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# International Herald Tribune

BUSINESS OF GREEN

## The threat in village soot

Black carbon issuing from millions of primitive stoves is emerging as a major and previously unappreciated source of global warming

A villager tending to her kitchen fire in Koluba, India. Recent studies estimate that black carbon is responsible for 18 percent of the planet's warming and could account for nearly half of Arctic warming.

ADAM FERGUSON FOR THE NEW YORK TIMES

# The threat in village soot

Black carbon emitted by primitive stoves emerges as a major global warming agent

KOLUHA, INDIA

BY ELISABETH ROSENTHAL

"It's hard to believe that this is what's melting the glaciers," said Veerabhadran Ramanathan, one of the world's leading climate scientists, as he weaved through a warren of mud brick huts, each containing a mud cooking stove pouring soot into the atmosphere.

As women in ragged saris of a thousand hues bake bread and stew lentils in the early evening over fires fueled by twigs and dung, children cough and gasp on the dense smoke that fills their homes. The undersides of thatched roofs are covered with grime. At dawn, a brown cloud stretches over the landscape like a diaphanous dirty blanket.

In Koluha, with no cars and little electricity, emissions of carbon dioxide, the main heat-trapping gas linked to global warming, are near zero. But soot — also known as black carbon — from millions of villages like this one in developing countries, is emerging as a major and previously unappreciated source of global climate change.

While carbon dioxide might be the leading contributor to rising global temperatures, scientists say, black carbon has emerged as an important No. 2, with recent studies estimating that it is responsible for 18 percent of the planet's warming, compared with 40 percent for carbon dioxide.

One recent study estimated that black carbon could account for nearly half of Arctic warming. These revelations are so new that black carbon was not even mentioned as a warming agent in the 2007 summary report by the Intergovernmental Panel on Climate Change that pronounced the evidence for global warming to be "unequivocal."

But decreasing black carbon emissions would be a relatively inexpensive way to significantly rein in global warming — especially in the short term, climate experts say. Replacing primitive cooking stoves with existing modern versions that emit far less soot could provide a much-needed stopgap while countries struggle



PHOTOGRAPHS BY ADAM FERGUSON FOR THE NEW YORK TIMES

A woman cooking in Koluha, India, over a fire fueled by twigs and dung. Converting to low-soot stoves would remove the warming effects of black carbon quickly, as well as bring relief to villagers suffering from air pollution.

with the more difficult task of enacting programs and developing technologies to curb carbon dioxide emissions from fossil fuels.

"It is clear to any person who cares about climate change that this will have a huge impact on the global environment," said Mr. Ramanathan, a professor of climate science at the Scripps Institute of Oceanography, who is working with the Tata Energy Research Institute in New Delhi on a project to give poor families new stoves.

Better still, decreasing soot could have a rapid effect. Unlike carbon dioxide, which lingers in the atmosphere for years, soot stays in the atmosphere for just a

"It is clear to any person who cares about climate change that this will have a huge impact."

VEERABHADRAN RAMANATHAN  
Professor of climate science, speaking of a project to give poor families new stoves

few weeks. Converting to low-soot stoves would remove the warming effects of black carbon quickly, while shutting down a coal plant takes years to substantially reduce global carbon dioxide concentrations.

In Asia and Africa, cooking stoves produce the bulk of black carbon, although it also emanates from dirtier diesel engines and coal plants there. In the United States and Europe, black carbon emissions have already been reduced significantly by filters and scrubbers now required to fight local particulate air pollution.

Like tiny heat-absorbing black sweaters, soot particles warm the air and melt glaciers by ab-

A boy cleaning his teeth on a rooftop in Koluha, India, piled with dung cakes. The air in the village, which has no cars and little electricity, is thick with soot, and dense smoke fills the homes. Scientists estimate that black carbon is responsible for 18 percent of the planet's warming.

sorbing the sun's heat when they settle on the ice. The fact that black carbon is not included in international climate efforts is "bizarre," said Mark Z. Jacobson, a professor of environmental engineering at Stanford University, but "partly reflects how new the idea is."

Doctors have long railed against black carbon for its devastating health effects in poor countries. The combination of health and environmental benefits means that reducing soot provides a "very big bang for your buck," said Erika Rosenthal, a senior lawyer at Earthjustice, a nonprofit environmental law firm based in Washington.