world mean is 92 deaths per 100,000 capita). Studies show that 29% of cardiopulmonary deaths and 40% of lung cancer deaths in the Ulaanbaatar city are attributable to ambient air pollution. Therefore, the establishment of low-emission and climate-resilient societies is an important precondition for the successful implementation of the sustainable development strategy of the country.

The two issues of climate change and air pollution are closely linked because i) in many cases greenhouse gases and air pollutants are emitted from the same sources, and ii) some of the same substances contribute to climate change, and to air pollution impacts, such as methane, black carbon and tropospheric ozone, i.e Short-lived Climate Pollutants (SLCPs). These two linkages provides substantial opportunity to design strategies and identify mitigation measures that can simultaneously air pollution and mitigate climate change.

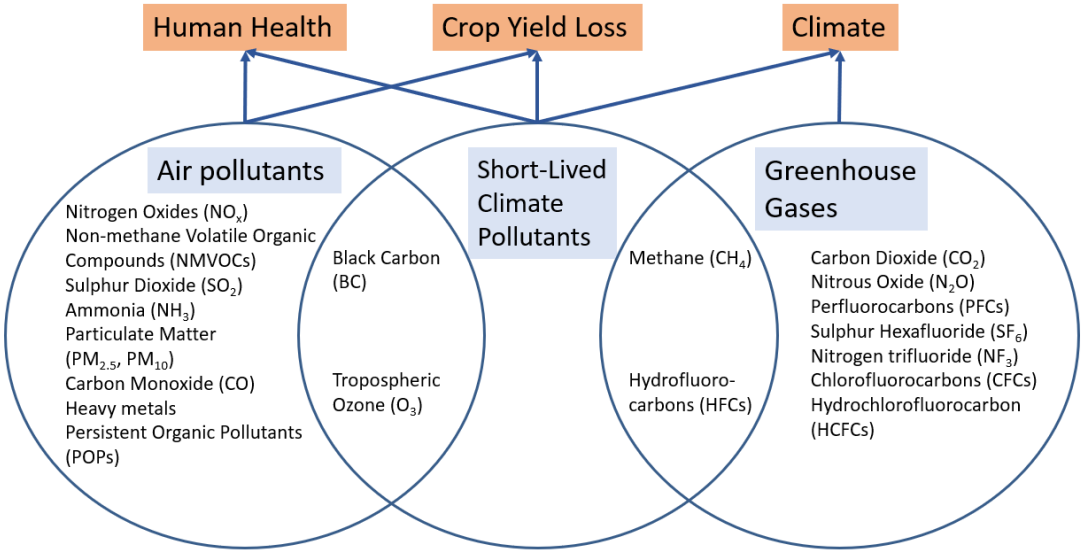

Figure ES1: Pollutants classed as air pollutants, short-lived climate pollutants and greenhouse gases

[1] Mongolian air pollution causing health crisis: UNICEF (2018), *https://respromasks.com/2018/02/23/mongolian-air-pollution-causing-health-crisis-unicef/*

To address these emerging problems caused by climate change and air pollution, an integrated assessment of emissions of air pollutants, SLCPs, and greenhouse gases, and their impacts on environment, human health and economic sectors of Mongolia was undertaken through the Climate and Clean Air Coalition (CCAC). The aim of this assessment was to evaluate the potential of different mitigation options to simultaneously improve air quality and mitigate climate change, including those included in Mongolia's revised NDC.

Major sources of air pollutant, SLCP and GHG emissions in 2017

In terms of short-lived climate pollutants, in 2017, there were 10 kilotonnes of black carbon emitted in Mongolia, and 822 kilotonnes of methane (Table ES1). For black carbon, the household sector and vegetation fires contributed most of these emissions (Figure ES1), while for methane, almost 90% of these emissions were emitted from the agriculture sector. In addition to these Short-Lived Climate Pollutants, there were also substantial emissions of other air pollutants and greenhouse gases across these sectors in Mongolia in 2017. For particulate air pollutants, like primary PM2.5, PM10, organic carbon, the major source sectors were the same as black carbon (household and vegetation fires), as were gaseous pollutants VOCs and carbon monoxide. For nitrogen oxides (NOx), there were also large contributions from road transport, and power generation to national total emissions. These emission sources were also large sources of carbon dioxide, with power generation, households and transport the largest CO2 emission sources.

Table ES1. Emissions of key SLCPs, air pollutants and GHGs in 2017(units: kilotonnes)

Sectors	OC	BC	PM2.5	NOx	NMVOCs	CH4	CO	CO2
All Others	0.1	0.0	0.2	0.1	1.9	46.3	0.7	58.7
Agriculture	0.2	0.0	0.4	1.6	0.0	731.5	4.6	-
Agriculture Forestry (Energy Consumption)	0.1	0.1	0.2	1.9	0.2	0.0	0.5	150.8
Commercial and Public Services	0.0	0.1	0.8	1.3	0.7	0.1	7.2	735.7
Electricity Generation	0.0	0.0	0.3	24.2	0.1	0.1	0.9	9,883.0
Heat-Only Boilers	0.0	0.0	0.2	11.7	0.1	0.0	0.4	4,767.7
Household	16.3	5.5	36.1	8.6	47.1	14.4	156.4	2,276.5
Industrial Process Emissions	-	-	0.1	-	1.6	-	-	333.5
Industry	0.1	0.1	0.8	2.9	0.7	0.1	6.5	893.4
Transport	0.2	0.6	1.1	38.8	3.2	0.1	15.4	1,481.4
Vegetation Fires	57.4	3.6	81.4	30.9	36.2	29.6	680.2	-
Total	**74.5**	**10.1**	**121.5**	**121.9**	**91.8**	**822.1**	**872.8**	**20,580.6**

Household Sector Emissions: In 2017, the majority of the emissions of all of these pollutants resulting from the burning of coal (Lignite), primarily for heating. Approximately half of the emissions of black carbon, carbon dioxide and other pollutants in the Household sector result from activities in

Ulaanbaatar. However, a substantial fraction of emissions also result from activities in other cities outside the capital, especially for black carbon and other air pollutant emissions, and carbon dioxide.

Electricity and Heat Generation Emissions: Emissions from electricity and heat production are predominantly associated with the combustion of coal, meaning that contribution of different power plants to the emissions of many pollutants is the same. Electricity and Combined Heat and Power Plants contributed over 70% of emissions from the electricity and heat generation sectors, while HOBs contributed approximately 28% of total emissions. The CHP4 was the largest single facility that contributing emissions in the electricity and heat generation sector (approximately 35% of the emissions of all pollutants).

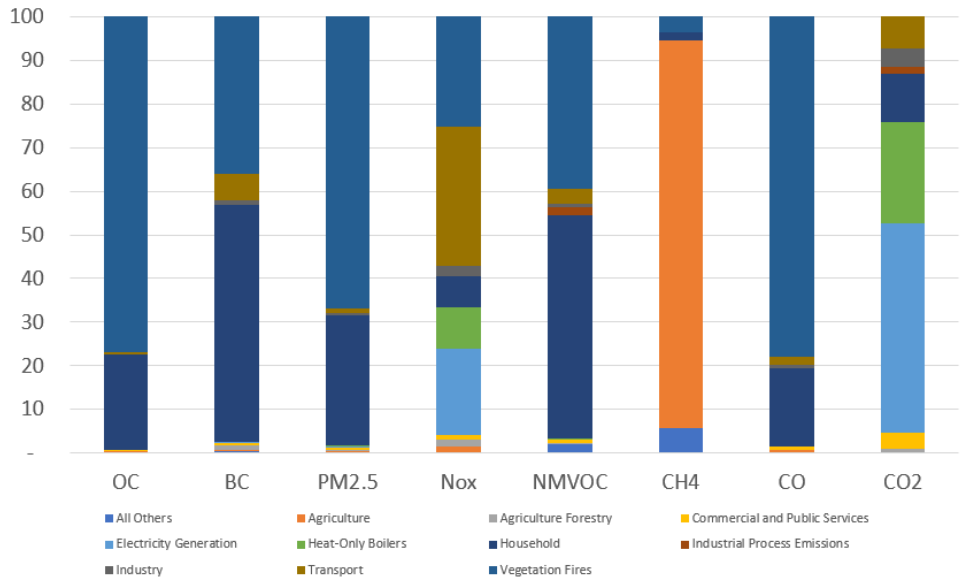

Figure ES1: Contribution of different source sectors to emissions of SLCPs, air pollutants and GHGs in 2017 in Mongolia

Transport Sector Emissions: Freight transport was estimated to produce the majority of air pollutant, SLCP and GHG emissions from the transport sector (over 90% of the emissions of BC, OC, PM2.5 and NOx), with a larger contribution from road freight transport compared to rail freight transport. Road Passenger transport makes more significant contributions to CO2 emissions, and emissions of carbon monoxide and VOCs.

Agriculture sector emissions: Agriculture, specifically the livestock sector, is the second largest emitter of the GHG emissions in Mongolia (through emissions of methane, also a SLCP). In 2014, the agriculture sector accounted for 48.51% (16.726.97 Gg CO2e) of total national direct GHG emissions (without LULUCF).

Mitigation strategies for climate change mitigation and air pollution reductions

Within existing plans and commitments, Mongolia has already committed to taking action that will reduce emissions of air pollutants, GHGs and SLCPs. For example, Mongolia's revised Nationally Determined Contribution outlines specific actions that it will take to reduce GHGs emissions by 22.7% (not including LULUCF) compared to a business as usual scenario in 2030. In addition, actions have been identified and have being implemented to improve air pollution in Ulaanbaatar specifically.

The analysis conducted using the LEAP model for Mongolia is the first analysis to assess the overall effect of the all these actions on all emissions to the atmosphere that affect air pollution and climate change. This helps to identify those mitigation actions selected to reduce GHGs that are also effective at improving air pollution, as well as identifying any climate change benefits from actions to reduce air pollution in Mongolia. The mitigation measures from the revised NDC, and those identified to improve air quality, are summarized in Table ES2.

Table ES2. Mitigation measures included in integrated air pollution and climate change assessment from Mongolia's NDC and air pollution mitigation actions

Mitigation Measure	Description	Scenario Grouping
Efficiency improvement of new coal-fired power plants	New coal fired power plants will be constructed with super critical-pressure technology by increasing efficiency of power plants.	NDC measures
Reduction of electricity and heat transmission and distribution losses	Transmission & distribution Loss should be reduced in 2030 to 7.8% compared to 14% in the baseline.	NDC measures
Station own use reduction of Combined Heat and Power plants	The station own use should be reduced in 2030 to 9.1% compared to 13.2% in the baseline.	NDC measures
Efficiency improvement of HOBs in aimag centers	Boiler efficiency is expected to be increased from 40% to 85% in 10 aimag centers, decreasing coal consumption.	NDC measures
Prohibited raw coal and use improved briquette fuel in Ulaanbaatar ger district	Government has prohibited raw coal use in Ulaanbaatr and replaced with improved briquette fuel. The number of households involved in this implementation measure is estimated to be 200000 households, which will be implemented by 2020.	NDC measures
Insulate old pre-cast concrete apartment buildings	Assembled apartment buildings in UB are 5,9,12 floor buildings with multi-layered plates built during the 1970s, 1980s and 1990s. The assemblies and current features of the buildings will be replaced with modern standards of insultation.	NDC measures
Energy efficiency in industry	Electric motors account for 60-70% of total electricity consumption in industry. Improving efficiency can reduce electricity consumption by 15-20%. Demand side management in the industry can save 10-15% of energy costs at low and low cost. By conducting energy audits energy efficiency in industry could be increased.	NDC measures
Prioritize animal quality and productivity over the livestock growth rate	Livestock quality and productivity will be prioritized and livestock numbers will be reduced through implementation of the Sustainable Livestock Development Action Plan	NDC measures
Transfer ger area households to apartment	Transfer of 100,000 households in ger area to apartment in Ulaanbaatar will reduce coal consumption in the ger areas. However, as these households are provided with centralized heat supply, the heat production at CHPs will increase and the GHG emissions will increase.	Air Quality Strategy Measure
Use electric heaters for ger district households	The Air and Environmental Pollution Reduction Program aims to provide 60,000 households with electric heating in ger areas of Ulaanbaatar in 2019-2025.	Air Quality Strategy Measure

Vehicle emission standards-Euro 5	As of 2018, the Euro 5 fuel was 7.7% and Euro 2-4 fuel - 92.3%. "The Sustainable Development Vision-2030" policy document states to increase the share of Euro 5 fuel to 70% by 2025 and 100% by 2030.	Air Quality Strategy Measure

The implementation of the revised NDC in Mongolia is based on the successful implementation of high potential mitigation measures, which together result in 22.7% lower GHG emissions compared to a reference scenario. The implementation of the revised NDC mitigation measures also reduce other SLCPs and air pollutants. There is an additional climate change benefit from implementing the revised NDC, because the implementation of the revised NDC was also estimated to reduce black carbon emissions by 11.5% compared to a reference scenario in 2030 (Table ES3, Figure ES2). These black carbon reductions would also improve air pollution and human health. There are also further benefits for improving air pollution from implementing the revised NDC, due to the estimated 9% reduction in primary PM2.5 emissions, and 10% reduction in NOx emissions.

The implementation of additional measures focusing on the transport and household sectors that target air pollution also lead to substantial additional benefits for reducing SLCPs and air pollutants. Therefore, the successful implementation of both Mongolia's climate change commitments and air quality strategy are estimated to reduce black carbon emissions by over one quarter, NOx emissions by over 20%, and a 17% reduction in primary PM2.5 emissions.

Table ES3: Emission reduction associated with the implementation of mitigation measures included in the revised NDC, and Air Quality Strategy

Scenarios	OC	BC	PM2.5	NOx	NMVOCs	CH4	CO	CO2
Reference (kilotonnes)	43	10	83	188	82	914	595	45,902
Mongolia's NDC (kilotonnes)	40	9	76	170	81	708	578	39,135
Mongolia's NDC (% reduction)	7.1	11.5	8.5	9.5	1.6	22.5	2.8	14.7
Mongolia's NDC and Air Pollution Strategy (kilotonnes)	37	7	68	146	72	706	535	40,220
Mongolia's NDC and AP Strategy (% reduction)	14.5	26.2	17.4	22.2	13.0	22.7	10.0	12.4

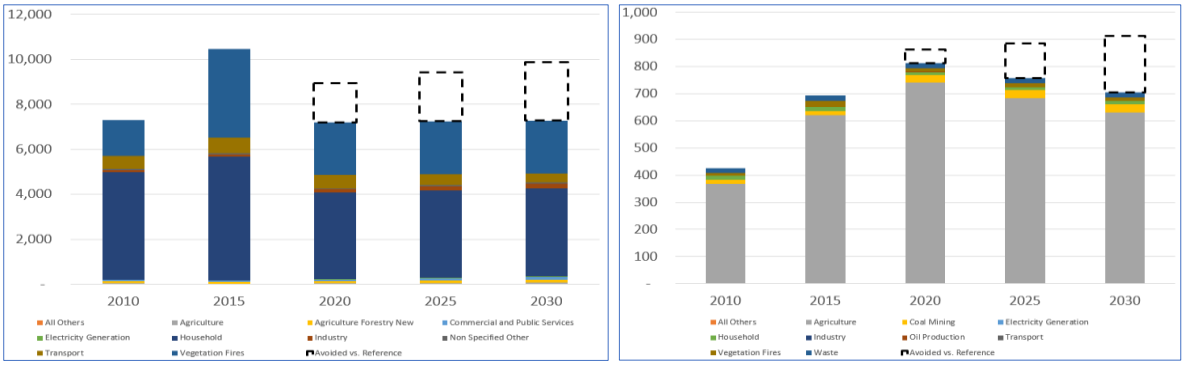

Figure ES2: Reduction in black carbon and methane emissions from implementation of Mongolia's NDC and air quality strategy

Conclusions and Recommendations

The integrated assessment of GHGs, SLCPs and air pollutant emissions has demonstrated that i) in Mongolia these pollutants are emitted from the same sources, in particular coal use for heating, coal use for power generation, transport and agriculture, ii) the actions included in the revised NDC will lead to air pollution benefits, in addition to reducing Mongolia's contribution to climate change, and iii) the reduction that will be achieved from the actions included Mongolia's revised NDC are in addition to the air pollution benefits from the actions that are included in Mongolia's air quality strategy (i.e. switching coal for electric heating in ger areas and switch ger households to flats).

The assessment demonstrates that there is value in ensuring that air pollution and climate change planning in Mongolia are integrated, so that the potential benefits that can be achieved are realized through the effective implementation of Mongolia's climate change and air pollution activities. Five specific recommendations for concrete actions that can be taken in Mongolia to integrate air pollution and climate change mitigation.

Recommendation #1: Integrate SLCP and air pollution mitigation into climate change planning: The climate change planning process provides a set of procedures into which SLCPs and air pollution co-benefits can be integrated. The inclusion of air pollutants in climate change planning allows this key local benefit of climate change strategies to be accounted for. This can be achieved by:

- Quantifying air pollutant and SLCP emissions in GHG inventory
- Developing integrated climate change and air pollution mitigation analyses
- Including air pollutants and SLCPs in National Communications and Biennial Reports
- Considering air pollution in development of long-term climate change mitigation strategy

Recommendation #2: Integrate SLCP and air pollution mitigation into sectoral strategies: The actions that are identified to reduce SLCPs and air pollutants in Mongolia are concentrated in a small number of source sectors. The development of sectoral strategies and plans provide an opportunity to ensure that actions that will be taken in each sector consider the implications for air quality and SLCP emissions.

Recommendation #3: Integrate SLCP and air pollution mitigation into National Development Plan: Air pollution was highlighted as a particular development challenge in Mongolia in its first Sustainable Development Goal Voluntary National Review. This assessment shows that implementation of Mongolia's revised NDC, can make a contribution to improving air quality. It is recommended that within the National Development Planning process, the link between air pollution and climate change mitigation is highlighted.

Recommendation #4: Increase integrated air pollution and climate change planning at sub-national scale: Air pollution in Mongolia is a local issue, affecting cities where coal burning, traffic and electricity generation using coal are the main sources. It is therefore necessary that the conclusions from this national assessment are translated into actions at the municipal level. Action is needed in Ulaanbaatar, but this assessment also highlights the need to develop air quality strategies for other cities across Mongolia, where substantial emissions were. This requires the engagement of municipal governments, and the building of technical and human capacity to assess and plan for air quality improvements within their jurisdiction.

Recommendation #5: Increase technical capacity for integrated air pollution, climate change and SLCP Planning: The integrated assessment of air pollution and climate change in Mongolia was conducted as a 'one-off' analysis in support of the NDC revision using the LEAP-IBC tool. To be able to track progress on air pollution and climate change mitigation, and to revise priorities as national circumstances change requires the increase in capacity to assess air pollution and climate change in an integrated way that can be regularly updated.