

ENERGY DEMAND FOR COOKING

Energy needed for cooking depends largely on the fuel used, energy conversion efficiency of the fuel, population growth, economic growth, government policies and urbanisation. Data suggests that on an average, a household uses an average of 14 MJ/day or 3.88 kWh /day. This is a major energy consuming sector, and has large implications on energy demand, environment as well as health and work burden on rural women. The four Levels in this analysis capture the gradual shift from biomass to cleaner fuels, as well as efficiency of cooking devices, in households. The elasticity of demand for commercial energy is also expected to fall with rise in GDP. The above efforts could reduce the energy demand for cooking by nearly one-third in the 'Heroic effort scenario' over Level 1 in the terminal year - 2047.

Level 1

Level 1 assumes that past trend of slow decline in biomass use continues. However, even in 2047, it is assumed that a number of households both in the urban and rural areas still use biomass. Moreover, due to

increased access to PNG, there is switching from LPG to PNG only in urban areas. Efficiency of LPG/PNG cook stoves and electric hobs improve marginally. Commercial energy demand expresses elasticity (ϵ) of 1 to GDP growth. Given these assumptions, India will need 1454 TWh of primary energy by 2032, and 1808 TWh by 2047 for its cooking needs.

Level 2

Level 2 assumes effective implementation of rural programs for increasing access to electricity (RGGVY), LPG (RGGLVY) and improved cook stoves. Establishment of a PNG network in some rural areas is assumed, leading to an increase in the use of PNG. Gas cook stoves, biomass cook stoves and electric hobs are assumed to be more efficient. Commercial energy demand expresses an elasticity of 0.9 to GDP growth. Given these assumptions, India will need 1228 TWh and 1539 TWh of primary energy by 2032 and 2047, respectively for its cooking needs.

Level 3

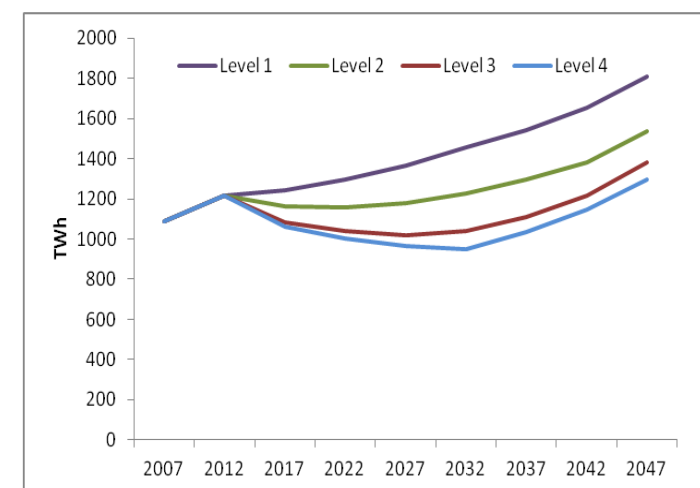
Level 3 assumes that dedicated efforts to increase supply and service quality in rural areas leads to active adoption of electricity, LPG and PNG. PNG networks expand

leading to more urban households adopting it as fuel by 2047. Efficiencies of gas and electric stoves increase, and are assumed to increase further. Commercial energy demand expresses a lower elasticity to GDP at 0.8. Thus, India's energy demand for cooking will be 1040 TWh of primary energy by 2032 and 1383 TWh by 2047. Primary energy demand falls initially due to switching to more efficient fuels (in spite of an increase in the number of households) and then increases due to increase in households and GDP.

Level 4

In Level 4, by 2047, dependence on electricity and LPG in rural households increase. Only a quarter of rural households use biomass (mostly with clean cook-stoves) and PNG penetration is assumed to increase. Gas and biomass stoves as well as electric hobs are assumed to become more efficient. Elasticity of commercial energy demanded for cooking to GDP growth is assumed to be 0.7. High access in PNG and electricity results in energy consumption of 949 TWh primary energy by 2032, and 1297 TWh by 2047.

Urban-Rural fuel mix shift from baseline (2012) [% penetration in households]											% efficiency improvement in cooking devices w.r.t baseline			
Fuel	2012		Level 1-2047		Level 2- 2047		Level 3- 2047		Level 4-2047		Level 1	Level 2	Level 3	Level 4
	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural				
LPG	69	13	39	26	36	33	30	36	18	32	3	5	8	10
Electricity	0	0	5	4	5	9	6	17	12	22	2	3	5	7
PNG	1	0	42	0	50	2	63	10	68	18	3	5	8	10
Biomass	23	85	14	65	9	49	1	36	0	28	43	83	123	162
Coal	3	1	0	0	0	0	0	0	0	0	4	9	13	17
Kerosene	6	1	0	0	0	0	0	0	0	0	4	9	13	17
Biogas	0	0	0	4	0	5	0	1	0	0	4	9	13	17



Note: Please see the detailed documentation for references.