IASS POLICY BRIEF 5/2019

Institute for Advanced Sustainability Studies (IASS)
Potsdam, September 2019

A Practical Approach to Integrating Climate and Air Quality Policy

This policy brief was written by Kathleen Mar (IASS) and Charlotte Unger (IASS).

The case studies reviewed here are in part based on semi-structured interviews carried out by the authors from May to July 2019 with policymakers from the US Environmental Protection Agency, the European Commission, the German Ministry for the Environment, and the Nigerian Federal Ministry of Environment. The authors would like to thank Bala Bappa, Christine Bindal, Elizabeth Dirth, Asmau Jibril, Susanne Lindahl, Ingeborg Niestroy, Till Spranger, and Sara Terry for their contributions and productive conversations.

This **IASS Policy Brief** should be cited as: Mar, K. A. and Unger, C. (2019): A Practical Approach to Integrating Climate and Air Quality Policy, IASS Policy Brief, September 2019.

Summary

Calls for "integration" have become commonplace in discussions of strategies for mitigating climate change and implementing the UN Sustainable Development Goals. This can be seen as a natural consequence of the complexity and interconnectedness of today's sustainability challenges. However, while the concept of integration sounds good in theory, the prospect of integrating a very wide range of concerns can seem daunting and even unrealistic. Rather than focussing on integration in the abstract, in this Policy Brief we examine what integration can look like in practice. We do this by considering an issue where the rationale for and benefits of integration are especially persuasive: the development of policies for climate change and air pollution.

Climate change and air pollution are two of the most critical health and sustainability challenges facing society today. They are also closely related: the major sources of CO_2 emissions are the most significant sources of air pollution. So it would seem only logical to seek joint solutions to these two problems. Yet, policymaking on climate change and air quality still tends to take place on parallel tracks, with limited coordination.

An integrated approach to policy development can help to maximise synergies, minimise trade-offs, and increase efficiency. To realise the promise of such an approach for climate and air quality, we make three concrete recommendations in this Policy Brief. They are informed by the participation by IASS researchers in the Climate and Clean Air Coalition (CCAC) and the Task Force on Hemispheric Transport of Air Pollution (HTAP) under the Convention on Long-Range Transboundary Air Pollution (CLRTAP), as well as a series of expert interviews.

- **Recommendation 1**

Involve crucial stakeholders early and regularly throughout the process.
An inclusive vision that encompasses climate, air quality, and other societal concerns will take a wide range of stakeholders into account. The involvement and ownership of these stakeholders is essential for the acceptance of policies and support for their implementation.

- **Recommendation 2**

Assess emissions of greenhouse gases and air pollutants together, and consider multiple impacts simultaneously.
Integrated policymaking on climate and air quality is made easier by using modelling tools that assess emissions of greenhouse gases and air pollutants in tandem in order to quantify multiple impacts, for example on climate, health, and crops.

- **Recommendation 3**

Take advantage of existing legal frameworks and ongoing policy processes.
Existing policy structures can be adapted in order to integrate mitigation efforts in the fields of climate change and air quality. One good example of this is the Gothenburg Protocol, an international agreement on air pollution, to which the climate pollutant black carbon has been added in a recent amendment.

The rationale for integration

An integrated policy approach begins with a fundamental awareness of the interconnectedness of climate, air quality, and many other aspects of sustainable development. Inherent to this is a sense of responsibility to more than just one "issue area" – even when the nominal task at hand has been sorted into the category of either "climate" or "air quality". This vision should be at the forefront of the whole policy cycle: the definition of the policy problem, the identification of goals and measures, implementation and evaluation, and throughout stakeholder involvement.

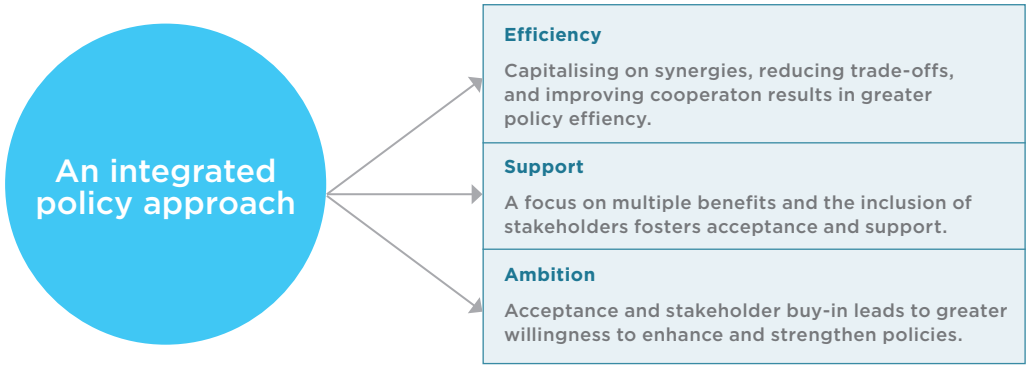

Figure 1: The rationale for an integrated policy approach

Source: IASS/the authors

Maximising synergies and minimising trade-offs: A classic argument in favour of policy integration is that it can capitalise on synergies and reduce trade-offs, thus making policies more efficient. Strategies that consider the reduction of greenhouse gases and air pollutants in tandem – particularly those that prioritise reductions in the warming short-lived climate-forcing pollutants methane and black carbon (see Figure 2) – can reduce warming, protect health, avoid millions of tons of crop losses annually by reducing tropospheric ozone, and prevent the climate from reaching tipping points that can make adapting to climate change more difficult.[1] An integrated policy approach can also ensure that conflicting policy goals are addressed directly in order to avoid trade-offs where possible.

[1] See, for example, Shindell et al., *A climate policy pathway for near- and long-term benefits, Science*, 2017.

Mobilising support: By its nature, integrated policymaking on climate and air quality captures a wide range of stakeholders and interests, including – but not limited to – the air pollution and climate communities. If coordinated effectively, the participation of many different interest groups in the policy development process can galvanise support for policies. A focus on the multiple benefits of policy options also helps to increase acceptance. Depending on the context, concerns regarding economic development, health, and food security may take precedence over climate change mitigation, and focusing on the likely benefits in these areas can help secure buy-in from relevant ministries and the general public.

Enhancing environmental ambition. Increased acceptance and stakeholder buy-in can in turn lead to greater willingness to strengthen policies, which could result in additional benefits – not only for climate mitigation, but also for air quality, health, and sustainable development. It is clear that current mitigation efforts and existing future commitments are inadequate to achieve the Paris Agreement goals, and countries urgently need to raise their climate ambition. Integrating climate and air quality policies could be one way for them to do so.

Challenges

The practice of integrating policy is not without its challenges and pitfalls. Accommodating multiple issue areas and diverse stakeholders in one overarching structure is a complex task that can require more resources and knowledge, at least initially. This is sometimes a hurdle to increased integration.

Another risk that comes with integration is the temptation to present business-as-usual scenarios as increased ambition. For instance, including already implemented air quality measures in a given country's climate plan might represent an addition to the climate plan via "integration", but should not necessarily be counted as "increased ambition" of climate mitigation targets. Integrating measures to reduce short-lived climate forcing pollutants (SLCPs) into Nationally Determiend Contributions (NDCs) under the Paris Agreement also raises technical challenges related to comparability. The temporal impacts of SLCPs and CO_2 on climate are very different (see textbox on p. 10) so using a single metric like 100-year global warming potential[2] to compare their climate impacts masks benefits as well as trade-offs.

Air pollution and greenhouse gases: common sources and solutions

The main source of CO_2 emissions – the burning of fossil and other carbon-based fuels – is also the primary source of air pollutants, so climate mitigation measures almost always have an impact on air pollution, and vice versa. And beyond the fact that the fumes coming from a single exhaust pipe or smokestack are a mix of CO_2 and air pollutants, many individual pollutants – often referred to collectively as Short-lived Climate-forcing Pollutants (SLCPs) – have both climate and air quality impacts.

[2] The 100-year time-horizon global warming potential (GWP100) is specified as the metric to be used in National Inventory Reports under the Paris Agreement under Decision 18/CMA.1 (Annex §37).

	Substance	Scale of primary impact	Global climate impact	Dominant health impact	Dominant ecosystem impact
	carbon dioxide (CO_2)	global	▲ warming		
short-lived climate-forcing pollutants (SLCPs)	hydrofluoro-carbons (HFCs)	global	▲ warming		
	methane CH_4	global	▲ warming		
	tropospheric ozone (O_3)	local to regional*	▲ warming		
	nitrogen oxides (NO_x)	local to regional	▲ warming ▼ cooling		
	black carbon (BC)	local to regional	▲ warming		
	inorganic aerosols (including sulfate, nitrate, and ammonia)	local to regional	▼ cooling		

* Tropospheric ozone's impact extends to the hemispheric scale.

Warming · Cooling · Climate change-related health impacts · Direct negative health impacts via inhalation · Ecosystem impacts via warming · Ozone damage to crops and other vegetation · Acidification and/or eutrophication via deposition · Indirect effect via formation of O_3

Figure 2:
Impacts of selected greenhouse gases and air pollutants.
Nearly all climate and air pollution mitigation measures will affect emissions of multiple pollutants, all of which should be considered during the policy development process. This table gives an overview of the most important climate, health, and ecosystem impacts of important greenhouse gases and air pollutants.

Source:
IASS/the authors; adapted from Melamed et al. 2016

Involve crucial stakeholders early and regularly throughout the process.

In 2018, Nigeria launched a *National Action Plan To Reduce Short-lived Climate Pollutants (NAP)*, which aims to reduce black carbon and methane emissions by 83% and 62%, respectively, by 2030 compared to the baseline scenario of 2010. The implementation of the 23 proposed measures will also reduce carbon dioxide emissions by 13%. This instrument is thus intended to benefit the climate, air quality, and health, as well as helping Nigeria to implement its Nationally Determined Contribution (NDC). Remarkable is not only the output – the National Action Plan – but also the policy development process, which together are an example of successful policy integration, where the inclusion of a great variety of stakeholders took centre stage.

An inclusive vision

Nigeria joined the Climate and Clean Air Coalition (CCAC) in 2012 and became active in the CCAC's 'Supporting National Action and Planning on Short-Lived Climate Pollutants' (SNAP) initiative in 2015. While the Nigerian Federal Ministry of Environment (FMEnv) devised the NAP in the context of climate change policy, policymakers cooperated closely with the Ministry's division for environmental and air pollution throughout the policy development process. The NAP is the product of the inclusive vision of the policymakers involved, which encompassed not only the mitigation of greenhouse gas emissions, but also development issues like food availability, health, nutrition and well-being, and job creation. A natural consequence of this vision was the involvement of a large variety of stakeholders, including sectoral ministries, departments, and agencies, as well as international partners, NGOs, and the private sector.[3]

The Climate and Clean Air Coalition (CCAC) is a transnational voluntary partnership aimed at slowing the rate of near-term global warming through the reduction of the SLCPs black carbon, methane, hydrofluorocarbons (HFCs), and tropospheric ozone. Its partners include national and subnational governments, intergovernmental organisations, businesses, scientific institutions, and civil society organisations.

[3] For example, the Ministry of Budget and National Planning; the Ministry of Power, Works & Housing; the Ministry of Agriculture and Rural Development; the Ministry of Transportation; the Ministry of Health; the Department of Petroleum Resources; the Energy Commission of Nigeria; the National Environmental Standards and Regulations Enforcement Agency; and international partners such as the CCAC, the World Bank, FAO, the EU, and ECOWAS.

Integration in action

The very first step was the creation of a platform to coordinate stakeholders: Nigeria established an SLCP coordination office (SLCP CO) within the Environment Ministry's Renewable Energy Programme and assigned it oversight for the process. Already in the planning and scoping phase, the SLCP CO held face-to-face meetings with all stakeholders and subsequently invited them to a first launch meeting. Advisory groups were formed comprising ministry representatives, agencies, and other stakeholders. In these groups, stakeholders were asked to suggest measures for dealing with SLCPs. Based on those suggestions, the SLCP CO produced a draft NAP that was again subjected to stakeholders' review and comments. Their input was then incorporated into the final version of the NAP.

Several notable success factors may be transferrable to other cases where processes for integrated policymaking are being developed. Nigerian policymakers report that during the process stakeholders gained a sense of ownership due to their capacity to actually influence policy. Furthermore, the mix of both informal and formal meetings was crucial for securing stakeholder acceptance. An extra coordination effort was required when it became clear that stakeholders had proposed more measures than the budget could cover. The steering and oversight of the SLCP CO as the dedicated, clearly designated authority contributed to the success of the endeavour.

Public transport is good for the climate, but it doesn't have to be bad for air quality.
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Assess emissions of greenhouse gases and air pollutants together, and consider multiple impacts simultaneously.

The implementation of a vision for integrated policymaking on climate and air quality is greatly facilitated by the use of modelling tools that (1) assess emissions of greenhouse gases and air pollutants together and (2) consider multiple impacts, at a minimum those on health and climate. The application of such tools is widespread in climate and air quality planning, but the work of the responsible agencies often takes place on parallel tracks, using different models and with limited coordination between the climate and air quality groups.

Keeping the big picture in mind

A modelling framework that itself integrates air quality and climate concerns allows us to gain an overview of the complete emissions profile (i.e. of all air pollutants and climate forcers) and compare different scenarios in terms of their multiple impacts – as shown in Figure 2. This helps policymakers keep the "big picture" in mind when making decisions. Importantly, the starting point for such a modelling tool is a set of scenarios or visions for how the future could and should unfold – and developing such scenarios is an excellent opportunity to involve stakeholders.

Integrated planning tools

One example of an integrated planning tool is LEAP-IBC[4], which the CCAC has used in its work in Nigeria and several other countries engaged in national planning processes on SLCPs.[5] The LEAP-IBC tool exemplifies an integrated policy approach by considering the greenhouse gas and air pollutant emissions of scenarios together in one "dashboard" and by calculating multiple benefits, including avoided premature deaths and avoided crop losses at the country or regional scale, and avoided temperature rise at the global scale. CCAC-supported national planning has focused on addressing warming SLCPs (methane, black carbon, hydrofluorocarbons, and tropospheric ozone). But the fact that the LEAP-IBC tool covers all air pollutants and greenhouse gases in addition to SLCPs allows policymakers to consider the full suite of impacts from SLCP reduction measures – including concomitant reductions in CO_2 emissions and potential climate penalties due to reductions in cooling aerosols.

[4] LEAP-IBC stands for the Long-range Energy Alternatives Planning – Integrated Benefits Calculator. It was developed by the Stockholm Environment Institute in collaboration with the US EPA and the University of Colorado, with support from the CCAC. Further information can be found at: https://www.sei.org/publications/leap-ibc/

[5] Countries that are developing national SLCP plans with the support of the CCAC include Bangladesh, Chile, Colombia, Côte d'Ivoire, Ghana, Mexico, Nigeria, Morocco, and Peru.

Adapting models to the task at hand

Another example of a widely-used tool for integrated air quality and climate planning is the GAINS model[6], which was developed by scientists in close cooperation with decision-makers in working groups under the Convention on Long-Range Transboundary Air Pollution (CLRTAP).[7] GAINS stands for "Greenhouse gas – Air pollution Interactions and Synergies", so the concept of integrating climate and air quality is built into the title. Like LEAP-IBC, GAINS calculates emissions of greenhouse gases and air pollutants (including SLCPs) based on development scenarios, and subsequently quantifies health impacts, climate impacts, and vegetation damage due to air pollution. The evaluation of near-term climate impacts and black carbon deposition in the Arctic was added to GAINS in the period from 2009 to 2011, parallel to deliberations on including SLCPs in the Gothenburg Protocol (see next section).

LEAP-IBC and GAINS are just two examples of integrated air quality-climate modelling frameworks, and while they share essentially the same objective, they differ in technical aspects, including the user-friendliness of the interface and the details of the modelling scheme. While both tools are designed for economy-wide planning, an integrated framework for analysing air quality and climate measures and impacts also makes sense at the sectoral level, for example in the context of mobility and transport planning. Depending on the task at hand as well as national priorities and capacities, models ranging from the simple to the sophisticated can be used.

Short-lived climate-forcing pollutants (SLCPs) and near- vs. long-term climate impacts

SLCPs have residence times in the atmosphere ranging from days to roughly a decade, which means they are "short-lived" in comparison to CO_2, which stays in the atmosphere for 100 years or longer once emitted. Thus reducing SLCP emissions primarily impacts near-term climate (i.e. in the next decade or two), whereas reducing CO_2 and other long-lived greenhouse gases primarily impacts long-term climate (i.e. about 100 years from now). Making the temporal differences in the climate benefits of reducing SLCPs vs. long-lived greenhouse gases explicit can help provide clarity on any policy trade-offs that may arise.

[6] Information on the GAINS model can be found at: http://www.iiasa.ac.at/web/home/research/researchPrograms/air/GAINS.html

[7] GAINS is also being used by the EU Commission for the EU Thematic Strategy on Air Pollution, and is freely available online, with setups for Europe and Asia.

Take advantage of existing legal frameworks and ongoing policy processes.

The starting point for integrated policymaking on climate and air quality could indeed be the launch of a new process – as was the case in the development of Nigeria's National Action Plan. However, in many contexts, existing structures – established legal frameworks and ongoing policy processes – are the more logical starting point for expanded efforts to consider climate change and air quality in tandem. Here we highlight two examples of international policy frameworks where a desire for more integrated thinking on air quality and climate has led to some concrete results.

The Gothenburg Protocol and NDCs

The Gothenburg Protocol to the Convention on Long-Range Transboundary Air Pollution (CLRTAP) became the first binding multilateral agreement on air pollution to explicitly integrate climate change concerns when it was revised to include black carbon in 2012.[8] As a component of particulate matter (PM), black carbon is an air pollution concern, but it also is a climate warmer and plays a disproportionately large role in Arctic warming in particular.[9] The well-functioning structure of the Gothenburg Protocol provided a framework that was receptive to the conclusion reached by its scientific bodies, namely that addressing black carbon would improve human health and provide regional climate benefits in the Arctic. The fact that a revision process of the Gothenburg Protocol was already under way further smoothed the way for new provisions on black carbon as a climate pollutant.

The entry into force of the Gothenburg Protocol amendments in October 2019 will trigger the next review process, where an evaluation of mitigation measures for black carbon emissions is stipulated.[10] Options for addressing methane as a precursor to tropospheric ozone are also expected to be considered here. It thus seems likely that the CLRTAP will continue to be a forum for deliberation and action on the meaningful integration of climate forcers into an existing air quality framework.

In international climate policy, too, there have been calls to align Nationally Determined Contributions (NDCs) under the Paris Agreement with other national goals and strategies – including those for air quality management. We understand such "alignment" as a process of integrated consideration of climate and air quality strategies in a way that maximises benefits and efficiency as well as addressing potential conflicts. How this is actually reflected in a country's NDCs will vary from case to case, with some countries already including additional reduction targets for SLCPs, including black carbon.[11] In this context more thought needs to be given to how to take short-lived and long-lived forcers into account when evaluating the impact of climate plans (see textbox on p. 10) – since it is clear that action on SLCPs, alongside mitigation of CO_2 and other long-lived greenhouse gases, is critical to limiting climate warming.[12] Clear accounting rules under the Paris Agreement would also help to minimise the risk of countries using the integration of air quality concerns to "greenwash" their climate ambition.

[8] The black carbon provisions of the amended Gothenburg Protocol are voluntary in nature, stating that parties "should" develop and maintain emissions inventories for black carbon as well as prioritise particulate matter reduction measures that significantly reduce BC.

[9] Black carbon deposited on snow and ice accelerates melting and warming. This is a particularly relevant concern in the CLRTAP region, which includes 51 countries in the Northern Hemisphere, including all the Arctic states.

[10] Article 10, Paragraph 3 of the amended Gothenburg Protocol.

[11] For instance, the Nationally Determined Contributions of Mexico, Chile, and Nigeria include separate sections on SLCPs and specifically mention mitigation of black carbon.

[12] The IPCC special report on the impacts of global warming of 1.5 °C stresses that deep reductions in emissions of non-CO_2 climate forcers, particularly methane and black carbon, are crucial to limiting warming to 1.5 or even 2 °C.

Conclusion and outlook

Integrated policymaking for climate and air quality begins with a vision of the interconnectedness of climate, air quality, and many other aspects of sustainable development. This vision should be at the forefront of the whole policy cycle, from the definition of the policy problem and the identification of goals and measures, to stakeholder involvement, implementation and evaluation. An integrated policy approach can increase efficiency and create rich processes and outcomes, especially when diverse stakeholders are brought together and included in all stages of the policy cycle. Support and acceptance in environmental policymaking can thus be strengthened and environmental ambition enhanced.

The term "integration" has attracted much attention and is used in many different policy fields – so much so that it has become somewhat of a "buzzword". In our view, more attention needs to be devoted to integration as a concrete, practical process. While there is clearly a need for research on the effectiveness and the process of integrated policymaking, we would like to see a vision beyond climate change mitigation permeate the planning and implementation of climate policy instruments, tools and programmes, as well as an increased awareness of the benefits of such an approach among the public. On the air quality side, we see a similar potential to integrate climate change into policymaking. Such an approach would be a constructive response to the growing recognition of the complexity and interdependency of today's sustainability challenges and the need for more integrated forms of problem-solving.

About the authors

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Kathleen Mar joined the IASS in 2012 and leads the group "Climate Action in National and International Processes" (ClimAct). ClimAct focuses on participation in and understanding of political forums that aim to drive climate action, with a particular emphasis on the United Nations Framework Convention on Climate Change (UNFCCC) and the Climate and Clean Air Coalition (CCAC). Kathleen holds a PhD in atmospheric chemistry and worked at the United States Environmental Protection Agency (US EPA) prior to joining the IASS.

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Further reading

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Further information on SLCPs and the LEAP IBC tool can be found on the Climate and Clean Air Coalition website: **ccacoalition.org**

Institute for Advanced Sustainability Studies (IASS) e. V.

Funded by the ministries of research of the Federal Republic of Germany and the State of Brandenburg, the Institute for Advanced Sustainability Studies (IASS) aims to identify and promote development pathways for a global transformation towards a sustainable society. The IASS employs a transdisciplinary approach that encourages dialogue to understand sustainability issues and generate potential solutions in cooperation with partners from academia, civil society, policymaking, and the business sector. A strong network of national and international partners supports the work of the institute. Its central research topics include the energy transition, emerging technologies, climate change, air quality, systemic risks, governance and participation, and cultures of transformation.

IASS Policy Brief 5/2019
September 2019

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Editing:
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DOI: 10.2312/iass.2019.025
ISSN: 2196-9221

SPONSORED BY THE
Federal Ministry of Education and Research
FONA Research for Sustainable Development
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