

INTEGRATING SHORT-LIVED CLIMATE POLLUTANTS INTO ASIAN NDCS

A SURVEY WITH RECOMMENDATIONS



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Key points

- Following the Paris Agreement, more than 180 countries pledged nationally determined contributions (NDCs) to the United Nations Framework Convention on Climate Change (UNFCCC). Many countries included plans to pursue other development priorities beyond climate change mitigation in their NDCs.
- The inclusion of these priorities is important because it can ensure that climate change is well aligned with broader development goals. It may also help bring climate finance to help fund the achievement of critically important goals.
- Only 8 percent of Asia and the Pacific currently breathes air that meets World Health Organisation (WHO) guidelines. Much of Asia therefore has significant potential to achieve cleaner air and control near-term climate change by integrating short-lived climate pollutants (SLCPs) into their NDCs.
- This paper analysed NDCs from Northeast, Southeast and South Asia to determine which countries are capitalizing on that potential.
- The analysis revealed many countries' NDCs referenced methane and hydrofluorocarbons, while a few included black carbon. Some countries incorporated air pollution and co-benefits into their NDCs as part of wider climate change strategies.
- Several interventions could facilitate the integration of SLCPs into NDCs, including: 1) sensitization strategies for high-level decision makers and operational staff; 2) interagency coordination mechanisms and internationally organized seminars; and 3) concrete activities underlying work on SLCPs, especially bringing black carbon into emissions inventories.
- The Climate and Clean Air Coalition (CCAC) have tools to support integration of SLCPs and other air pollutants into NDCs and other relevant policies.
- The Asian Pacific Clean Air Partnership (APCAP) can also strengthen NDCs with continual enhancement through the implementation cycle as way to strengthen the science-policy interface.



Introduction

The Paris Agreement, adopted in December 2015 at the 21st Conference of the Parties (COP 21) to the United Nations Framework Convention on Climate Change (UNFCCC), seems destined to mark a turning point in the history of climate negotiations. Part of the reason it appears primed to earning that distinction is that it is the first agreement under the UNFCCC that pledges to keep global temperature increases well below 2 degrees Celsius relative to pre-industrial revolution levels (UNFCCC, 2015). But the Paris Agreement might turn out to be even more consequential if it succeeds in encouraging countries to limit the temperature increase even further - to *1.5 degrees Celsius*. Since many developing countries are experiencing rapid economic development and population increases, achieving the transformational 1.5 target will require concerted efforts from all countries within the next decade (IPCC, 2018).

For many countries, pursuing the 1.5 goal could create a tension between development priorities and climate change policies. The 2019 IPCC 1.5°C Special Report nonetheless demonstrated this tension can be reconciled by capitalizing on links between climate mitigation and other development concerns (IPCC, 2018). In Asia, policies that address air pollution as well as climate change reinforce this conclusion because they deliver multiple benefits beyond mitigating climate change. These benefits are partially attributable to high levels of air pollution.

South and East Asia currently suffer from the highest number of premature deaths from air pollution globally (Landrigan et al., 2017); and the size of the benefits tends to be greatest where existing legislated and planned air pollution controls are weak (IPCC, 2014). In fact, a recently published United Nations Environment Programme report identified 25 measures could avoid more than a million premature deaths, while also boosting crop yields and enhancing energy security in Asia (CCAC and UNEP, 2018). There is hence significant scope for countries in Asia to achieve reductions in air pollution while mitigating climate change.

One of the ways that countries could realize this potential is mitigating SLCPs. SLCPs—including methane, tropospheric ozone and black carbon (which is emitted directly into the atmosphere in the form of fine particles (PM_{2.5})¹—have significant warming impacts in short atmospheric lifetimes (typically between a week and a decade as opposed to the multi-decadal lifetimes of other GHGs). Black carbon can also accelerate snowmelt and dull ice albedo, increasing their warming effects. Finally, black carbon and tropospheric ozone have a direct effect on air quality. As such, mitigating SLCPs can deliver multiple benefits for the climate and air quality in Asia. In so doing, they can help the world and many countries move along a 1.5 pathway while achieving other sustainable development goals (SDGs) (Shindell et al., 2017).

¹ PM_{2.5} is made up of carbon components, nitrate, sulfate, ammonium salt, inorganic elements such as silicon, sodium, aluminum etc.(Government of Japan., 2017)

SHORT-LIVED CLIMATE POLLUTANTS	ANTHROPOGENIC SOURCES	LIFETIME IN ATMOSPHERE	IMPACTS
Black Carbon (BC)	diesel cars and trucks residential stoves forest fires agricultural open burning industrial facilities	Days	ice and snow melting rainfall patterns human health
Methane (CH ₄)	natural processes coal mines natural gas and oil systems landfills	12 years	climate system (direct) human health (indirect)
Tropospheric Ozone (O ₃)	not emitted directly but formed by sunlight-driven oxidation of ozone precursors	Weeks	atmospheric warming agricultural production human health
Hydrofluorocarbons (HFCs)	air conditioning refrigeration solvents foam blowing agents aerosols	15 years	atmospheric warming

Table 1: Short-Lived Climate Pollutants (Source: CCAC)

The potential from mitigating SLCPs in Asia raises an important question: how can countries in the region strengthen the legislation and policies that mitigate SLCPs? A possible solution involves their Nationally Determined Contributions (NDC) that were pledged to the UNFCCC in response to the Paris Agreement. Countries in Asia could capitalize on the political and financial support flowing from the Paris Agreement and NDCs to help mitigate SLCPs and curb air pollution. This, however, necessitates that countries in Asia integrate SLCPs into their NDCs.

This paper has three objectives intended to help countries with that integration.

- First, it provides an overview of which countries in Asia have integrated SLCPs (or related terms) into their NDCs.

- Second, it offers pragmatic recommendations on how to strengthen that integration at the national level.
- Third, it suggests ways that the Climate and Clean Air Coalition (CCAC) (an international partnership promoting action on SLCPs) the Asia Pacific Clean Air Partnership (APCAP) (a regional initiative promote science-based solutions to air pollution) can support integration at the national level.

It is hoped that findings from this analysis will not only prove useful to countries that are already incorporating SLCPs into their NDCs but other countries (in and beyond Asia) considering integrating SLCPs into NDCs and other sector-specific or subnational climate actions. The study draws upon an examination of original NDC text submitted to UNFCCC as well as interviews and follow-up surveys with policymakers.

Integrating SLCPs into NDCs

The NDCs are national responses to climate change that countries pledged to the UNFCCC following COP 21 in 2015. According to Article 4 paragraph 2 of the Paris Agreement, each party shall prepare, communicate, and maintain a succession of NDCs. In general, NDCs consist of a single or combination of actions such as policies or projects aimed at achieving a specific result such as reducing GHG emissions to a particular level (a GHG outcome) or increasing energy efficiency to another level (a non-GHG outcome) (World Research Institute, 2015). The NDCs are the most recent illustration of a trend wherein countries pledge to take bottom-up actions to mitigate climate change. This trend began more than a decade ago when countries agreed to take Nationally Appropriate Mitigation Actions (NAMAs) in the Bali Action Plan (2007) that concluded COP13. The NDCs, however, are broader in scope than NAMAs as their contents often refer to both mitigation and adaptation actions. They also elicited relatively more support from countries participating in climate negotiations: as of January 2019, 181 parties have submitted NDCs (UNFCCC, 2019). Many of those countries have begun implementing domestic mitigation measures as they reviewed every five years with the “peer pressure” generated from the sharing of actions meant to motivate countries to “ratchet up” emission reductions.

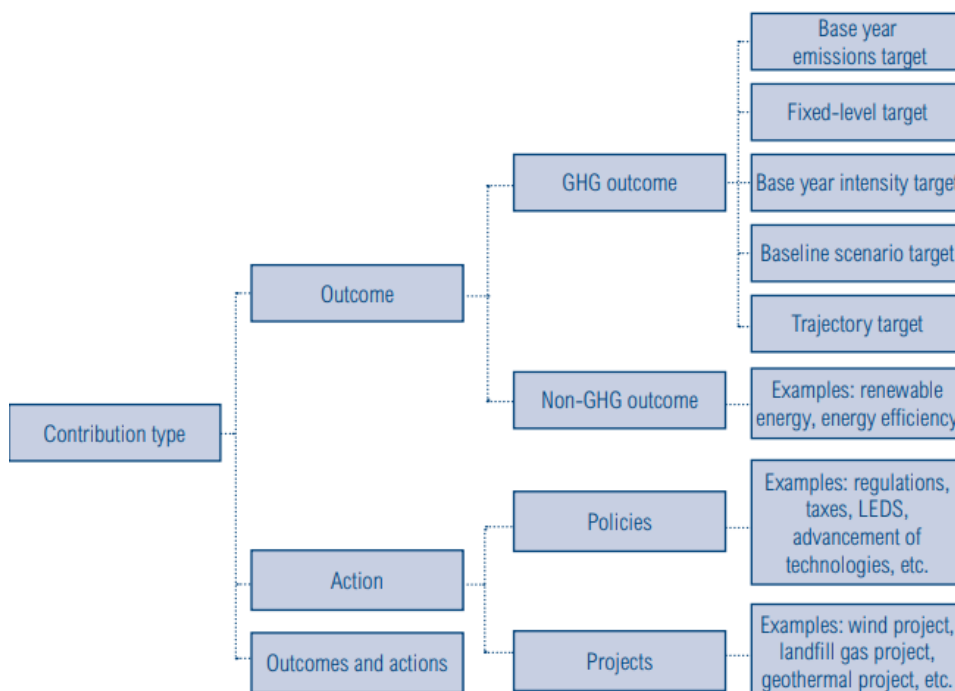


Figure 1: Types of Mitigation Contributions (Source: WRI, 2015)

While the NDCs have therefore generally drawn more participation from countries than past bottom-up climate actions, they vary in the specific issues they address. Some have expressed concerns that this flexibility has resulted in a lack of standardization over the scope and content as well as implementation costs and financing of actions (Pauw, Klein, et al., 2017). Others have taken a more balanced view of this flexibility, noting it has allowed countries to include only the gas that contribute most to the national GHG inventory or all seven GHGs covered under the Kyoto Protocol (WRI, 2015). Yet others have cast this flexibility in an even more favorable light, suggesting it enabled countries to make links to core development needs such as 17 SDGs that are to be implemented over the timeframe as the NDCs (TERI, 2017).

A complementary group of studies to this more favorable literature has sought to provide guidance on how to create links between NDCs. To illustrate, the Global Alliance for Clean Cookstoves has sought to help least developed countries (LDCs) and small island developing states (SIDs) to mainstream clean energy concerns into their NDCs (GCCA, 2016). Others have pointed to the potential to integrate climate and gender equality and highlighted the challenges of converting that potential into action (UNDP, 2009). A third group of researchers have offered guidance on strengthening synergies between NDCs and sustainable transport priorities (GIZ,

2017). Perhaps most relevant to the focus of this policy brief some studies have shown that across a wide range of countries current NDCs as well as potentially more ambitious NDCs could lead to significant improvements in air quality and public health (NewClimate Institute, 2015c, 2015d, 2015a, 2015e, 2015b).

Many previous studies therefore underline that potential to leverage NDCs to advance other development needs. In several key sectors such as transport and waste management, development partners and international organizations are offering guidance into how to make these links with the NDCs. Further, one of the most attractive areas to make these links is between climate change and air pollution. It nonetheless merits highlighting that to improve the atmospheric environment, it is necessary to more actively incorporate SLCPs measures into NDC. This inclusion could be especially relevant to making NDCs more compatible with other development concerns and encouraging other countries to make similar efforts. That is, the comparisons of NDCs could help countries to learn from each other about how to link different policy areas (Pauw et al., 2017), including air pollution and climate change.

SLCPs in NDCs in Asia

The section analyses the content of the NDCs submitted to the UNFCCC from countries in Northeast, Southeast and South Asia to see if they are making the links between their climate actions and SLCPs. Not surprisingly, the pollutant that receives the most references in the region's NDCs among the SLCPs is methane. Methane is in the basket of UNFCCC GHGs but is an SLCP because it has a relatively short atmospheric lifetime and contributes to the formation of tropospheric ozone (also an SLCP as well as a potent air pollutant which impacts human health and ecosystems). Bangladesh, Cambodia, China, Indonesia, Japan, Malaysia, Nepal, South Korea, Sri Lanka, Thailand, and Viet Nam outline plans to reduce methane from the waste, agriculture, and energy sectors in their NDCs. In the waste sector specifically, Bangladesh set clear targets for landfill gas to be captured and used for electricity generation. An even more tangible example can be found in language in Sri Lanka's NDC that suggests it will reduce methane through waste-to-energy programmes.

Hydrofluorocarbon (HFCs) refrigerants are another important category of SLCPs. HFCs do not directly influence air quality, but their replacement can catalyze improvements in appliance energy efficiency which can indirectly influence air quality and energy-related GHG emissions by reducing energy consumption (depending upon the fuel source and location of energy). Like methane, HFC emissions are covered under the UNFCCC

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(and recently have been placed under the Montreal Protocol following the passage of the Kigali Amendment in 2016). Several countries such as Bangladesh, China, Japan, South Korea, Thailand and Viet Nam expressed their intention to reduce HFCs. While Japan is introducing refrigerant control technology and some other measures to control emissions of fluorinated gases, other countries do not discuss specific measures to reduce HFCs in their NDCs. Japan's relatively greater concreteness might be attributable to its comprehensive plan to regulate HFCs domestically.

Black carbon is the pollutant where there is arguably greatest effort needed to make the link between the SLCPs and NDCs. Unlike HFCs or methane, black carbon is a particle emitted due to the incomplete combustion of carbon-based fuels and is not one of the seven GHGs covered by the UNFCCC. Given that it is not under the UNFCCC umbrella, it is noteworthy that three countries in Asia directly reference reductions to black carbon in their NDCs: namely India, Sri Lanka and Laos. These three countries focus on achieving these reductions in the transport sector through measures targeting diesel emission reductions such as upgrading of fuel quality standards and implementing new vehicle emission standards.

In other instances, countries reference actions that would clearly lead to reductions in black carbon but do not directly mention the term in their NDCs. In the case of Bangladesh, for example, there is no direct mention of black carbon but there is a discussion actions that are meant to result in lower emitting cooking environments. Bangladesh's NDC states that from a business-as-usual (BAU) baseline it aims to achieve 70% market share of improved biomass cookstoves (reaching 20 million households in 2030); 40% market share of improved gas cookstoves; and 10% market switch from biomass to LPG for cooking. This is not the only area where Bangladesh intends to achieve reductions in black carbon. In the transportation sector, Bangladesh also seeks to shift in passenger traffic from road to rail of 20% by 2030 through the development of infrastructure that could shift passengers from diesel-consuming public transport.

Another arguably more indirect way that countries might end up reducing SLCPs through their NDCs involves action to address air pollution. Countries like India, Laos, Mongolia, Myanmar, Nepal, and Sri Lanka all refer "air pollution" or "air quality" in their NDC. In some instances, countries elaborated on the relationship between air pollution and socioeconomic development. For example, Sri Lanka expressed concerns about the linkages between air pollution and expansions in urban planning and human settlements. Other countries make reference to efforts to ensure that words in their NDC are supported by action. To illustrate, Nepal introduced a new fuel

tax system in the Kathmandu Valley that is intended to improve air quality. Meanwhile, Mongolia articulated an interest in abating air pollution and achieving air quality co-benefits by improving household stoves. India goes one step further in both discussing the need for the abatement of pollution as well as mentioning its National Air Quality Index (AQI) that was launched 2014 to help achieve cleaner air. The AQI is based on six pollutants and serves as a tool to disseminate information on air quality in easy-to-understand qualitative terms that can help improve communication with the general public on a technically complex topic.

A final subset of countries use the term “co-benefits” in their NDCs in a more general sense, suggesting broader links between climate and development. In this case, Bangladesh’s NDC clarifies that its mitigation options are expected to have some co-benefits (including improving air quality). It further provides the examples of increasing renewable energies and reducing traffic congestion to suggest what kind of actions could deliver those benefits. Paralleling the approach of Bangladesh, the Philippines notes that, when it considered mitigation options, it used assumptions that could help realize co-benefits in the form of environmental or socioeconomic improvements. India also mentions co-benefits but uses the term to refer to co-benefits of mitigating climate change as a desirable side effect of economic growth. Table 2 below summarizes which countries include which SLCPs in their NDCs.

COUNTRY	BLACK CARBON	METHANE	HFCS
Bangladesh		X	X
Cambodia		X	X
China		X	X
India	X		
Indonesia		X	
Japan		X	X
Lao	X		
Malaysia		X	
Nepal		X	
South Korea		X	X
Sri Lanka	X	X	
Thailand		X	X
Viet Nam		X	X

Table 2: SLCP Reductions mentioned in NDCs in Asia (as of Aug.2017)

Before turning to discussion that synthesizes these findings, it is worth noting that the notion of integrating SLCPs into NDCs is also visible outside the region. Countries such as Mexico and Chile are among a list of several non-Asian countries integrating SLCPs into their NDCs. In the case of Chile, for example, this was achieved by government introduced the 2014-2018 Atmospheric Decontamination Strategy that included implementation of PM_{2.5} reduction measures. This effectively meant that Chile was incorporating black carbon into its NDC as it is one of the components making up PM_{2.5} and comes from diesel transport, heating and residential wood fire cooking.

The Reasons for Integration: A Synthesis of Survey Results

The previous section suggests that many countries in Asia have made some linkages to SLCPs in their NDCs. Methane and HFCs are incorporated in the greatest number of countries with black carbon (and sector-specific actions that control black carbon) referenced in fewer countries. Tropospheric ozone is not mentioned directly in any NDCs. There are also several more indirect references to air pollution and co-benefits that open opportunities for mitigating SLCPs as part of a broader climate change strategy.

The varying degrees of the integration raises an important question: how can the integration of the SLCPs into the NDCs be facilitate above beyond methane and HFCs? This section draws upon interviews and responses to a questionnaire (attached in the Appendix) from several policymakers to assess the reasons behind the varying degrees of integration. It also highlights possible interventions that could strengthen that integration.

Awareness raising is needed to sensitize policymakers to the language of SLCPs

The survey found that the term SLCPs is still a relatively recent part of the vocabulary for environmental policymakers. The term came to prominence in 2012 with the creation of the CCAC—a voluntary partnership of state and non-state actors promoting efforts to mitigate SLCPs. While SLCPs have seen more usage globally over the past six years, it will require significantly more awareness raising before those negotiating climate change are conversant in, for example, the sources and impacts of black carbon. Part of the challenge is that SLCPs are inherently complex. This complexity is illustrated by the considerable uncertainty surrounding the warming and cooling impacts of black carbon and co-emitted aerosols and gases. In countries interviewed for this project that

made the most progress in “sensitizing officials,” there were references through a top-down and bottom-up channel that proved useful for raising awareness.

The top-down channel involved senior-level officials who possessed significant experience and knowledge of air pollution and could therefore communicate to others the importance of controlling SLCPs for climate change. The bottom-up channel involved considerable efforts to understand SLCPs among staff involved in policy analysis and the implications of bringing SLCPs into a national and international climate strategy. That awareness has then moved up to the senior ranking officials. In spreading information about SLCPs among relevant staff, one interviewee pointed to the framing of SLCPs. In particular, he noted that the non-technical language of co-benefits or multiple benefits could help to make the case for taking action on SLCPs and perhaps reduce concerns over technical complexity among officials without an air pollution background. It was also suggested by the same respondent that the language of co-benefits would be easier to convince higher-level champions on the importance of making linkages between SLCPs and NDCs. In yet another instance, an interviewee from an international initiative spoke about the ongoing effort to create a coherent narrative that brought together work on GHGs and SLCPs under what is being called a pathway approach as being critical to factoring SLCPs into the currently GHG-centered NDCs.

Interagency coordination mechanisms that help integrate SLCPs into NDCs are also critically important

Above and beyond awareness and understanding, a related challenge is the lack of coordination or information sharing between air pollution and climate change divisions. Bureaucratic sectionalism prevents the formulation of coherent policies in many countries; the walling-off of divisions can sometimes be an unfortunate casualty of budgeting and staffing procedures that narrowly define tasks and responsibilities in the name of specialization. In the particular case of SLCPs, many governments have assigned the air pollution and climate change portfolio to separate divisions or even entirely different agencies. This can lead to a scenario where the air pollution division has a better understanding of SLCPs but lacks the authority to work on NDCs.

While these institutional divisions can be problematic, they are not necessarily permanent. In many contexts where policy coherence could be helpful, countries have made progress in lowering barriers to cooperation. Some of the progress is due to the use of existing interagency coordination mechanisms; the crosscutting nature of

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climate change has led many countries to set up climate change commissions (or similarly titled coordination mechanisms) that offer a natural entry point for making the link between climate change and other development priorities (including air pollution). In other cases, countries have created a special national steering committee on SLCPs with technical, climate, air quality, and environmental management divisions playing active roles. In yet another interesting and possibly replicable practice, the environmental ministry that is overseeing the work on SLCPs has reached out to government funded research institute to support its efforts to bring SLCPs into the NDCs. This research institute is therefore offering a skilled forum that officials within and beyond the agency could turn to get technical information but also learn other divisions and agency views. This information exchange can be further facilitated by seminar convened by international organizations. By raising the profile of SLCPs, internationally recognized stakeholders can serve as a trusted broker of knowledge that helps national agencies work upon shared interests.

In yet a final set cases, there have also been efforts to address both the awareness and coordination issues (mentioned above) at the same time by working with a communication expert from public communication department. These efforts were intended to not only promote better communication among relevant government stakeholders but to give the business and the general public a clearer understanding of SLCPs; this clearer understanding at the local level is particularly important since many of the SLCP actions require changing at a relatively small scale. Hence, it will help to ensure that there are actually implementable actions that can back up the insertion of the SLCP language in NDCs.

Concrete activities such as the creation of emissions inventories can complement efforts to integrate SLCPs into NDCs

In addition to institutional coordination, several of the interviews pointed to the importance of having a concrete set of activities underlying the work on the NDC. Many countries are working to develop and refine their emissions inventories. Several countries are working to include black carbon into their emissions inventory development process. This was viewed as important because it gives multiple relevant stakeholders a common and concrete objective for their collective actions. One country also plans to include black carbon in city-level inventories as well as their national inventory.

Echoing the importance of outside assistance, many countries pointed to the important role the CCAC is playing to supplement national awareness raising and coordination efforts. For example, the CCAC Supporting National Action Planning (SNAP) initiative engages with countries to formulate national action plans and also builds national capacity by supporting the hiring of an official in the relevant government agency to oversee the SLCP portfolio. Initiatives such as the CCAC Regional Assessment and Urban Health Initiative also have intentions to provide national and subnational officials information about the SLCPs.

There are also opportunities for the CCAC to strengthen links between its initiatives and NDCs. This could be achieved by using the tools employed by the SNAP initiative and the CCAC's new multiple-benefits pathway framework (see Box 1) to look at the current and possible additional elements for the NDCs. It may also make sense to engage with countries who are not in the CCAC but are referencing SLCPs (or related terms) in their NDCs. Engaging CCAC countries that are not making this link may also be a useful strategy for all parties involved. Among non-CCAC countries, the review in the previous section of the paper shows that Myanmar, Nepal, and Sri Lanka have been implementing relevant projects or indicated their intentions to reduce SLCPs.

The Asian Pacific Clean Air Partnership (APCAP)—a UNEP initiative founded in 2015 to help bring together air pollution agreements in Asia and create a science panel that offers Asia's policymakers updates on relevant science—may also have an expanding role in this context. APCAP may want to look at ways that countries can share information and experiences on the integration of SLCPs into NDCs. Considering that APCAP has been collaborating with CCAC on the aforementioned UNEP and CCAC report with 25 solutions, there may also be scope to support the development of capacity building programs with relevant partners on SLCP integration into NDCs. Such capacity building could include introducing tools that are used for SLCP planning and linkages between air pollution, climate change as well as other development priorities (such as job creation). To make this support more effective, it is essential to ensure that the support provided is timely and linked to the NDC cycle so that more countries are able to increase the level of ambition of their climate mitigation efforts and support implementation (GIZ, 2017).

Box 1: The Multiple-Benefits Pathway Framework can empower countries to deliver necessary near-term mitigation ambition

The CCAC's multiple benefits pathway framework is an integrated approach that links strategies to reduce emissions of CO₂, SLCPs, and other air pollutants. It allows for the identification of mitigation strategies that can maximise improvements to health and other key local development priorities, and at the same time significantly reduce the rate of warming in the near-term (i.e. next 25 years) to place the world on a more sustainable path towards Paris targets.

The framework was developed to empower countries to take action immediately and showcase strategies that can significantly reduce climate and air pollution impacts in the near term – with immediate benefits to health – and every year after action is taken. These actions complement strategies to safeguard the climate over the longer term.

The multiple benefits pathway framework responds to the Paris Agreement's long-term temperature goals and puts additional focus on saving lives and reducing temperature increases in the near term. For many countries with high methane and black carbon emissions, and potential for high HFC emissions, the largest reductions in near-term temperature is likely to come from implementing SLCP measures. However, for other countries, such as Norway, with low SLCP and air pollutant emissions, CO₂ reductions give the largest reduction in both near-term and long-term temperatures. Therefore, this framework emphasises the near-term goals (local and global) which can be achieved by a variety of strategies, even though in most cases implementing SLCP strategies is going to have high priority.

The CCAC has worked on a practical application of the framework using different tools – such as the Long-range Energy Alternative Planning system with the added Integrated Benefits Calculator (LEAP-IBC) – that can be applied by practitioners in countries, sub-national regions or cities to identify the multiple benefits of different strategies on the path to achieving the Paris targets.

This framework was first applied at a global scale as a methodology underpinning the 2011 Integrated Assessment of Black Carbon and Tropospheric Ozone (UNEP & WMO, 2011). It has also been applied at the regional scale as the methodology for the 2018 Assessment of SLCPs in Latin America and the Caribbean (CCAC, 2018) and the 2018 Air Pollution in Asia and the Pacific: Science Based Solutions Report (CCAC, 2018).

Conclusion

This report has demonstrated that several countries in Asia have incorporated SLCPs in their NDCs. The inclusion of SLCPs in NDCs holds promise to bring more financial resources and other forms of support to efforts to clean the air and mitigate near-term climate change in Asia. At the same time, the report found that there is considerable potential for more countries in Asia to make these climate-air pollution links in their NDCs, particularly for black carbon. Sensitization programs for policymakers at different levels of decision making, interagency coordination mechanisms, and initiating complementary activities with concrete objectives could help advance this integration in more countries in Asia.

The study also raised some important areas for future inquiry. One such promising channel is whether countries decide to bring in SLCPs into revised versions of their NDCs as they prepare for the five-year review cycle. The flexibility inherent in the NDCs allows for just such a possibility. Another interesting area of research involves working with cities, businesses and other non-state actors to build SLCPs into their climate mitigation strategies. Increasingly it is actors outside of national governments that are working on climate change. It makes sense that they too would bring SLCPs into their planning. There are also a range of broader developmental policies that could more explicitly target SLCPs in effort to mitigate climate change, improve air quality, and achieve their primary objectives. In Asia, efforts to reduce from the agricultural sector could pay significant and often underappreciated dividends for climate change and air quality. Even more broadly SLCPs could be targeted in the context of many actions that help achieve the sustainable development goals (SDGs) such as clean water and sanitation, access to clean energy, sustainable cities, or responsible consumption and production. A final potentially fruitful area of research would involve looking across regions to see what lessons learned could be transferred between countries and policymakers.

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Appendix 1: Survey Questions

1. General Questions

- Can you briefly describe your work and primary job responsibilities?
- Did your country integrate short-lived climate pollutants (SLCPs), air pollution, or other co-benefits into its national determined contributions (NDCs)?
 - If yes, go to section 2. If no, go to section 3.

2. Yes: Have Integrated SLCPs into NDCs

- What were the key factors that led to the inclusion of air pollution or SLCPs in the NDC?
- How much do you think decision makers in your country understood SLCPs (and co-benefits more generally)? In what ways, were you or other relevant colleagues raise awareness of these issues?
- What kind of inter-agency communication and coordination mechanisms were created to facilitate the integration of SLCPs into NDCs?
- How did your country encourage/promote awareness raising for business, the general public and/or civil-society organizations on SLCPs?
- What is the status of efforts to implement parts of the NDCs related to SLCPs?
- What are remaining challenges, if any, to strengthening the integration of SLCPs?
- What kinds of recommendations would you offer to other countries that have not integrated SLCPs into their NDCs?

3. No: Have not Integrated SLCPs into NDCs

- What were main barriers or challenges to integrating air pollution and SLCPs into NDCs?
- What do you think is needed to overcome these challenges?
- What kind of support could the Climate Change and Clean Air Coalition (CCAC) and other international initiatives provide to strengthen the integration of SLCPs into your NDC? What kind of support could other countries provide for the same purposes?
- Are there any plans to strengthen the integration of SLCPs into NDCs in future revisions of the NDC?



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