

NIGERIA'S NATIONAL ACTION PLAN (NAP) TO REDUCE SHORT-LIVED CLIMATE POLLUTANTS (SLCPs)



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EXECUTIVE SUMMARY

Short-lived Climate Pollutants and Opportunities for Mitigation

In 2017, it was estimated that 670,000 premature deaths were associated with outdoor and indoor air pollution exposure. This includes 114,000 premature deaths in Nigeria, including 70,000 premature deaths for children under 5 years old. At the same time, climate change is already affecting vulnerable populations and ecosystems across the world, resulting in crop yield losses, regional climate changes and increases in extreme weather events damage to ecosystems, in addition to premature deaths mentioned above (UNEP, 2016). Given the substantial impacts of air pollution and climate change, identifying those strategies that can simultaneously mitigate could result in substantial benefits.

Short-lived climate pollutants (SLCPs) are a group of pollutants that have relatively short lifetime in the atmosphere of a few days to about a decade and a half in the atmosphere. The major SLCPs are Methane, Tropospheric Ozone, Black Carbon and Hydro fluorocarbons (HFCs). They are the major contributors to global warming after long-lived greenhouse gases, specifically carbon dioxide (CO₂). In addition SLCP are dangerous air pollutants, responsible for various negative impacts on human health, agriculture and ecosystems.

The major SLCP emission sources, including household energy use, transport, oil and gas, agriculture, industry and the waste sectors, are also major sources of greenhouse gases such as CO₂, and other air pollutants, such as PM_{2.5}, organic carbon (OC), nitrogen oxides (NO_x), sulphur dioxide (SO₂), volatile organic compounds (VOCs), and carbon monoxide (CO).

The short lifespan of SLCPs, and the common sources of SLCPs, greenhouse gases and air pollutants, means that assertive action now, in addition to rapid reduction in CO₂ emissions, to reduce emissions from major SLCP sources could rapidly improve both air quality as well as slowing the rate of near-term climate change. A Scientific Assessment by UNEP/WMO in 2011 estimated that the emission reductions from full implementation of 16 measures targeting the major SLCP source sectors could globally avoid 2.4 million premature deaths, prevent 52 million tons of agricultural crop yield loss and reduce global average temperature increase by 0.5 degrees centigrade.

Recognizing that the mitigation of the impacts of SLCPs is critical in the near term, Bangladesh, Canada, Ghana, Mexico, Sweden and the US, together with the UN Environment Programme (UNEP) came together to form the Climate and Clean Air Coalition (CCAC) in 2012. The CCAC seeks to bring together an international network of policymakers, industry, intergovernmental

organizations, and civil society to promote the mitigation of short-lived climate pollutants and also make concerted efforts to remove barriers to this.

National SLCP Planning in Nigeria

A member of the CCAC since 2012, Nigeria is committed to reducing the emission of Short-Lived Climate Pollutants (SLCPs) emanating from activities and processes within its border, which has informed the preparation of this National SLCP Actions Plan (NAP), purposely set for the mitigation of short-lived climate pollutants in the country.

This plan is an outcome of a multi-sectoral consultative process that took place between 2016 and 2018. The process included the identification of the different sources of SLCPs emissions, their analysis, identification and prioritization of measures targeted at reducing emissions from major SLCPs such as Black Carbon (BC), Methane (CH₄), as well as long-lived greenhouse gases such as Carbon Dioxide (CO₂). The plan gives to the country the possibility to enhance Nigeria's NDC commitment by expanding them to cover other gases and pollutants beyond the long live greenhouse gases as recommended by UNEP emission gap report 2018.

The LEAP-IBC tool was used to analyze SLCPs, greenhouse gases, and air pollutants emissions from 2010 to 2050. The objective was to analyze the current state of SLCP sources in the country, their future progressions and impacts on human health, agriculture and climate. The assessment formed the basis of the measures proposed for SLCP emissions abatement.

Emissions of Short-lived Climate Pollutant

Methane emissions in 2010 were in the amount of 3,725.52kt. The main source of Methane was the agriculture constituting 32.9% of total the country's methane emissions. The second dominant source was residential which makes up 29.3% of the total emissions in 2010 followed by waste and bio mass burning.

Black Carbon emissions in 2010 in Nigeria were 344.55kt. The dominant source of BC emissions was residential from the use of traditional cookstoves. This source represents 56.9% of the national BC emissions. Other sources were "biomass burning" which made up 11.8% of the total emissions, followed by Waste and Transport.

Fig.S.1 shows the levels of the black carbon and methane in 2010, and the contribution from different source sectors. It is important to note that the major source sectors of these SLCPs, like Residential, Waste, Biomass Burning and Transport are also the major sources of other air pollutants such as primary particulate matter, nitrogen oxides and sulphur dioxide. These pollutants also contribute to the substantial health effects of air pollution. Finally, these sources also contribute to greenhouse gas emissions. Carbon Dioxide emissions in 2010 was 171.14 Mt (excluding land use change CO₂ emissions), which was mostly emitted from the transportation sector which constituted 59.4% of the national total. The second largest source of CO₂ was electricity generation accounting for 10.9% total emissions.

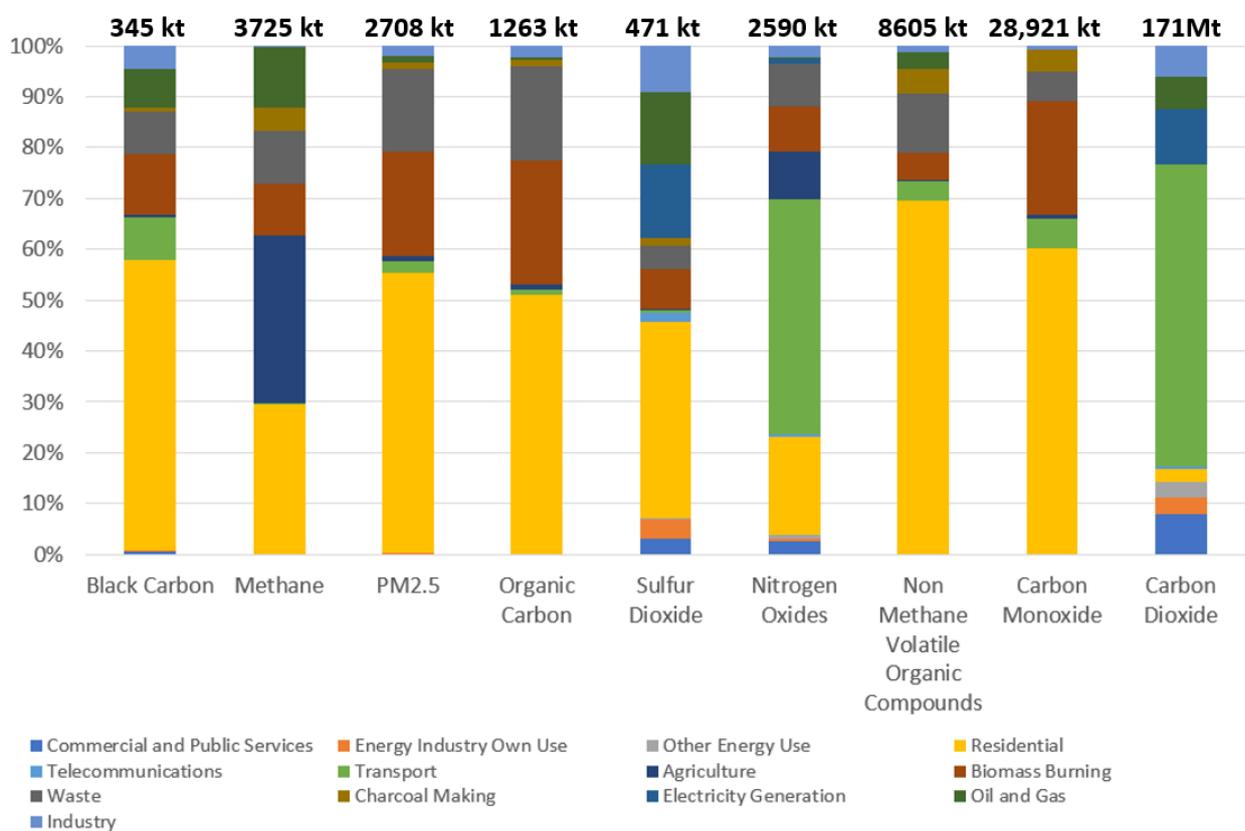


Fig.S.1: Emission Levels of SLCP, Air Pollutants and GHGs in 2010 in Nigeria and the contribution of major source sectors

HCF emissions originate entirely from the use of HFCs in products such as heat pumps and refrigerants

These emissions have health, environmental and climate effects. In this document, health effects are defined as effects on public health caused by given concentrations of fine particulate matter

(PM_{2.5}), the pollutant most associated with negative health impacts. The impact quantified here are premature deaths associated with PM_{2.5} exposure, although air pollution has a much wider effect on health, including non-fatal effects on the respiratory and cardiovascular systems. In Nigeria in 2010, fine particulate matter exposure was associated with about 61,000 premature deaths with the most affected being children of less than 5 years of age.

Environmental effects are defined as effects on crops and forests, while climate effects are defined as global warming or cooling of the atmosphere.

Crop loss associated with exposure to fine particulate matter in 2010 is about 3million tonnes, with the greatest loss being maize.

Global temperature change resulting from Nigeria's pollutant emissions is estimated to be about 0.018 degree C. in 2050 under a baseline scenario

Twenty-Two SLCP Mitigation Measures with Air Quality and Climate Benefits

The identification and prioritization of measures to mitigate SLCP relevant emissions in the country was undertaken considering i) 16 SLCP mitigation measures identified as being globally relevant in the UNEP/WMO 2011 assessment report, and ii) the emission levels and source sector contributions in Nigeria estimated using the LEAP-IBC tool using Nigeria's activity data and emission factors. This led to the identification of 22 SLCP mitigation measures across eight sectors (Table S.1) They are targeted at reducing emissions from major SLCPs such as Black Carbon (BC), Methane (CH₄), as well as reducing missions of co-emitted long-lived greenhouse gases such as Carbon Dioxide (CO₂) and other air pollutants.

Table S.1: SLCP abatement measures adopted in the National SLCP Plan

Source Sector	SLCP Abatement Measures	Target
Transport	<ol style="list-style-type: none"> 1. Renewal of urban bus fleet in Lagos 2. Adoption of CNG Buses in Nigeria 3. Introduction of low sulphur Diesel and Petrol 4. Elimination of high emitting vehicles that do not meet vehicle emission standards 5. Reduction of vehicle journeys by car through transport modal shifts 	<p>5000 new buses in Lagos complete and Danfo buses fully replaced by 2021</p> <p>25% of all Buses converted to CNG by 2030</p> <p>50 ppm diesel fuel introduced in 2019; 150 ppm petrol introduced in 2021</p> <p>Euro IV limits met by all vehicles by 2030</p> <p>500, 000 daily journeys shifted from road to rail & waterways</p>
Residential	<ol style="list-style-type: none"> 6. Increase in population using modern fuels for cooking (LPG, electricity, kerosene, biogas, solar cookers) 7. Replacement of traditional biomass cookstoves with more efficient improved biomass stoves 8. Elimination of kerosene lamps 	<p>80% of H/H using modern fuels for cooking in 2030</p> <p>20% H/H using improved biomass stoves for cooking in 2030</p>
Oil & Gas	<ol style="list-style-type: none"> 9. Elimination of gas flaring 10. Fugitive emissions/leakages Control 11. Methane Leakage Reduction 	<p>All kerosene lighting replaced by solar lamps by 2022</p> <p>100% of gas flaring eliminated by 2020</p> <p>50% Methane Reduction by 2030</p> <p>50% Methane Reduction by 2030</p>
Industry	<ol style="list-style-type: none"> 12. Improved Energy Efficiency in Industrial Sector 	<p>50% improvement in energy efficiency by 2050</p>
Waste Management	<ol style="list-style-type: none"> 13. Reduction of methane emissions and open burning of waste at open dumpsites through adoption of digesters at dump sites 14. Septic sludge collection 15. Sewerage Systems and Municipal wastewater treatment plants 	<p>50% methane recovered from landfills by 2030; 50% reduction in open burning of waste by 2030</p> <p>Promote Septic sludge collection, treatment and recycling in 37 municipalities</p> <p>Establish, expand Sewerage Systems and municipal wastewater treatment plants in Lagos, Kano and Port Harcourt</p>
Agriculture	<ol style="list-style-type: none"> 16. Increased adoption of intermittent aeration of rice paddy fields (AWD) 17. Reduce open-field burning of crop residues. 18. Anaerobic Digestion (AD) 19. Reduce methane emissions from enteric fermentation 	<p>50% cultivated land adopt AWD management system by 2030</p> <p>50% reduction in the fraction of crop residue burned in fields by 2030</p> <p>50% reduction by 2030</p> <p>30% reduction in emission intensity by 2030</p>
Power [Energy]	<ol style="list-style-type: none"> 20. Expansion of National Electricity Coverage 21. Increase share of electricity generated in Nigeria from renewables 	<p>90% of the Population have access to electricity grid by 2030</p> <p>30% electricity generated using renewable energy in 2030</p>
HFCs	<ol style="list-style-type: none"> 22. Elimination of HFC Consumption. 	<p>10% of HFCs phased out by 2030, 50% by 2040 and 80% by 2045</p>

Nigeria has submitted its Nationally Determined Contribution (NDC) outlining its commitment to reducing greenhouse gas emissions. Nigeria is also party to an international convention set to limit HFC emissions, the Montreal Protocol. It is within this context that activities to reduce HFCs in the country is being considered.

The 22 mitigation measures contained in this plan reflect measures outlined under these two international commitments that will also reduce SLCP emissions, as well as new, additional measures specific for SLCP mitigation. When implemented, the 22 identified abatement measures can together lead to a reduction in the emission of SLCPs as well as CO₂ and other air pollutants. Indeed, the full implementation of the measures included in the National SLCP Plan could reduce total emissions of black carbon and methane by 82% and 62%, respectively, by 2030. It could also produce similar percentage reductions across a whole range of other air pollutants, including organic carbon, sulphur dioxide and nitrogen oxides, as well as reducing CO₂ emissions, providing an integrated strategy to achieve air quality and climate goals.

Table S.2: Emission Reductions from implementation of 22 SLCP mitigation measures in 2030

	Black Carbon	Methane	Particulates PM _{2.5}	Organic Carbon	Ammonia	Sulfur Dioxide	Nitrogen Oxides	Non Methane Volatile Organic Compounds	Carbon Monoxide	Carbon Dioxide
<i>Baseline Emissions 2030 (kt)</i>	517	4,887	4,082	1,889	1,210	788	3,493	13,789	43,056	254,970
<i>National SLCP Plan Implementation 2030 (kt)</i>	90	1,903	1,038	560	610	171	1,450	2,272	9,919	220,232
<i>Avoided Emissions 2030 (kt)</i>	427	2,984	3,043	1,329	600	617	2,043	11,516	33,137	34,738
% Reduction 2030	83%	61%	75%	70%	50%	78%	58%	84%	77%	14%

Implementation of the 22 abatement measures included in the National SLCP Plan are estimated to lead to substantial benefits for air pollution exposure, with benefits for human health and crop yields, and to climate benefits. The expected air quality benefits are a 22% reduction in exposure to fine particulate matter in 2030 (Fig.S.2), which could result in 7000 fewer premature deaths associated with air pollution exposure (Fig. S.3). In addition, implementation of these measures

could reduce Nigeria’s contribution to global temperature increases (excluding emissions from land use change (LUCF sector) by 80% in 2050, relative to 2010, due to the simultaneous reduction in CO₂ emissions and SLCP mitigation (Fig.S.4).

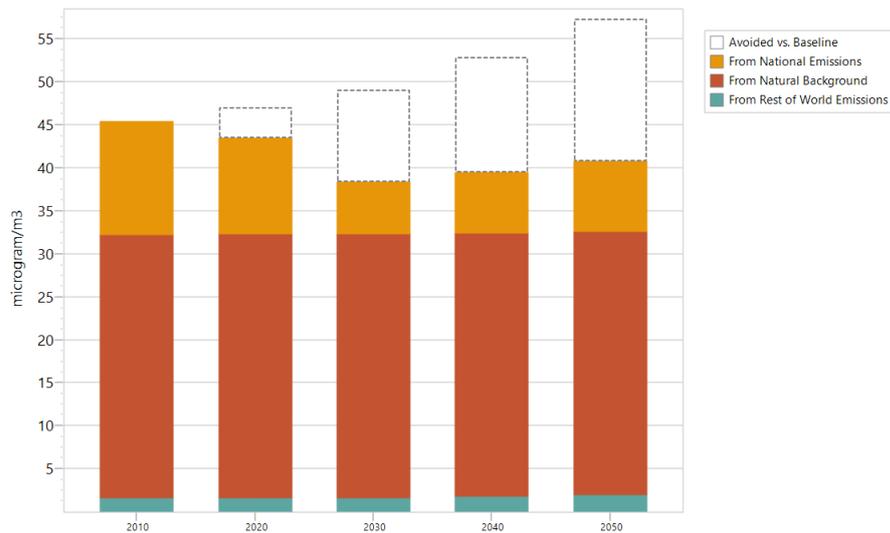


Fig. S.2: Reductions in outdoor average fine particulate matter (PM_{2.5}) exposure across Nigeria from implementation of the 22 SLCP abatement measures

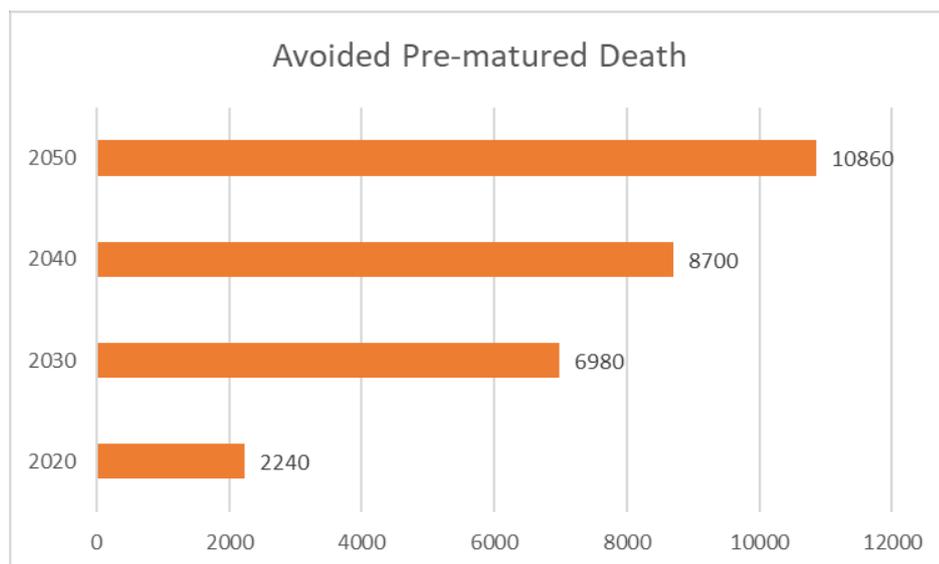


Fig.S.3: Avoided Pre-matured Death from 2020 -2050.

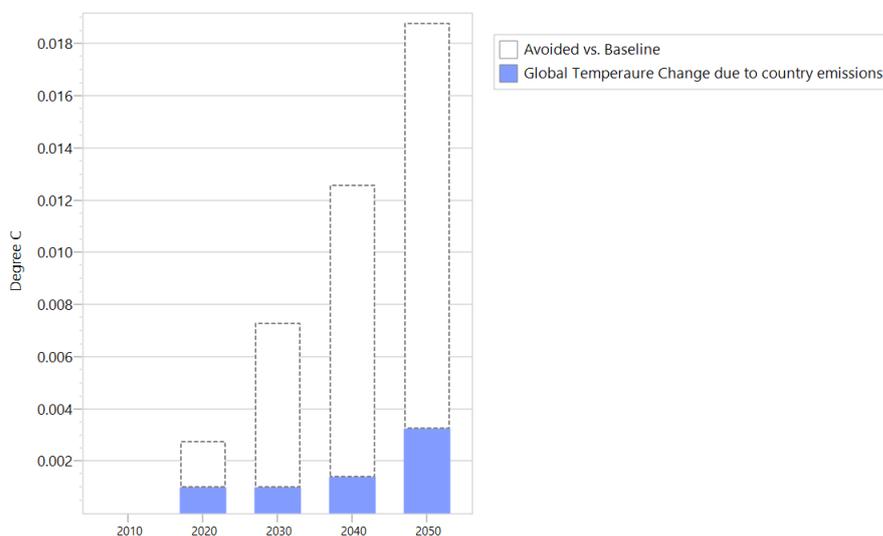


Fig.S.4: Avoided contribution to average Global Temperature rise

Implementing the National SLCP Plan

Nigeria needs to get the identified measures implemented and also ensure that they are integrated into the country’s development agenda. As much as possible, the 22 mitigation measures have been aligned with other national planning processes including the Nationally Determined Contribution (NDC) to reduce GHG emissions, the HFC phasedown, the Sustainable Energy 4 All Action Plan, Nigeria’s Economic Recovery and Growth Plan (NERGP), and the sustainable development goals (SDGs) Therefore, ensuring that there is alignment in implementation of all these strategies can help to achieve multiple goals, including SLCP mitigation. For each of the SLCP abatement measures, barriers to implementation have been identified in this document, and actions have been identified to overcome them. It is key that following the political endorsement of this plan that there is a mainstreaming of SLCPs abatement issues into the overall national development agenda. The proposed abatement measures need to become part of the day-to-day activities of government, and included in the sectoral plans developed by the relevant Ministries, Departments and Agencies (MDAs).

The SLCP Unit within the Climate Change Division of the Ministry of Environment will be the main entity to coordinate implementation of the National SLCP Plan, which it will undertake in

collaboration with stakeholders MDAs. The SLCP Unit will monitor and evaluate the implementation of the National SLCP Plan, and each relevant sectoral MDA will have a desk officer assigned with responsibility for SLCP issues. To ensure a successful implementation, the SNAP office, in collaboration with line MDAs' Plan Implementation Desks will need to undertake extensive awareness raising campaigns and also give serious attention to monitoring and evaluation of the plan's implementation so that it can be periodically updated to reflect changes in circumstances in the country.

Identifying appropriate funding mechanisms for these actions will be a key step towards implementing the National SLCP Plan. This could include public funds from the national budget being committed to the implementation of SLCP abatement measures, which will require that SLCP mitigation actions are included in MDAs budgets submitted to the Ministry of Planning and National Budget. Domestic Resource Mobilization, which enhances national ownership and sustainability, should be seen as the long-term path for SLCPs abatement measures implementation in the country. It will also include the mobilization of resources from international donors, and from the private sector.