Centre for Science and Environment

ANIL AGARWAL DIALOGUE

ENERGY ACCESS & RENEWABLE ENERGY

February 27-28, 2014, New Delhi

"*The chulha trap*"

Energy access for health security of the poor

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Cooking energy
Firewood dominates

Source: Census of India 2011

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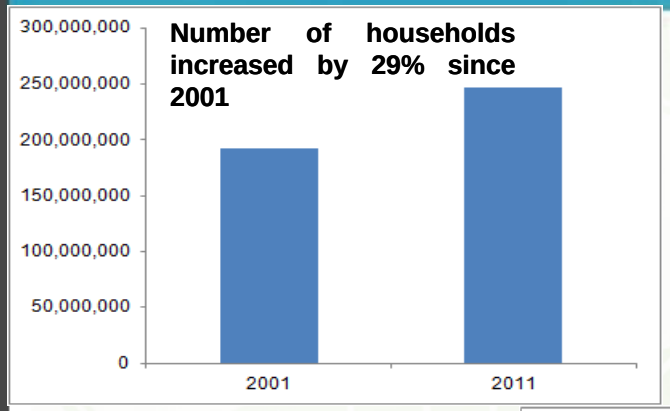
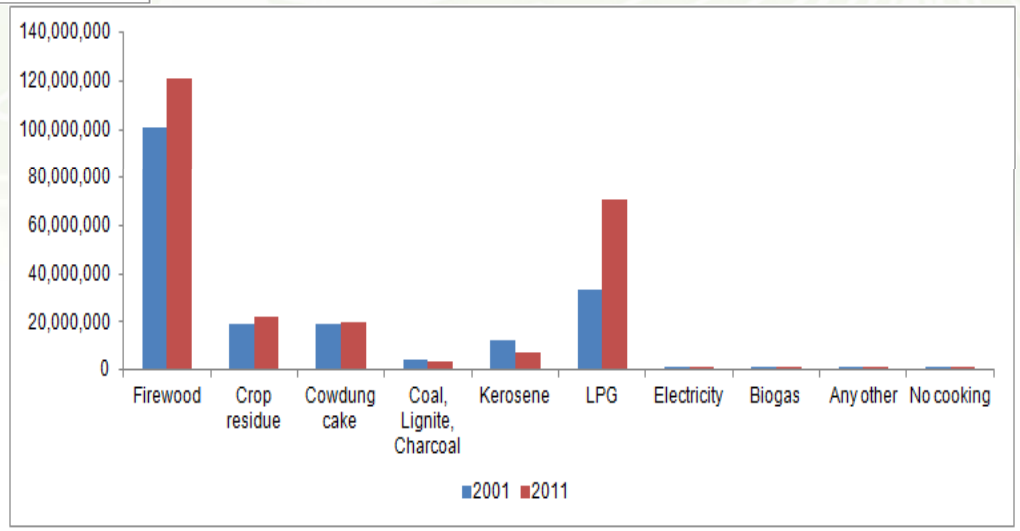
Use of firewood still increasing



Consumption of firewood and LPG has increased



Source: Census of India 2011

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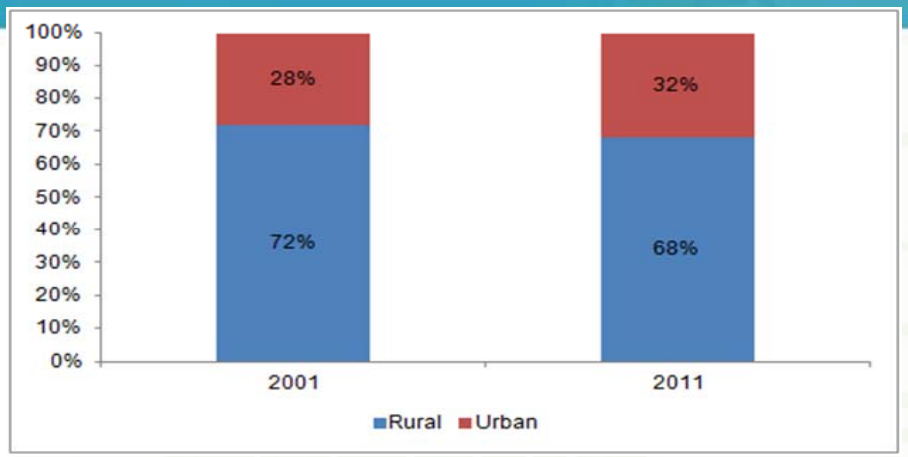
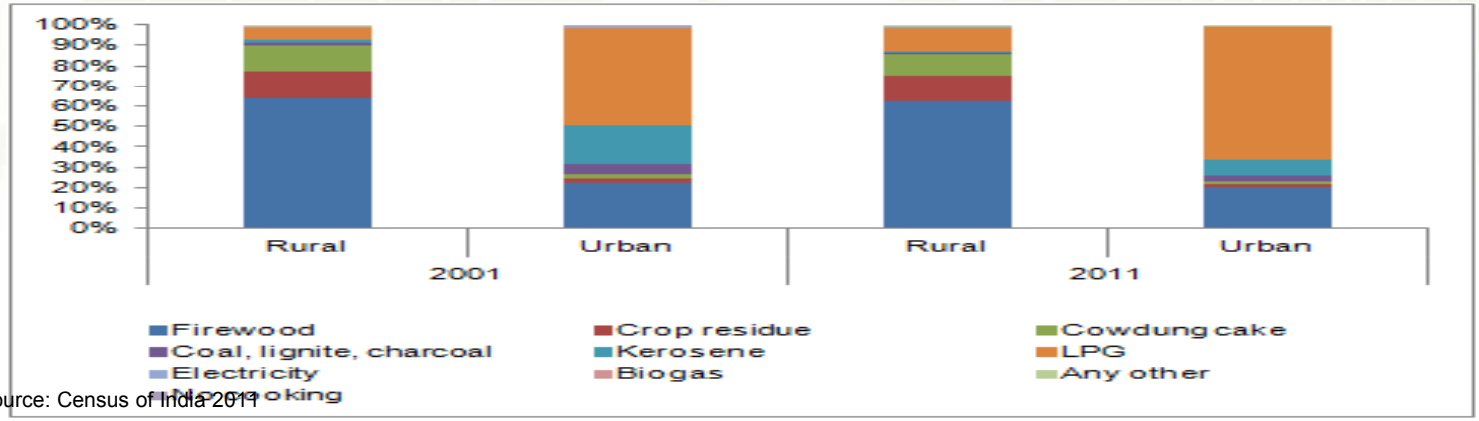
Rural - urban divide



Share of rural households have declined

Firewood dominates rural cooking.

Dramatic change in urban India



Source: Census of India 2011

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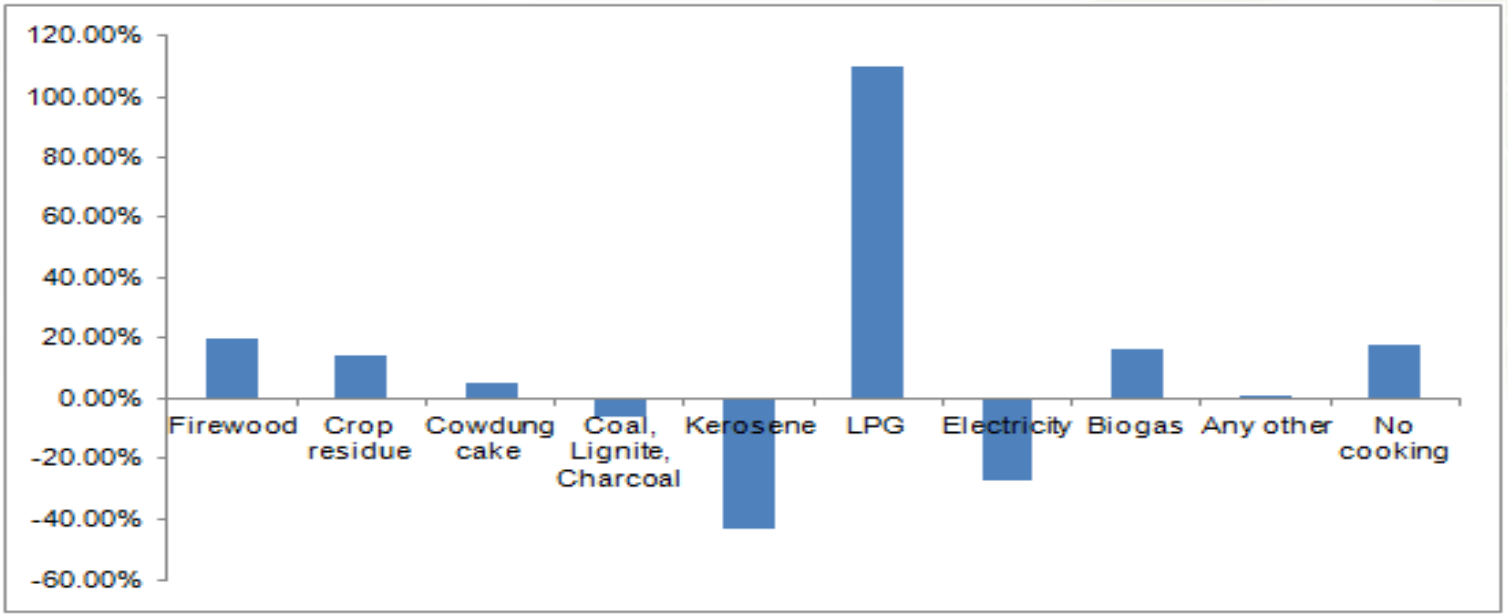
Mixed trends

- **Over the decade LPG use has increased by 110% -- highest increase**
- Firewood use increased by 20%, biogas by 16%, crop residues by 14% and cow dung cake by 5%
- Kerosene use dropped by -42.90%, electricity by -27.03% and coal, lignite, charcoal -5.91%



Source: Census of India 2011

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Trapped in smoke….

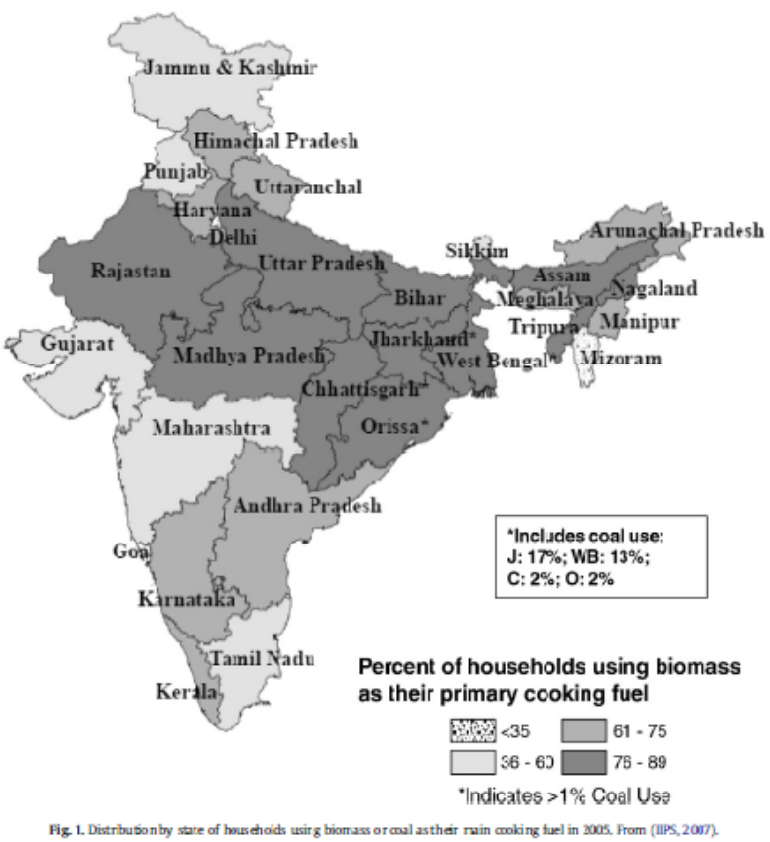

Fig. 1. Distribution by state of households using biomass or coal as their main cooking fuel in 2005. From (IIPS, 2007).

What is the 'Chullha trap'?

1990: 85%: 700 million people using solid fuels

2010: 60%: 700 million people ~1980 700 million people in entire country (Kirk Smith)

New census supports this 2001 census: Total number of households using firewood – 100.84 million

2011 census: 2001 census: Total number of households using firewood – 120.87 million

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Ills of typical chullha ……..

Poor thermal efficiency – only 18% of the heat transferred to the pot for cooking…74% of heat is wasted….

Products of incomplete combustion that adds to the toxic emissions ……

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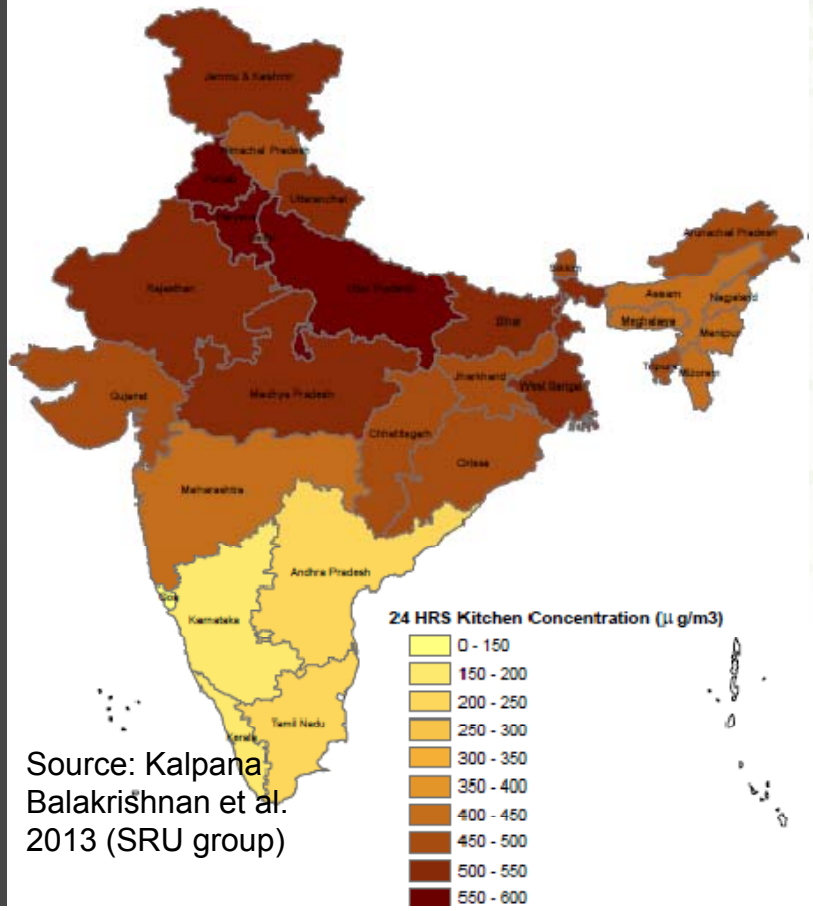
PM2.5 concentration inside homes (Stae-wise/24 hr average)



Source: Kalpana Balakrishnan et al. 2013 (SRU group)

Over the great part of northern India household concentration of PM2.5 is very high -- more than 450 microgramme per cum

During cooking the level can go as high as 600-1000 microgramme per cum

In relatively cleaner states like Tamil Nadu levels are still high – 150-200 microgramme per cum

WHO is developing guidelines for indoor air quality -- Outdoor air quality standards do not allow more than 60 microgramme per cum daily

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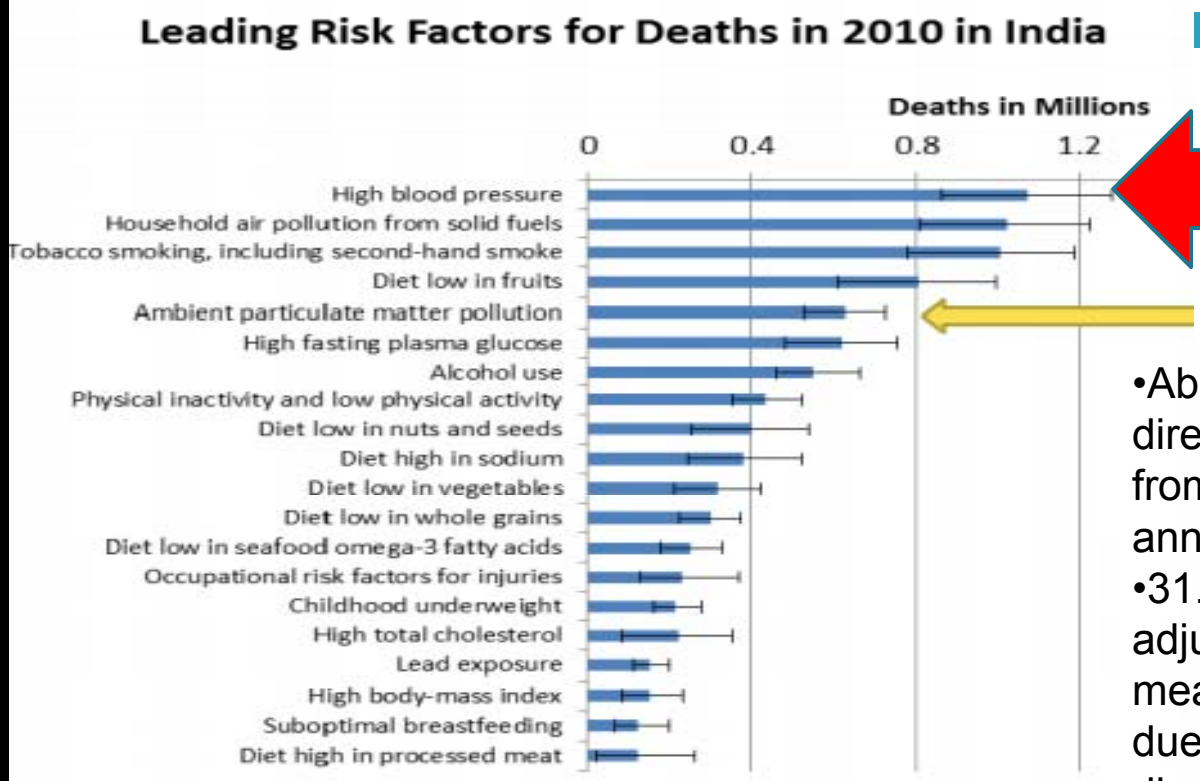
Global Burden of Diseases 2010: House hold air pollution second largest killer in India…….



House hold air pollution

- About 1.04 million direct premature deaths from indoor air pollution annually in 2010
- 31.4 million disability adjusted life years—measure of years lost due to ill-health, disability

Source: http://cseindia.org/content/air-pollution-now-fifth-largest-killer-india-says-newly-released-findings-global-burden-dise Source:

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Toxic……

A typical chullha emits smoke equal to **400 cigarettes….**

Toxic cocktail – small particles, carbon monoxide, nitrogen dioxide, hydrocarbons, poly aromatic hydrocarbons, aldehydes, etc etc….

.Deadly impCT – heart disease, lung cancer,,,,,,,,,,

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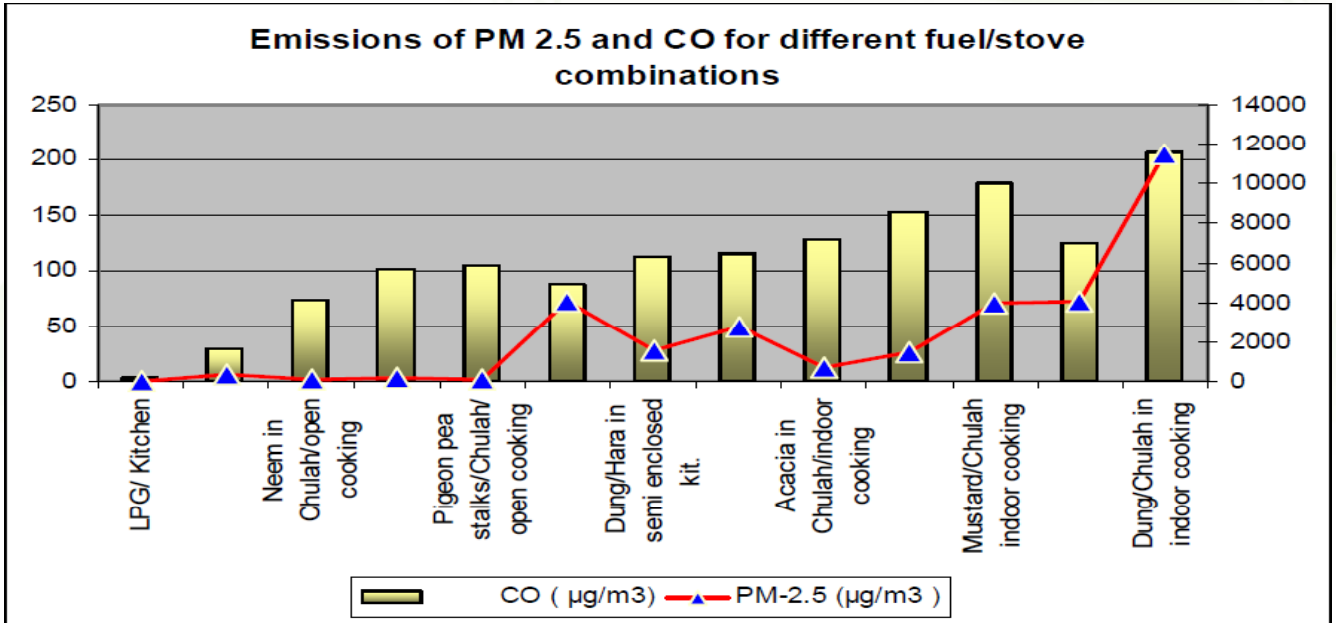
Smoked!

Rural households of Jhajhar district of Haryana

Exposure levels of PM2.5 and CO from different types of solid fuels and LPG

(Study by IIT Delhi and National Institute of Health & Family Welfare)



Source: http://www.ipcbee.com/vol10/44-S20027.pdf

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Climate impacts?
Heat trapping black carbon and co-emissions of OC, CO etc……

Warming vs cooling = net warming?
The jury is not yet out …….

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Policy thrust……make chullhas more energy efficient, lower emissions or take the smoke out of the house……

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Setting performance standards for chullhas….

•**National Biomass Cookstoves Initiative** (NBCI) launched by MNRE in 2009 -- to design and develop the most efficient, cost effective, durable and easy to use device.

R**evised emissions standard for chullha** Standard for thermal efficiency, CO and TPM based on testing results for various cook stove models. The cook stoves are approved by MNRE.

Sl. No.	Type of Biomass Cookstove	Standard Performance Parameters		
		Thermal Efficiency (%)	CO(g/MJd)	PM(mg/MJd)
1	Natural Draft Type	Not less than 25	≤ 5	≤ 350
2.	Forced Draft Type	Not less than 35	≤ 5	≤ 150

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Smokeless chullha programme since 1980s

•Studies observe 50% PM2.5 reductions from typical natural draft stoves and over 90% reductions from some forced draft stoves that use a fan to increase combustion efficiency.

Helped to improve fuel efficiency, women's time use, and other welfare benefits ….

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Fiscal incentives for cookstoves

Excise duty exemption for approved cook stoves

Financial assistance:

- Financial assistance from MNRE limited to 50% of the cost of cookstoves with ceiling of Rs. 400 per cookstove for natural draft type and Rs. 800 for forced draft type portable domestic cookstoves.
- Larger cookstoves, the support limited to 50% of the cost of the cookstoves with ceiling of Rs. 2500 per cookstove for natural draft type and Rs. 5,000 for forced draft type portable community cookstoves.
- Technical assistance for conducting training and for meeting administrative charges approximately 25% of the support on each stove is also provided to implementing agencies.

Is that the only way to move forward?

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Can chullhas deliver on health objectives?

Improved stoves reduce fuel use by 30−60%. **But** ……..

Can improved chullhas significantly reduce smoke exposure on a community wide basis?

Gap between lab tests and field performance of chullhas. Do not satisfy WHO guidelines……(K Smith, K Balakrishna)

Indoor combustion also contributes to outdoor air pollution. Chimney moves smoke two meters away……

Households together contribute enormously to ambient air…… High PM levels have been recorded in villages…….close to 200 microgramme per cum in villages of Haryana …(K Smith)

GBD estimates the contribution to be as high as 25-30% in India

The WHO developing guidelines for indoor air quality….

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Need energy transition……..

Tree hugger

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Kerosene is not the answer…….

- Kerosene emits toxic emissions
- Kerosene consumption declining


Tree hugger

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Biogas holds promise…..

•National Biogas and Manure Management Programme since 1981-82

•Implemented by state nodal agencies and Khadi and Village Industries Commission.

•As of december 2013 there are 47 lakh family type bio gas plants

•Holds promise. But implementation challenges:

- Poor maintenance, lack of technicians for repair and maintenance, increasing costs of construction, poor delivery of subsidy etc.

Tree hugger

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Need LPG transition in rural areas

•**Rajiv Gandhi Gramin LPG Vitaran Yojana** for small size LPG distribution agencies in rural areas to cover 75% of rural population by 2015.

Rich benefiting more from subsidies: Current total subsidy on each domestic LPG cylinder - Rs. 555.44 (cap of 9 cylinders/year). Total subsidy Rs. 41,547 crore in 2012-13. Not well targeted……

•**Aadhar based Direct Benefit Transfer Scheme** –not well targeted towards deserving consumers.

•**India imports almost 40% of the LPG requirement. Prioritise poor people's energy access**

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Electric cooking …….

Linked to expansion in mini and micr grid……

Tree hugger

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Way forward……

Need energy transition – health is non-negotiable

- **Focus on LPG – keep it affordable and accessible for rural poor**
- **Electric cooking linked with expansion of mini/micro grids**
- **Step up focus on biogas**
- **Truly clean biomass cook stoves; encourage innovation**
- **Address last mile problem to ensure uptake by consumers**
- **Leverage national and global finance for public health and climate**
- **Restructure subsidies for clean fuel to target poor better**