COMMENTARY:

Soot and short-lived pollutants provide political opportunity

David G. Victor, Durwood Zaelke and Veerabhadran Ramanathan

Cutting levels of soot and other short-lived pollutants delivers tangible benefits and helps governments to build confidence that collective action on climate change is feasible. After the Paris climate meeting this December, actually reducing these pollutants will be essential to the credibility of the diplomatic process.

Over the past two decades there has been an increasing amount of scientific research showing that a reduction in black carbon (BC, also known as soot), tropospheric ozone, methane and hydrofluorocarbons (HFCs) can slow near-term climate change significantly more than previously thought[1–6]. All of these compounds are short-lived climate pollutants (SLCPs) that persist in the atmosphere for days to a decade and a half — as opposed to CO_2 and other long-lived gases with atmospheric lifetimes of hundreds to thousands of years, which have historically dominated scientific and political attention on climate change.

The fresh scientific insights about SLCPs are opening up a new political front in the battle to mitigate climate change. With available technologies, it is possible to cut these pollutants drastically; reductions of 30% for methane, 75% for black carbon, and nearly 100% for the most potent HFCs are achievable. This would avoid up to 0.6 °C of warming by mid-century, while also slowing the rise in sea levels (Fig. 1), the melting of glaciers, and the retreat of the Arctic ice cap[1–6]. These are not hypothetical cuts; in just two decades, California, for example, has cut its emissions of black carbon and several pollutants that produce ozone by half[7].

Carbon dioxide causes long-term warming of the planet as a whole — a highly diffused problem that most countries don't yet take seriously enough, in part because the main benefits of action arise decades after today's politicians have left office. SLCPs, on the other hand, will reduce the rate of warming within a decade of implementing mitigation actions. Moreover, an even more compelling case for reducing these pollutants is their huge impact on the local ravages of air pollution, which already kills seven million people every year[8] and degrades more than a hundred million tons of crops[2,3]. Compared with long-lived pollutants, potential action on SLCPs is better aligned with political realities — especially in the emerging countries whose participation is vital for any global scheme to manage climate dangers. And by successfully acting now to cut emissions of SLCPs, governments could go a long way towards rebuilding credibility in the broader global effort to manage climate change — an effort that must include CO_2 and other long-lived gases as well.

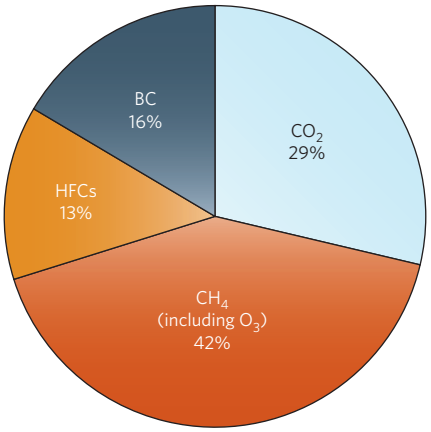

Figure 1 | Avoided sea-level rise at 2100 due to aggressive mitigation of long-lived CO_2 and short-lived climate pollutants (SLCPs). Such aggressive actions can reduce the rise in sea levels by 35 cm (uncertainty range is 17–70 cm) from the projected sea-level rise of 112 cm (49–210 cm) under a business-as-usual scenario for emissions (Representative Concentration Pathway (RCP) 6.0). The pie chart shows percentage contribution of each pollutant. Mitigation of the SLCP methane would lead to reductions in tropospheric ozone, another SLCP, and hence the pie chart includes both. As a long-lived pollutant, CO_2 plays a substantial role (blue section), but reduction in SLCPs (shown in darker colours) would lead to a larger degree of avoided sea level. (Under a more intensive business-as-usual RCP8.5 level, reductions in CO_2 would increase the share of CO_2 mitigation to 50%). All of the simulated values shown in the pie chart are taken from ref. 17.

Policy confusion

Oddly, over the past few years some papers and policy advocacy from climate scientists may have inadvertently confused policymakers about the huge opportunity in SLCPs. Even those studies highlighting the important role that SLCPs can play in slowing climate change in the near-term make the obvious but important point that SLCPs alone can't stop warming forever[1–6,9]. Other studies are rooted in a curious political logic that imagines that countries can't focus on more than one thing at a time — and thus efforts to cut SLCPs might somehow make it harder to address long-lived pollutants such as CO_2 (ref. 10). Still others are based on the questionable reasoning that reduction in CO_2 emissions from uptake of renewable technologies will automatically result in reductions in emissions of SLCPs[11], so we need not bother with separate efforts.

While shifting to clean energy will of course sweep up some air pollution that otherwise would have been emitted, the current investment in energy infrastructures has locked high emissions into place for some time to come[12]. In fact, the better political logic runs in the opposite direction: cutting black carbon and tropospheric ozone pollution, which is what many countries are most focused on achieving, will also lead to significant CO_2 mitigation.

As a practical matter, very little that the scientific community does will alter the outcome of the Paris talks. But after Paris, the opportunities for action on soot

and other SLCPs will be of paramount importance as diplomats grapple with the many topics that the meeting won't resolve — including the reality that the efforts agreed in Paris, on their own, won't come anywhere close to stopping warming at 2 °C or other widely discussed goals. Reductions in SLCPs, precisely because these pollutants are short-lived, can help to rapidly slow the rate of warming, by as much as 50% by mid-century[1,4]. Both for vulnerable developing countries and for natural ecosystems, immediate efforts to slow warming are essential yet unattainable with mitigation strategies that focus only on CO_2 and other long-lived gases.

New vision

The opportunity for science to help realign the politics of global warming arises because a new vision is emerging that recognizes that effective action must happen on many fronts and in many forums, not just the United Nations Framework Convention on Climate Change (UNFCC)[13]. Several of those fronts are ripe for action on SLCPs. Important other forums include the Montreal Protocol — a treaty designed and successfully relied upon over the past 30 years to address the depleting ozone layer, while also producing significant climate benefits[14], notably because the chlorofluorocarbons it phased out were both ozone depleters and strong warming gases[15]. Diplomatic talks aimed at an agreement on phasing down HFC production and consumption are far advanced. Other forums include the Climate and Clean Air Coalition to Reduce Short-Lived Climate Pollutants (CCAC), a voluntary coalition of governments, non-governmental organizations (NGOs) and business associations developing practical plans to reduce black carbon from cooking stoves, brick kilns[16], and diesel vehicles; it is also focusing on methane and HFCs. Bilateral programs on climate change — such as that between the US and China — also include a heavy focus on HFCs, soot and other SLCPs. Even unilateral action has played a role — most notably by the EU and California, where deep cuts in SLCPs are being implemented.

This new approach lets countries — as well as companies and NGOs — pursue many strategies for mitigation, trying new ideas and seeing what is technologically feasible and gets political traction, which has been the missing ingredient in most diplomatic efforts to address climate change. It promises to be less brittle than relying just on the UNFCCC to deal with the reality that so many different countries and issues cannot be glued together into a single, integrated global agreement. But success requires demonstrating that decentralization and flexibility can produce tangible reductions in climate stress and are not merely new excuses for inaction.

Ending the downward spiral

Fixing the global problem of climate change requires effective international cooperation. Making that a reality requires that the community of climate change scientists understands that credibility is the pivotal challenge for international political action on climate change. International cooperation has few serious enforcement mechanisms; agreements, such as the accords taking shape in Paris, have an impact only if national governments and their citizens believe they align with national interests and implement them through national measures. Despite overwhelming scientific evidence of climate dangers, the credibility of international climate change negotiations has plummeted after decades of inaction. Spiralling downwards, this inaction has led industries to lose confidence that they should invest in technologies to cut emissions. And this, in turn, has delayed advances in needed technologies and made political action to cut warming gases even harder. Practical near-term cuts in SLCPs can reverse the spiral — they can create fast, tangible and multiple benefits that are politically attractive to the world's biggest emitters. In turn, that success can give those emitters more confidence to do more to tackle the politically harder problem of CO_2, which is essential for stopping warming in the long term. Efforts of many types will be needed, with scientists and diplomats working in tandem.

First, in the run-up to Paris, governments have made pledges to reduce emissions through a process known as intended nationally determined contributions (INDCs). From these pledges serious collective action can emerge — once countries see what others will pledge, they, in turn, can adjust what they promise. SLCPs are an ideal area for this upward ratcheting of effort because they have such strong resonance with what countries already see as in their national interest — such as cutting local air pollution under their national laws. The INDCs submitted so far don't pay much attention to SLCPs or offer practical information on the kinds of cuts in SLCPs that are feasible, although Mexico's INDC does include soot, Chile announced that it would follow suit and China is notably making major efforts to cut air pollution. It will be essential in the after-Paris period to fill in this missing information and expand the pledges to cut SLCPs.

Second, the community of scientists and engineers can play a pivotal role in the review of INDCs and other policy pledges. After Paris the questions will quickly become: what has been achieved? What more is feasible? These questions need to be answered long before 2020 — when the Paris agreement is expected to take full effect — and technical input will be essential. A robust system of assessment and peer review for pledges is needed — a system that can learn from the success of the Montreal Protocol, where experts evaluate national programs in a fair manner and root their analysis in a sober assessment of what is feasible[16].

Third, the opportunities for action on SLCPs will, in many countries, need funding. The World Bank needs to launch a planned (but not yet implemented) financing mechanism that could cut black carbon from cooking stoves and other sources while also expanding its mechanism for financing cuts in methane (www.pilotauctionfacility.org). In the future, climate credits may even help finance some of these projects. The HFC amendment under the Montreal Protocol is also due to finish in 2015 — a process that will unlock funding from that treaty's financial mechanism. The new funds that will be agreed on in Paris should include specific mandates for action on SLCPs.

As in many other areas of international diplomacy — such as the global talks on trade that are mired in more than a decade of gridlock — serious action on climate change has proved to be long, slow and difficult. While near-term gains are achievable, they are most likely to occur if they are decentralized and will work on many different fronts, not just through a single treaty negotiation under the UN. Success in these efforts requires working first on problems that are politically tractable and can build credibility. Action on SLCPs raises the odds that, this time, the world will develop the confidence to get serious on climate change. ❐

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COMMENTARY:

Honouring indigenous treaty rights for climate justice

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Expansion of the oil sands industry in Canada has caused land destruction and social friction. Canada could become a leader in climate governance by honouring treaty commitments made with indigenous peoples.

Energy extraction in western Canada has impacts on global climate, local ecologies, human health and indigenous cultures, causing an increasingly controversial public profile. More than 100 protests objecting to the extraction of bitumen from oil sands and the construction of pipelines for transporting this bitumen to domestic and world markets have been held in various First Nations and cities across Canada (for example, Ottawa, Montreal, Winnipeg, Victoria, Edmonton, Calgary, Toronto and Saint John; see Fig. 1). More than half demanded climate change action. Oil sands development is Canada's fastest growing source of greenhouse gas (GHG) emissions and is responsible for the country's most significant set of environmental issues in recent history[1–3]. Pressing social issues have also accompanied oil sands development, such as infringements of treaty and Aboriginal rights, inequalities in economic benefits, health care, housing shortages, substance abuse, food insecurity and high suicide rates[4].

In 1982, the existing treaties and rights of Aboriginal peoples in Canada were recognized and affirmed in Section 35 of its constitution. Any Aboriginal or treaty rights that existed in 1982 should therefore enjoy constitutional protection. Instead those rights remain largely undefined and subject to interpretations by the courts, leaving Aboriginal people in limbo. Governments must consult Aboriginal communities when developments are proposed on lands in which the community has an interest[5]. However, consultation as currently practised is largely one-sided, with many communities feeling powerless, often pragmatically accepting new developments, hoping the financial benefits will outweigh the social and/or environmental consequences. For example, in ethnographic and interview research with northern Alberta First Nations (C.N.W., unpublished data), representatives identified the limited likelihood of stopping the ongoing 'tsunami' of development proposals as a reason for their pragmatic decisions to gain whatever benefits are possible while opposing the most damaging aspects of oil sands projects on their territories. Some First Nations leaders launched court action to recognize and protect their treaty rights — for example, the case of the Athabasca Chipewyan First Nation and the Beaver Lake Cree Nation.

We argue that honouring the treaties with many Canadian First Nations would expedite environmental and social benefits to all Canadians, globally repositioning Canada as a leader in sustainability and climate governance. We use the oil sands in Treaty Eight as an example.

The numbered treaties were signed between 1871 and 1921 across much of Canada (see Fig. 2). Based on the written text of treaties (signed by generally illiterate Aboriginal leaders), governments view them as land surrender agreements, providing benefits such as reserve lands (which are small in relation to the territory surrendered) and economic advantages including nominal cash payments, farm implements, ammunition (for hunting) and twine (for fishing) in return. First Nations, who often cite oral traditions, tend to view the treaties as sacred agreements to share the land with newcomers only "to the depth of a plow", while entering into kin-like relations with them. One matter of general agreement, and of foremost importance to northern First Nations, is the livelihood (hunting, fishing, gathering and trapping) rights recognized in the treaties.

Thus, among other provisions negotiated in 1899, Treaty Eight guaranteed First Nations people the right to a subsistence livelihood. Despite this, some legal scholars have upheld that the current extent of development in northern Alberta constitutes a *de facto* breach of the rights guaranteed in Treaty Eight[6]. Indeed, Treaty Eight First Nations have ongoing grievances, these including:

- The leasing of traditional lands for oil sands exploitation without proper consultation with Aboriginal people. The resulting habitat destruction has