Modern cooking energy – Observation on the current status and suggestions to MNRE on the way forward.

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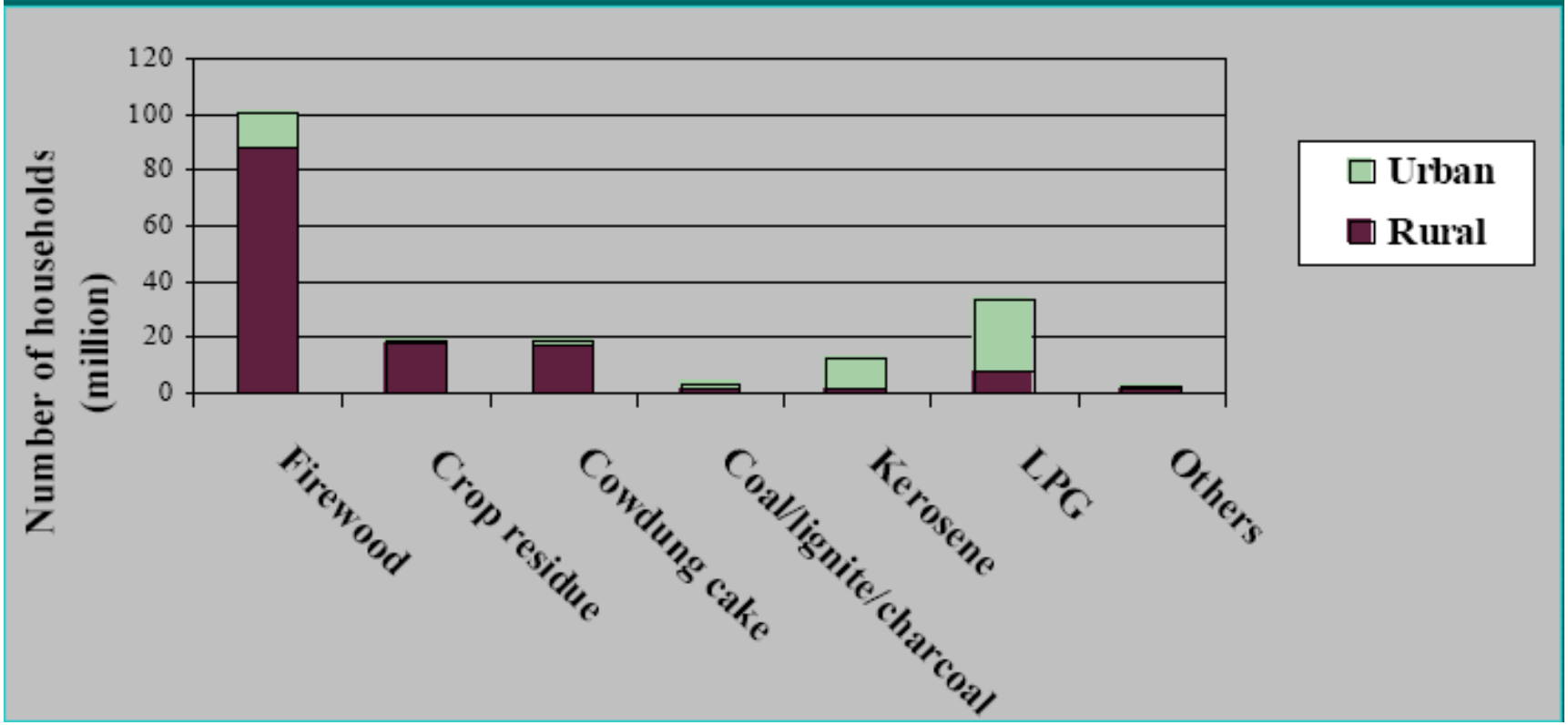
Indian household use of cooking fuels

(Census 2001)



The spectrum of cooking fuels – note urban sector also uses firewood, Crop residue fraction in rural cooking ~ 25 % - drawn from IEI report

Fuel usage over rural and urban households and their efficiency (mmt = million metric tonnes)

Fuel	Rural HH million	Urban HH million	Fuel used mmt/year	Tonnes /yr/HH
Fire wood	87	15	250	2.5
Agro-residue	20	2	120	5.5
Cow-dung cake	20	2	35	1.6
Coal	2	2	6	1.5
Kerosene	2	8	5	0.5
LPG	9	25	8	0.24
Others	1	2	-	-
Total	141	57		

Note: While all bio-fuels are used inefficiently compared to LPG/Kerosene

Agro-residue use is most inefficient!

Efficiency comparison through water boiling tests:

LPG stove eff ~ 70 %, kerosene stove ~ 65 %, non-modern biomass stoves ~ 5 to 30 %

In practice, stoves may operate for a time with no cooking.

But this is significant with biomass stoves

Fuel-wood Consumption by sectors
mmt = million metric tonnes

Sector/ End-use	mmt
1. Household	
(a) Forested Rural	93
(b) Non Forested Rural	95
(c) Urban Areas	17
Sub Total	**205**
2. Cottage Industry	**32**
3. Rituals	**6**
4. Restaurants etc.	**12**
Total	**250**

Biomass bought vs. collected for household use

Fuels	Rural, %			Urban, %		
	Bought	Collected	Home Grown	Bought	Collected	Home Grown
Firewood	18	54	28	78	11	11
Dry Dung	13	22	65	59	8	33
Crop-residue	13	52	35	77	23	0

Collection of Fire-wood by rural household:

Time spent per day ~ 1.5 hours (quarter to five hours)

Distance travelled about 2.5 km (max: 6 km)

Collection ~ 4 to 6 kg firewood

Comment: It is vital that quality fuel be made available at affordable cost to the poor – rural and urban. Others can pay market costs

Cooking fuels used in India and their characteristics (H =calorific value at 10 % moisture)

Fuel	Density t/m^3	Shape	Size mm	Ash %	H MJ/kg
Fire wood	0.3 – 0,.7	Regular	10-100	~ 1	15
Agro-residue	0.05 - 0.1	Fine, odd	1 - 10	1 - 20	15 - 13
Cow-dung cake	~ 0.15	Regular	100	~ 10	~ 12
Coal	~ 1.2	Pieces	5 to 50	30 - 45	18 - 16
Kerosene	0.78	-	-	-	42
LPG	0.5	-	-	-	48

The use of agro-residues implies the material must be dried, pulverized and pelleted to the required density, shape, and size before use. The mix of agro-residues need to be chosen to get the right ash content and ease of pelletizing.

The crucial points

- Biomass needs to be made a *main-stream fuel* as much as kerosene by improving the quality in terms of *shape, size and moisture content* the significant variation in all of which is contributing to poor performance as a cooking fuel.
- It is far more important that we should attempt to improve the efficiency of the use of agro-residues because:
  - It is definitely renewable (something not always true of fuel wood)
  - Using it for cooking will preserve fuel wood for better uses.

What should be done by MNRE? - 1

- Support infrastructure for preparation of quality solid bio-fuel for cooking, storage, and supply to users in rural and urban communities.
- Subsidize purchase of cooking fuel - through PDS, perhaps
- Capital subsidy to stoves of high efficiency and low emissions in a graded manner so that even manufacturers are motivated to belong to better class →

a. Those between *standard water boiling efficiency* (using BIS or other standards to be created) of up to 30 % and CO of 3 g/MJ and above

b. Those between eff, of 30 to 40 % and CO of 2 to 3 g/MJ

c. Those with efficiencies above 40 % and CO of 1 to 2 g/MJ

[*standard water boiling efficiency* – say, using 10 liter flat bottomed aluminum vessel and determining the biomass at 10 % moisture and a cal value in the stove to heat the water up to near-boiling condition]

What should be done by MNRE-2?

1. It is important to be sensitive to efficiency and emissions.
2. Create testing agencies, about a dozen around the country, perhaps using the current facilities in private and public enterprises.
3. All involved should contribute finances or authority. MNES part money, user, part money and the agency, quality and authority.
4. Some tests should be done by multiple agencies to ensure reduction of noise in the results (round-robin tests). Periodic meetings of agencies under the aegis of a technical committee to ensure quality in testing.
5. Any representation of improper authorization should be resolved by round robin tests