

A MULTIPARTY AND GLOBAL EFFORT TO ADDRESS AIR POLLUTION AROUND THE WORLD

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Dirty cookstoves are one of the sources of household air pollution

Helena Molin Valdés is the head of the Climate and Clean Air Coalition (CCAC) Secretariat at the UN Environment office in Paris, a position that she has held since 2013. Helena is an experienced leader within the UN system. She was a senior executive with the UN Office for Disaster Risk Reduction (UNISDR), where she led work on resilience, disaster risk reduction, sustainable development and climate change related topics. She was UNISDR's regional director for Latin America and the Caribbean and worked with the Pan American Health Organization on hospital mitigation and disaster preparedness. Before joining the UN, Helena was a practicing architect, planner, and head of a Swedish NGO based in Central America that worked on community-based projects and appropriate technology development, including improved bricks production and cook stoves with the University of Lund.

The Climate & Clean Air Coalition (CCAC) is an initiative that unites governments, civil society, international organizations, research institutions and the private sector, committed to improve air quality and protecting the climate in the next few decades by reducing short-lived climate pollutants, such as black carbon, methane, HFCs and tropospheric ozone across sectors.

The CCAC acts as a catalyst to reduce these pollutants and implement and share immediate solutions addressing near-term climate change.

The CCAC works at identifying, promoting and supporting best initiatives and projects regarding air quality.

This article presents some exemplary projects improving air quality in rural and underprivileged areas:

- In Mongolia, the CCAC has provided technical assistance to the Mongolian bank *XacBank*, in order to study affordable improved technologies for heating, such as electric and solar power;
- In Nigeria, the CCAC supports a women's association that has created a network of women entrepreneurs to provide affordable clean energy solutions across the country;
- In Sweden and Chile, an awareness campaign was launched on a global online platform sponsored by the CCAC. It asks woodstove users to follow a few simple steps when burning solid fuels to get better heat output, while reducing fuel use and harmful emissions by as much as half;
- The CCAC supported the Gold Standard Foundation in the creation of a monitoring methodology and ISO standard specific to cookstoves. The aim is to improve access to carbon financing markets and make stoves more affordable.

Given that indoor air pollution is primarily a result of poverty and, as such, impacts the most vulnerable populations (women and children), initiatives that improve indoor air quality must be considered as a global priority.

What is the Climate and Clean Air Coalition and what is its role regarding air quality issues?

Helena Molin Valdés: The Climate and Clean Air Coalition (CCAC) is a voluntary partnership of governments, intergovernmental organizations, businesses, scientific institutions and civil society organizations committed to improve air quality and protect the climate through actions to reduce short-lived climate pollutants¹ (SLCP).

This global network, created in 2012, currently includes over 140 state and non-state partners, and hundreds of local actors from the private sector, supporting fast action and delivering benefits on several fronts at once: climate, public health, energy efficiency and food security.

The Coalition helps partners and stakeholders create policies and practices to deliver substantial reductions in short-lived climate pollutant emissions. It supports actions on the ground through 11 initiatives designed to provide transformative action in specific sectors or as cross-cutting efforts to reduce air pollution:

- Seven initiatives focus on specific sectors (heavy duty vehicles, oil and gas, waste, bricks, hydrofluorocarbons and efficient cooling, household energy, agriculture) to identify the most cost-efficient and practical pathways to reduce their emissions. These actions include training and institutional strengthening, support for developing laws, regulations, policies and plans, technology demonstrations, political outreach, awareness raising campaigns, co-funding and catalyzed funding, and development of knowledge resources and tools. The coalition works closely with relevant communities, industry representatives, NGOs and policy makers to support targeted improvements in technology, best practice and policies;
- Four other initiatives carry out work across sectors to accelerate emissions reductions for all short-lived climate pollutants (SNAP², finance, assessments, health).

¹ Short-lived climate pollutants are powerful climate forcers that remain in the atmosphere for a much shorter period of time than carbon dioxide (CO₂), yet their potential to warm the atmosphere can be many times greater. The main SLCP are black carbon, methane, tropospheric ozone, and hydrofluorocarbons.

² SNAP: Supporting National Action and Planning on Short-Lived Climate Pollutants. The Coalition's SNAP Initiative is a collaborative programme aimed at supporting the efforts of Coalition partner countries to scale up action in a coordinated and prioritized way.



Solar energy in Madagascar

In addition, the Coalition's activities follow sixteen measures addressing black carbon³ and methane, identified in a 2011 UN Environment and World Meteorological Organization (WMO) assessment⁴, and also alternatives to hydrofluorocarbons (HFCs) in the cooling sector. These measures target the primary sectors responsible for short-lived climate pollution emissions: replacing wood stoves and burners with pellet stoves; banning open-field burning of agricultural waste; recovering and using gas and fugitive emissions during oil and natural gas production; upgrading wastewater treatment with gas recovery and overflow control, etc. are all examples of measures promoted by the Coalition. Almost half of these measures could provide co-benefits for air quality, human health, ecosystems and food security. If implemented globally by 2030, these measures could reduce global methane emissions by as much as 40% and global black carbon emissions by as much as 80% relative to a reference scenario, preventing up to 0.5 °C of warming⁵.

The Coalition has also set up a Solution Centre⁶ to provide resources, training materials, and expert advice on a range of measures and policies to reduce short-lived climate pollutant emissions (guidelines and tools, webinar and training, expert assistance, resource library).

What are the risks related to indoor air quality, especially for the poorest, but also for the environment?

H. M. V.: Indoor air pollution has a direct impact on health. According to the World Health Organization, air pollution in general is responsible for 7 million premature deaths per year. More than half of those (3.8 million) can be attributed to household exposure to smoke from dirty cookstoves, heatstoves and fuels, as the main reason for indoor air pollution is the use of kerosene, coal, wood and other biomass burning for cooking, heating and lighting. Today, 3 billion people – more than 40% of the world's population – still do not have access to clean lighting, cooking fuels and technologies in their homes.

Around 3 billion people – more than 40% of the world's population – still do not have access to clean cooking fuels and technologies in their homes, the main source of household air pollution

The WHO has been monitoring household air pollution for over a decade, and while the rate of access to clean fuels and technologies is increasing everywhere, improvements are not keeping pace with population growth in many parts of the world, particularly in sub-Saharan Africa. In addition, some people suffer from more exposure and impacts than others. These include women, children and elderly persons, since they spend more time at home. The more we look at the impacts of indoor air pollution on health, the more we realize that it is a much more serious problem than previously thought. We know now that one of the most important health interventions we can make is to ensure that people can access clean household energy. Indoor air pollution must also be considered with regards to justice and gender issues. Very often, indoor air pollution is primarily a result of poverty, including energy poverty. What we do know is that it impacts women and girls disproportionately:

- Fuel collection and risks associated with the use of some traditional technologies are affecting livelihoods. For instance, hazards from kerosene use include poisoning, fires, and explosions. Use of these polluting cooking, heating and lighting technologies also contributes to outdoor air pollution. Sustainable Development Goal number 7⁷ sets the specific goal to “ensure access to affordable, reliable and modern energy for all by 2030”. It has also been shown that new wood stoves deployed in high income countries can make important contributions to both indoor and outdoor air pollution with associated health impacts;
- Cooking exposes women and children, who are often close to their mothers while they are cooking, to noxious emissions: indeed, household cooking and heating account for 58% of global black carbon emissions;
- Children using highly polluting kerosene lamps to do their homework are exposed to long-term health risks while trying to make a better life for themselves;
- Collecting firewood is an exposed activity for women, considering the dangers they face while doing that, including violence, sexual violence and abuse;
- Particulate emissions from dirty cookstoves or heatstoves are directly disrupting meteorological processes affecting precipitation that millions of people depend on for their available drinking water and crop irrigation. Collection of fuelwood for cooking and heating as well as charcoal production contribute to forest degradation and land use changes.

The other important global aspect of indoor air pollution is its impact on the climate. We know that cooking and heating stoves are major emission sources of black carbon, which is a powerful climate forcer and impacts local weather patterns. Black carbon

³ Black carbon is a potent climate-warming component of particulate matter formed by the incomplete combustion of fossil fuels, wood and other fuels. Complete combustion would turn all carbon in the fuel into carbon dioxide (CO₂), but combustion is never complete and CO₂, carbon monoxide, volatile organic compounds, and organic carbon and black carbon particles are all formed in the process.

⁴ https://library.wmo.int/index.php?lvl=notice_display&id=12414#.XWk29CgzaUk

⁵ Integrated Assessment of Black Carbon and Tropospheric Ozone, United Nations Environment Programme, World Meteorological Organization (WMO), 2011

⁶ <https://www.ccacoalition.org/en/solution-centre>

⁷ Ensuring universal access to affordable electricity by 2030 means investing in clean energy sources such as solar, wind and thermal. Expanding infrastructure and upgrading technology to provide clean energy sources in all developing countries is a crucial goal that can both encourage growth and help the environment.

is an important contributor to warming, because it is very effective at absorbing light and heating its surroundings. Per unit of mass, black carbon has a warming impact on climate that is 460-1,500 times stronger than carbon dioxide (CO₂). When deposited on ice and snow, black carbon reduces their ability to reflect sunlight, and heats the surface. The Arctic and glaciated regions such as the Himalayas are particularly vulnerable to melting as a result. This threatens the water supply of billions of people. In Arctic countries, this is leading to awareness campaigns, to reduce the impact of household emission sources on local air pollution.

While many national and international actors are already working on the challenge of transforming the way billions of people around the world cook their food and heat and light their homes, SLCP⁸ considerations remain mostly absent from ongoing efforts, and integration of health and climate change mitigation approaches is still lacking. As such, dirty cookstoves and heatstoves represent an important, yet largely untapped opportunity for SLCPs emissions mitigation and realization of air quality, climate, environmental, social and economic benefits.

The CCAC is trying to help address the issue in many ways, including by helping countries around the world seize the opportunity for black carbon and air pollution mitigation. This year, with other partners, it launched a research study to deepen the understanding of the relationship between emissions and exposure.

According to you, which levers can be implemented to improve indoor air quality?

H. M. V.: A crucial lever is improving access to clean energy for 3 billion people. Getting renewable energy on small local distribution grids will help people phase out fossil and polluting fuels. The CCAC has worked with development banks and micro-finance institutions to develop programs to support impoverished communities and enable them to get access to renewable energy.

One example is *XacBank*, in Mongolia. In this country, the smoke from coal and wood burning is a major contributor to black carbon and PM2.5 air pollution, and has made the capital, Ulaanbaatar, one of the most polluted cities in the world. The Coalition is thus providing technical assistance to the Mongolian bank *XacBank* to study affordable improved technologies, like electric and solar, for heating. In partnership with the Frankfurt School of Finance & Management, the Coalition is also supporting a feasibility

study that will advise *XacBank* on the design of a financial product to help poor families afford cleaner heating options.

There is a need to create conditions for efficient combustion. Very concrete levers exist: in places with poor access to alternative fuels or renewable energy, installing more efficient cookstoves partly answers indoor air pollution issues and can also help mitigate the climate change impacts. These cookstoves ensure that solid fuels are burned more efficiently, and that proper combustion takes place, reducing both the amount of pollution generated during cooking and the amount of fuel used.

Another important lever lies in the household lighting sector. According to the World Bank, about 101 million (out of 212 million) people in Nigeria do not have access to the electrical grid. In rural areas, only 34% of Nigerians have access to the grid. Most people rely on kerosene lamps, candles and torches for lighting. Yet, this type of lighting can be easily replaced by inexpensive solar lighting. In Nigeria, a group of rural women are working to protect themselves and their families from dangerous air pollution: the Rural Women for Energy Security (*RUWES*), a sisterhood of over 2 million Nigerian women, is taking control of household energy decisions

by creating clean energy enterprises, training women in the manufacturing and maintenance of clean cookstoves and solar systems, and creating a network of women to provide affordable clean energy solutions across the country. *RUWES* is creating a viable market and sustainable supply chain for clean energy technologies, provides a source of income for women by helping them become clean energy entrepreneurs, and supplies clean energy to homes and small businesses. It helps women access finance for business incubation and entrepreneurship. By 2020, *RUWES* hopes to provide 20 million clean cookstoves across Nigeria's six-geopolitical zones.

However, those projects must be considered in a harsh economic context (impoverished households with very low revenues and almost no access to job markets, meaning that people might not be able to purchase new equipment despite being on the energy grid), while the cultural dimension can also be an obstacle (reluctance to change cooking or heating habits). Changing the way billions of people around the world cook their food, and heat and light their homes remains a very challenging task, and current levels of financial support going to the sector remains largely insufficient.

Finally, helping leaders realize the opportunity that the sector represents to reduce black carbon emissions and hence mitigate climate change can be an important lever that the CCAC is trying to help materialize.

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⁸ Short-lived climate pollutant

In your opinion, what are the best public policies and environmental practices related to indoor air pollution and energy efficiency (developed countries excepted)?

H. M. V.: Some countries have implemented effective and ambitious public policies: The *Santiago Respira* campaign in Chile⁹ is a good example of how to build public opinion support and to collect ideas for a “decontamination” plan. Another example of effective public policy can be found in Peru with the ambitious stove distribution program named *Clean Cook stove Program Peru*¹⁰.

In Asia and Africa, progress towards improved and cleaner stoves has been slower. However, some initiatives must be underlined: Kenya has the leading market for improved cookstoves thanks to a bunch of innovative and successful companies. For instance, *Koko networks* is a venture-backed technology company operating in East Africa and India. It builds and deploys dense Networks of cloud

connected “*KOKOpoints*” inside local corner stores, which serve as consumer access points for goods and services delivered in partnership with major suppliers. The network is distributing ethanol gel for cooking which delivers significant cost savings and quality of life improvements. In parallel, a number of companies like *Envirofit*¹¹ do “pay-as-you-cook”¹² methods meaning that the user and the distributor can track and monitor the consumption of the gas, to make it affordable for low-income earners and the middle class.

Governments can also support the energy transition by transferring subsidies away from polluting fuels like kerosene and coal to solar, biofuels, biogas¹³, Liquefied petroleum gas (LPG), and other cleaner solutions.

India’s LPG reform is a rare success story. It has achieved much in the difficult area of energy subsidy reform. *PaHaL*¹⁴, India’s cooking gas subsidy, is the largest

9 Santiago Respira aims to improve air quality through solutions that target multiple sectors such as energy, transportation, and waste management.
 10 Clean Cook stove Program Peru. To date, more than 107,000 Peruvian families have received a new cookstove.

11 Envirofit International is a social enterprise that innovates smart energy products and services that improve lives on a global scale
 12 By paying through Mobile Money, the quantity of gas to use during a certain period of time, also called “Pay As You Cook”.
 13 Which can be locally produced from dung and organic waste through bio digesters
 14 Pratyaksh (Direct) Hastantarit (Transfer) Labh (Benefit) in Hindi.



Nigerian women from the Rural Women for Energy Security (RUWES) with clean cookstoves

direct benefit transfer program in the world. *PaHaL* has increased efficiency and reduced leakage compared to the previous in-kind subsidy regime, resulting in significant fiscal savings for the government with minor costs. By providing additional fiscal space, it has also facilitated a rapid expansion of clean cooking fuel, especially to poor rural households who were previously left out of the LPG network. In the process, it is reducing exposure to household air pollution with positive long-term health benefits, in particular for rural women and girls.

What have been the most significant and innovative initiatives of the private/associative sectors regarding indoor air quality over the last few years?

H. M. V.: In the last few years, many renewable technology initiatives to reduce the price of solar lighting systems have been developed and deployed, especially in rural energy poor areas. Working to improve solar and other renewables while also reducing the price of these systems is important to reduce household air pollution in many places.

Other initiatives are emerging around carbon/climate finance mechanisms and innovative financing schemes developed with manufacturers, banks and other financial institutions, to finance clean household energy technology. The CCAC supported the creation of a black carbon monitoring methodology by the Gold Standard Foundation, to give more efficient cookstoves access to carbon financing markets and make stoves more affordable. Stove manufacturers need the subsidies from carbon finance to lower the price of technology.

Some firms are answering the air pollution issue through innovation: *IKEA* created in 2019 a curtain that absorbs air pollution¹⁵. The curtain uses a unique technology, developed in partnership with universities in Europe and Asia, as well as *IKEA* suppliers and innovators. The way it works is similar to a photosynthesis process, activated by both outdoor and indoor light. However, this is clearly a high-end market solution, which does not address the problems of the most impoverished households.

Nexleaf Analytic is an important social enterprise using innovation to fight air pollution. This nonprofit technology company has a unique bottom-up approach for bringing data-driven solutions to public health and climate change interventions in low- and middle-income countries. The firm builds and uses cloud-based sensors, dashboards with visualizations and customizable analytics tools designed to help its partners monitor the uptake of improved cooking technologies and access climate finance credits. For instance, they built and installed *StoveTrace* in more than 700 households in India, a cloud-based remote monitoring system for improved cookstoves in rural households, which measures how often the stoves are used. The data allows stove manufacturers to track the way their products are used. It also enables payments to households via carbon markets and carbon funds to subsidize and encourage the use of cleaner stoves.

There is a growing market for products that protect people from both outdoor and indoor air pollution. However, mere protection is not enough. We need the private sector to innovate and to move us away from polluting technologies but also polluting commercial models and production chains as fast as possible. De-carbonising and moving to low-to-zero emissions forms of energy (whether for transport or energy production) throughout the life cycle of the associated technologies is the condition to ensure good public health.

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¹⁵https://www.ikea.com/us/en/about_ikea/newsitem/021919-IKEA-GUNRID-curtain