

Partnership for Clean Indoor Air



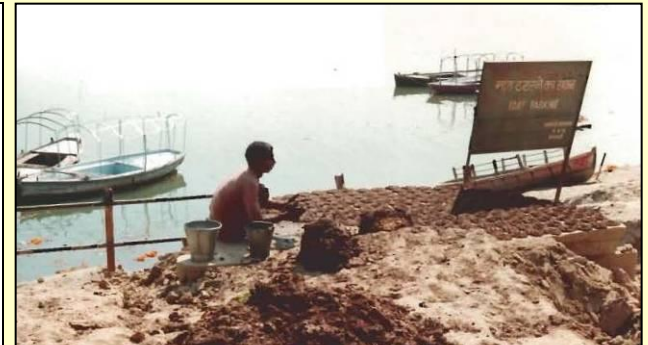
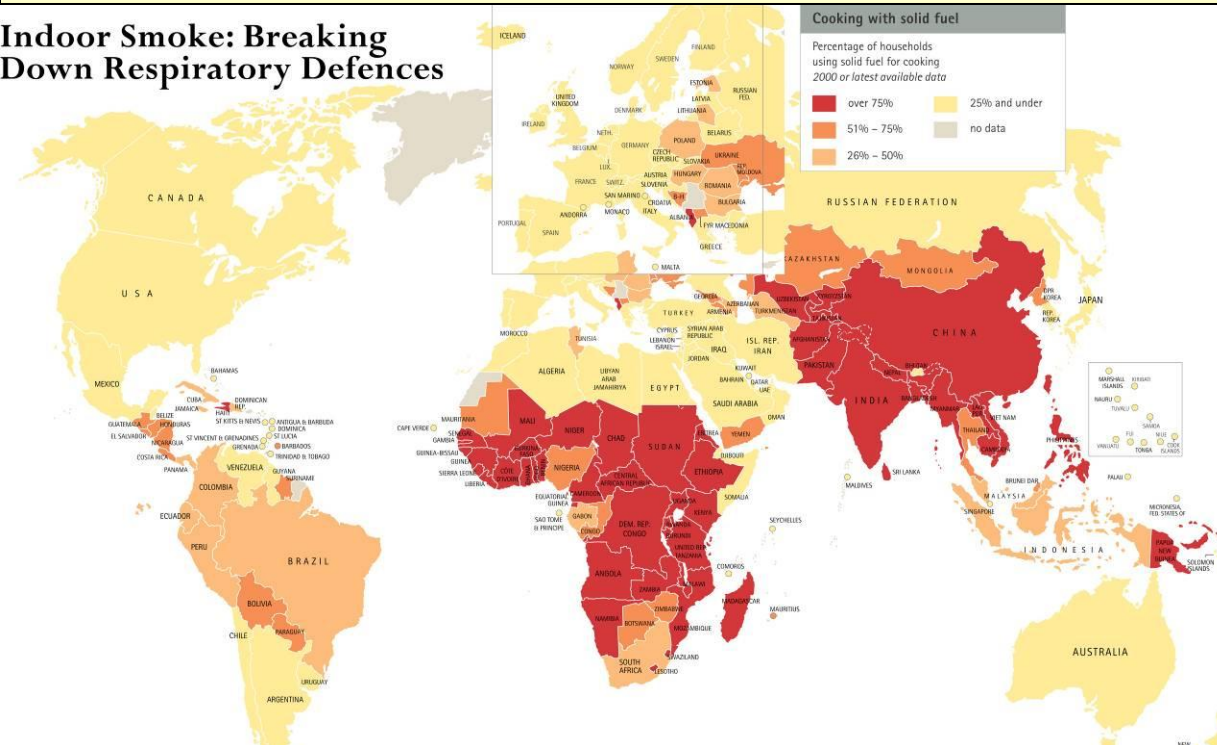
Cookstoves and Black Carbon Senate Briefing

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November 9, 2010

Half the World Still Uses Solid Fuels for Home Cooking and Heating

Indoor Smoke: Breaking Down Respiratory Defences



Making dung patties (India)



Collecting fuelwood (Togo)



Charcoal on sale (Togo)

200 million more people will be using biomass by 2030.



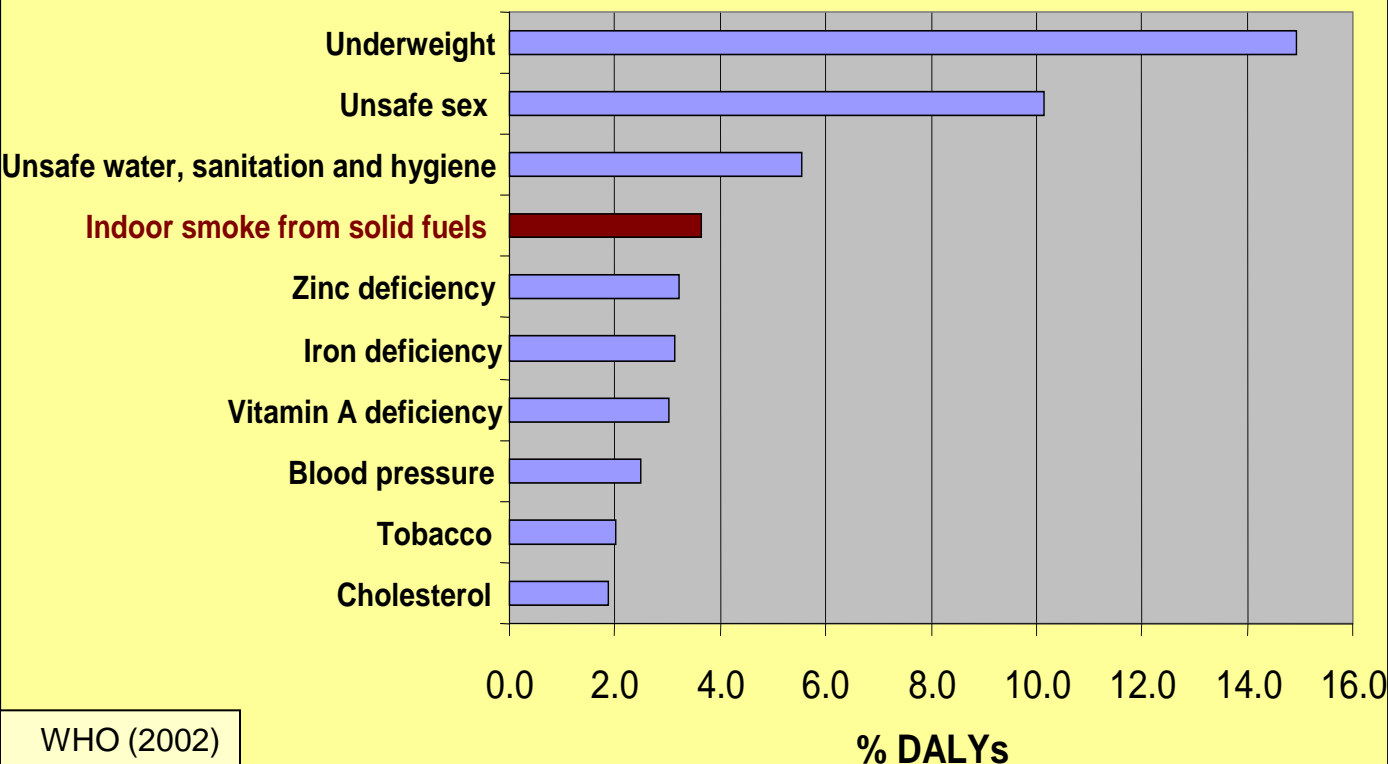
Fuelwood transport and sale (Niger River, Mali)



Sources: WHO (2002); IEA (2007)

Indoor Smoke from Solid Fuel Use is the 4th Worst Health Risk Factor in Poor, Developing Countries

Major Burden of Disease -- 10 Leading Risk Factors in Poor Developing Countries



Indoor Smoke from cookstoves leads to 1.5 million premature deaths each year – nearly all among young children and women.

A Little Perspective on Poor Air Quality (PM_{2.5} as an indicator)



Chicago, IL: August 16, 2000
PM_{2.5} < 10 µg/m³

Chicago, IL: August 26, 2000
PM_{2.5} = 34 µg/m³

Home with Open Fire (Guatemala)
Peak PM_{2.5} = 8670 µg/m³
Typical 24-hr : 100s-1000s µg/m³

Some Pollutants in Indoor Smoke

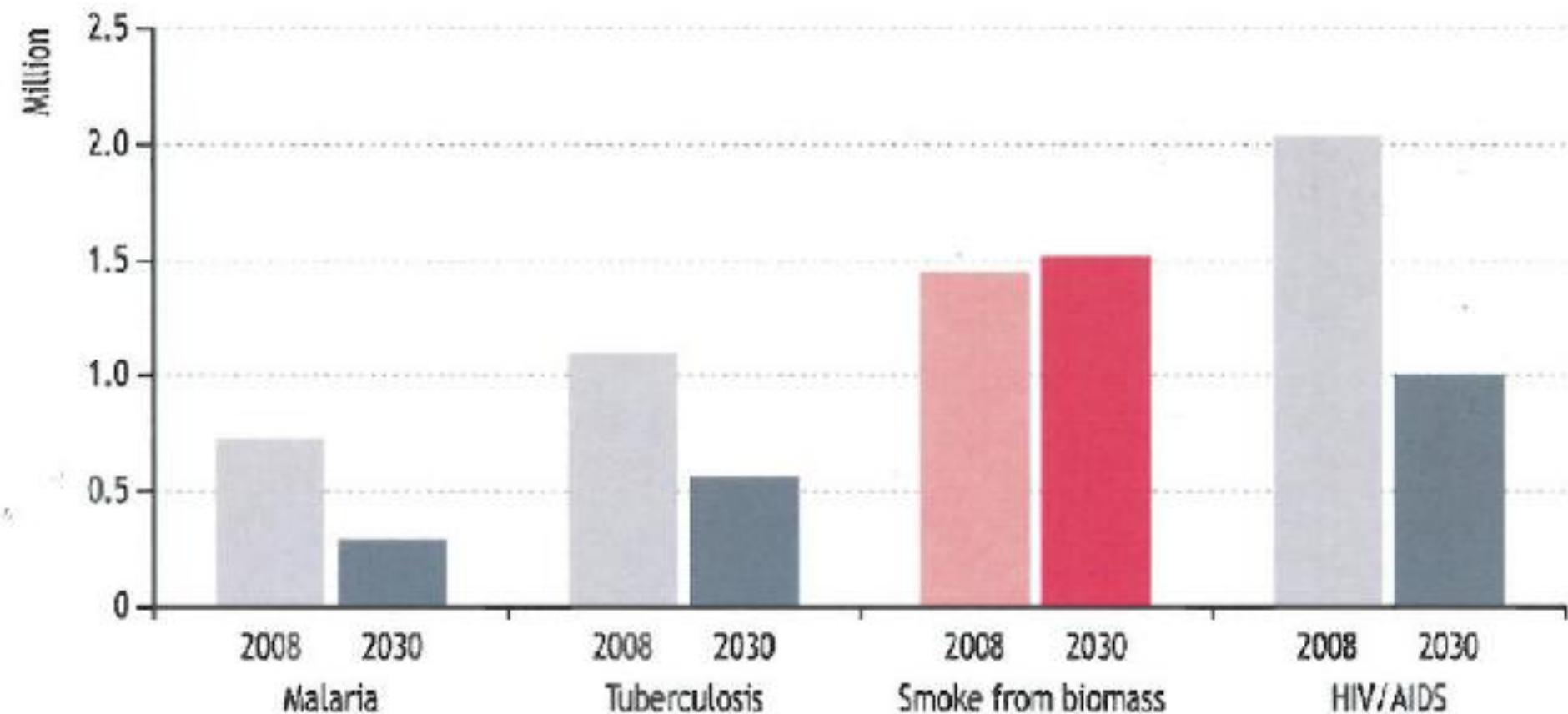
Criteria Pollutants: PM_{2.5}, CO, NO₂
Toxics: formaldehyde, benzene, 1-3 butadiene, benzo[α]pyrene
Climate Forcers: CO₂ (partial), CH₄, CO, NMHCs, BC, OC
For Coal: CO₂ (full), SO₂, As, Pb, Hg, & F

	Annual		24-hour	
	EPA Standard	WHO Guideline	EPA Standard	WHO Guideline
PM _{2.5}	15.0 µg/m³	10.0 µg/m³	35 µg/m ³	25.0 µg/m ³

A Little Perspective on Trends in Health Risks in Poor Countries

Source: IEA, 2010

Figure 5: Premature annual deaths from household air pollution and other diseases



Sources: Mathers and Loncar (2006); WHO (2008); Smith *et al.*, (2004); WHO (2004) and IEA analysis.

Additional Impacts of Solid Fuel Use



Time loss for women and children



Women's & girl's personal safety in conflict zones



Contributes to deforestation



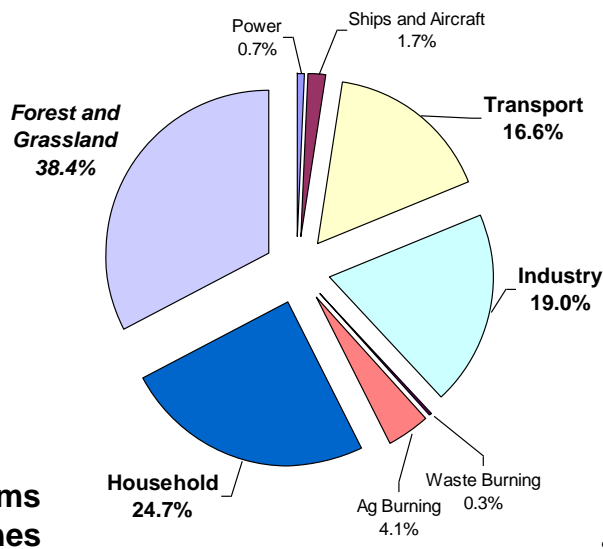
Contributes to loss of critical habitat

Cookstoves & Climate

- Typical carbon savings from an improved cookstove = $\sim 0.5\text{-}2 \text{ tCO}_2\text{-e/year}$
- The Power of Carbon Credits:
 - Financial transaction vs. development aid – no reductions, no money
 - Demands extensive monitoring per established protocols
 - Transaction costs incentivize: large projects + continued use of stoves
- Key Limitation: focus is on fuel use/efficiency, not emissions – so on its own carbon financing won't get us to advanced, super-clean stoves

Total Black Carbon Emissions in 2000

Source: T Bond Database, V 7.1.1 Feb 2009
Plus Bond et al., 2004



Slide from Kirk Smith, UC Berkeley

Black Carbon

- Possible immediate lever on climate change
- Global and regional impacts
- Regional inventories and mitigation strategies vary substantially
- Significant uncertainties (inventory; direct, indirect, and net effects)
- Cookstoves are an estimated 20-25% of the global BC inventory

Total:
= 7900 gigagrams
= 7.9 megatonnes

Cookstoves: Potential to Reduce Black Carbon

- **Traditional Cookstove:**
 - black carbon is ~25% of PM_{2.5} emissions (varies with fuel and operator)
- **Basic Improved Wood Stoves:**
 - Reduces PM_{2.5} emissions by ~50% in lab
 - May not reduce BC emissions much at all
- **Processed Solid Fuels (charcoal, pellets, biomass cakes):**
 - Allows for more consistent and cleaner combustion (for PM_{2.5} & BC)
- **Advanced Stoves (fan stoves or gasifiers):**
 - PM_{2.5} and BC emissions typically reduced by over 90% in lab
 - Field emissions reductions likely large, but somewhat more modest
- **Clean Fuels (LPG, biogas, ethanol):**
 - Can virtually eliminate emissions of PM_{2.5} and BC

What's Changed – Technology?

Examples: new stove/fuel technologies in the market

Intermediate Stoves



GERES charcoal stove (SE Asia)

Over \$1M carbon financing in 2008; over 1 million sales



StoveTec 2-door stove (charcoal or wood)

Mass manufactured at low cost; combustion chamber can stand alone



EnviroFit/Shell Foundation wood stove

5-yr warranty on metal combustion chamber (can be stand-alone, too)



HELPS wood plancha stove (Guatemala)

High quality, very safe, but costly stove for local use

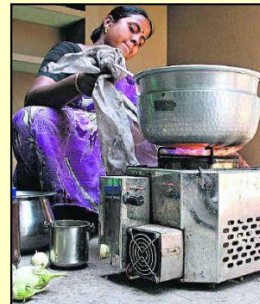
Innovative Element

Advanced Stoves/Fuels



Philips wood fan stove

Very clean; 5-yr warranty; just entering markets



Oorja pellet fan stove (India)

Very clean; pellets from local ag waste; emerging mkt vision



Linhong gasifier stove (China)

Won international competition prize; very clean



ARTI home biogas system (India)

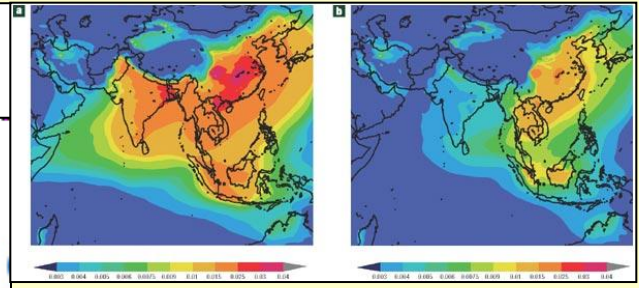
Very clean, but costly; gas from household waste

Innovative Element

Is the Field Approaching a Tipping Point?



More complete and rigorous health data is emerging.



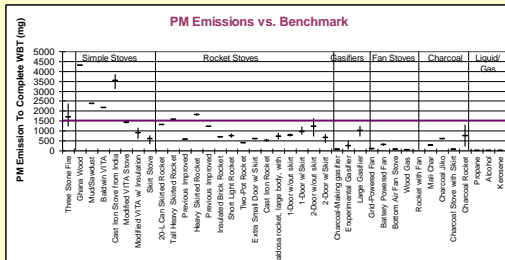
Climate change is creating real financing and operational opportunities, and catalyzing public interest.



Improved stove designs are reaching the market – across a range of price points.



Different business models are starting to reach larger scale.



The field is getting much more rigorous on testing, monitoring, and evaluation.

New Initiative for Development and Deployment of Improved Cookstoves: Recommended Action Plan

Executive Summary of The Draft Report prepared by Indian Institute of Technology Delhi and The Energy and Resources Institute, New Delhi

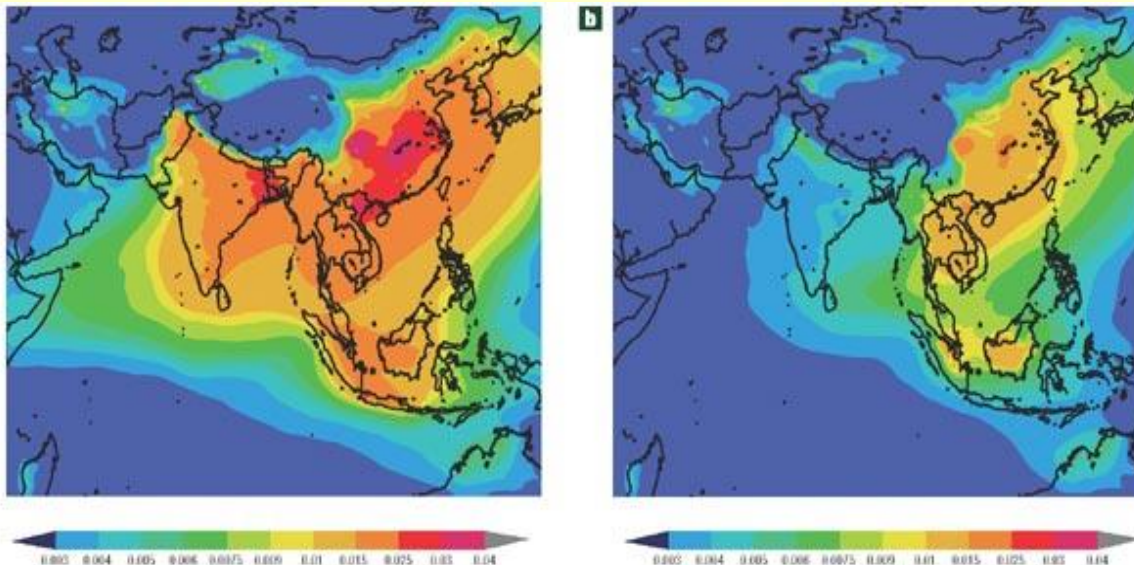
Govt. of India



New leaders are stepping forward.

A Little Perspective on Scale

- Global Market Size = 500-700 million households
 - Regional = 100s millions of homes for each of Africa, China, and India
- Current Activity:
 - Improved stove sales today likely on scale of single millions per year
 - Advanced stove sales today likely on scale of under 1 million per year
- ***To have a significant impact on burden of disease and net black carbon emissions would require a massive scaling up of effort.***



The possible impact in black carbon heating of replacing biofuel cooking with smoke-free cookers:

- ❖ South Asia – a 70-80% decrease
- ❖ East Asia – a 20-40% decrease

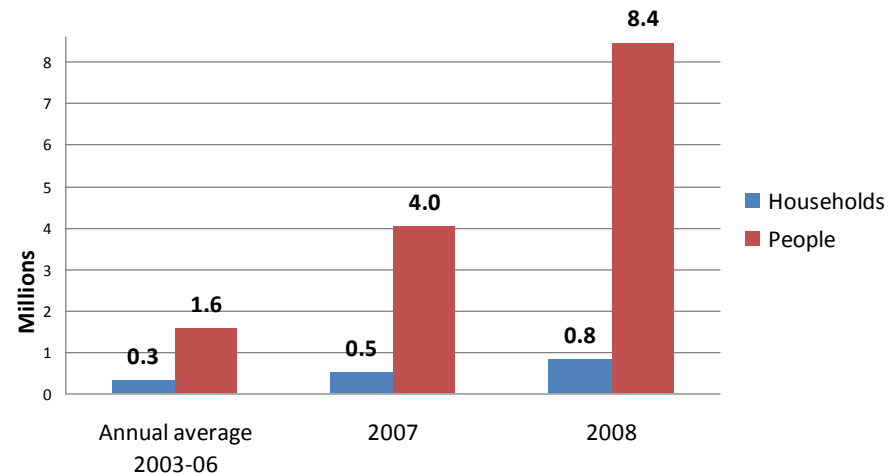
Source: Ramanathan and Carmichael, *Nature Geoscience*, March 2008

EPA-led Partnership for Clean Indoor Air

- **PCIA Launch:** at the 2002 World Summit on Sustainable Development (Johannesburg)
- **PCIA Goal:** Increase the use of clean, reliable, affordable, efficient, and safe home cooking and heating practices that reduce exposure to indoor air pollution.
- **Breakthrough Growth:**
 - from 13 to over 400 partners
 - partners' results are roughly doubling roughly every two years



Partners Help Millions use Cleaner Cooking Technologies



Breakthrough results reported from 95 implementing organizations through 2008

Global Alliance for Clean Cookstoves

Launched September 21, 2010, with Founding Partners:

U.N. Foundation, Shell Foundation, United States, Germany, Peru, Norway, GTZ, SNV, Shell, Morgan Stanley, SEWA, and 7 U.N. agencies

Mission: *To save lives, improve livelihoods, empower women, & combat climate by creating a thriving global market for clean and efficient household cooking solutions*

Vision: Universal adoption of clean & efficient cooking solutions

Interim Milestone: Adoption of 100 million clean and efficient cookstoves by 2020



GLOBAL ALLIANCE FOR
CLEAN COOKSTOVES

Summary Points on Cookstoves and Black Carbon

- **Cookstoves.** They represent a large, controllable part of the black carbon inventory
 - We now know enough to realistically go after this sector at a large scale.
 - This is a good time to aspire to that scale – but success will require significant investment and strategic cooperation.
 - A global vehicle to lead such an effort now exists – the Global Alliance for Clean Cookstoves managed by the UN Foundation
- **Key Message.** This is an enormous win-win opportunity:
 - Developed countries: immediate climate benefits
 - Developing countries: save lives, promote economic development.
- **Key Caution on Message:** Don't blame climate change on women in poor countries who are cooking to feed their families!