Improved Biomass Cooking to Fight Climate Change and Poverty

Inefficient firewood and charcoal usage contributes massively to global greenhouse gas emissions and causes four million mortal diseases a year

Relative to other climate protection measures, public investments in the dissemination of improved biomass cooking stoves provide a very effective low cost measure to reduce greenhouse gas emissions. More than three billion people in developing countries rely on inefficient cooking stoves fuelled by firewood and charcoal. Improved cookstoves have the potential to reduce greenhouse gas abatement costs to only 3 Euro per ton of CO_2 equivalent and at the same time alleviate poverty.

Kontakt: Prof. Dr. Jörg Peters, joerg.peters@rwi-essen.de

MAIN FACTS

The widespread use of inefficient firewood and charcoal cooking stoves in developing countries is responsible for four million mortal respiratory diseases a year and contributes massively to global greenhouse gas emissions

Public investments in research and dissemination of biomass cooking stoves provide an effective and low cost policy option to reduce global greenhouse gas emissions and alleviate poverty

With improved cooking stoves, greenhouse gas abatement costs could be reduced to only 3 Euro per ton of CO_2 equivalent

Why does cooking in developing countries matter?

More than three billion people use firewood and charcoal for their daily cooking purposes, mostly in very inefficient stoves or in open fire spots. As many regions of the developing world rely on woodfuels extracted unsustainably from local forests, cooking contributes to deforestation and thus to a loss of carbon sinks. No less than one fifth of global greenhouse gas emissions are estimated to stem from deforestation. The environmental effect is not limited to global warming: soot emissions from the dirty combustion processes of traditional stoves are hazardous to health, leading to severe respiratory diseases that kill four million people worldwide every year. Improved cooking stoves not only reduce household air pollution, but also relieve women from the daily burden of carrying firewood to their homes.

What are the alternatives?

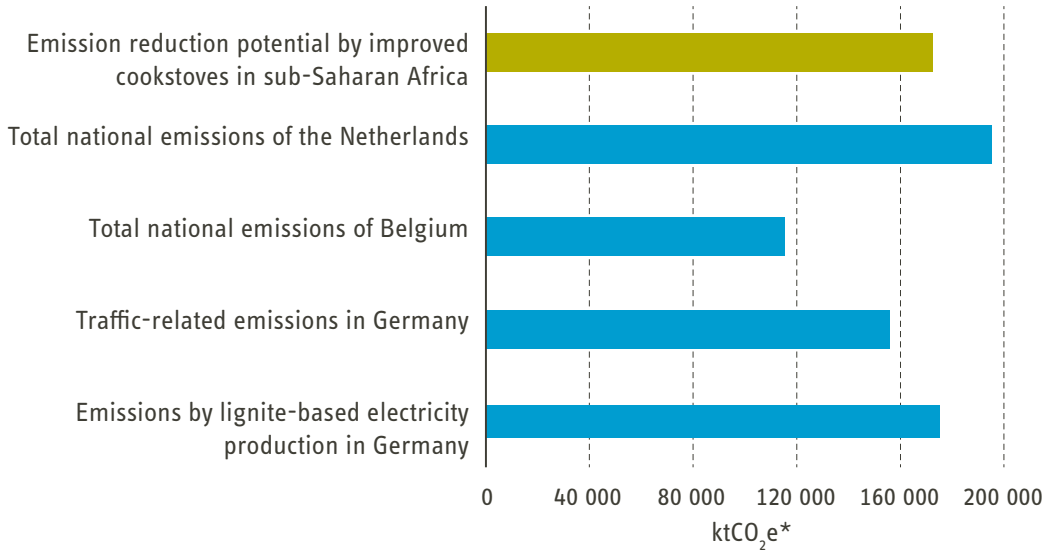
Electricity and gas – the typically used cookfuels in industrialized countries – are not available in most parts of the developing world. As an alternative, improved biomass cooking stoves are designed to economize firewood or charcoal by simple improvements in the combustion process relative to inefficient traditional stoves. A large variety of such improved cookstoves exists. This is propitious, because each region requires a special type for differing cooking habits. Simple improved cookstoves economize 25-50% of woodfuel and come at production costs of 5 to 10 Euro per piece. This translates into greenhouse gas abatement costs of only 3 Euro per ton of CO_2 equivalent, which is clearly below prices of traded greenhouse gas emission allowances in the EU and most alternative energy sector abatement strategies. The dissemination of improved cookstoves thus offers a low-cost emissions mitigation opportunity.

Why is a policy intervention needed?

While not all improved cookstoves have met the expectations accorded to them, in many regions rigorous research has proven their savings potential. The remaining challenge lies in dissemination, as improved cookstoves have not yet made their way into many households in the developing world. This is mainly due to two reasons: First, in most regions, firewood is not purchased, but collected, and thus the benefits of improved cooking do not pay monetarily. Second, even if people buy their woodfuels, poor households cannot afford the investment in an improved stove, because a pay-back-period of a few months is too long given the prevailing credit constraints. By increasing investments into the research on and dissemination of improved cookstoves, a double dividend could be gained: reducing greenhouse gas emissions and alleviating poverty at the same time.

IMPACT NOTES
Improved Biomass Cooking to Fight Climate Change and Poverty

High Emission Reduction Potential in Developing Countries



Sources: Own calculations, UNFCCC (2015), Umweltbundesamt (2015), Bailis et al. (2015), Johnson et al. (2009), Smith (2000), IPCC (2006).

** in 1000 tons of carbon dioxide (CO2) equivalents, which is the aggregate measure for all greenhouse gases (including methane and carbon monoxide among others), calculated in terms of the equivalent concentration of carbon dioxide*

Policy Recommendations

- Divert public investments from high cost greenhouse gas abatement strategies in industrialized countries to proven improved cooking technologies in the developing world as a low-cost option to mitigate greenhouse gas emissions.
- Fund research to develop appropriate and affordable improved cookstoves for regions facing high deforestation pressures. Before scaling up, cooking stoves should be field tested in large pilot studies to underpin their fuel savings potential under day-to-day conditions and their appropriateness with regards to local cooking practices.
- In order to reach different capacity-to-pay customer segments, the whole quality range of improved biomass stoves should be exploited.

Sources:

Bensch, G., M. Grimm and J. Peters (2015), Why Do Households Forego High Returns from Technology Adoption? Evidence from Improved Cooking Stoves in Burkina Faso. *Journal of Economic Behavior & Organization*, 116: 187-205 (earlier version published as **Ruhr Economic Paper #498**).

Bensch, G. and J. Peters (2015), The Intensive Margin of Technology Adoption - Experimental Evidence on Improved Cooking Stoves in Rural Senegal. *Journal of Health Economics* 42: 44-63 (earlier version published as **Ruhr Economic Paper #494**).

Editor:

Rheinisch-Westfälisches Institut für Wirtschaftsforschung (RWI)
Hohenzollernstr. 1-3
45128 Essen/Germany
Fon: +49 (0) 201-8149-0

Oktober 2015