The Role of Solid Biomass in Future Energy Systems: Considering Access to Clean Energy

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Bandung Workshop
4-5 October 2018
Background: Clean Cooking Access Low

Proportion of Population Dependent on Solid Fuels for Cooking

Background: Associated Health Impacts High
Health & Safety Impacts of Dependence on Solid Fuels

- Almost 3 million die prematurely every year due to exposure to household pollution due to inefficient combustion of solid fuels
- Back aches, pains, and injuries from biomass collection

Livelihood Impacts of Lacking Access to Modern Energy

- Limited productive hours in the day for those who spend time in own fuel collection
- Lack of access to modern energy also limits work and business possibilities

Equity Impacts of Lack of Access to Modern Energy

- The deaths from household pollution and drudgery of fuel collection falls disproportionately on women and children
- Perpetuates poverty, gender and other social disparities

Environmental Consequences of Solid Fuels Dependence

- Local forest, land and soil degradation
- CO2 emissions if biomass is non-renewably harvested
- Emissions of non-CO2 GHG and PIC with higher GWP
- Growing evidence of strong climate impacts of black carbon (soot) for arctic and glacial ice melting
Potential Synergies of Clean Cooking with Other SDGs

- SDG1 – Poverty alleviation
- SDG3 – Improved health
- SDG5 – Gender equality
- SDG10 – Reduced inequalities
- SDG11 – Livable human settlements and cities
- SDG12 – Improved production and consumption patterns
- SDG15 - Halt deforestation and prevent biodiversity loss

Source: South Centre
Relationship of Fuel Choices with Income in South Asia

Source: Poblete-Cazanave & Pachauri 2018
Emissions consequences of cooking transition in India between 2001-2011
## Change in Share of HHs Using Firewood & LPG in India 2001-2011

<table>
<thead>
<tr>
<th></th>
<th>Urban</th>
<th>Rural</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exclusive Fuelwood HH</td>
<td>8%</td>
<td>3%</td>
</tr>
<tr>
<td>Exclusive LPG HH</td>
<td>17%</td>
<td>5%</td>
</tr>
<tr>
<td>Multi – fuel HH (min. LPG + fuelwood)</td>
<td>2%</td>
<td>5%</td>
</tr>
</tbody>
</table>

Source: Singh et al 2017
Estimate of Fuel Use for Cooking

- National displacement of 7.6 million tons of biomass. Almost 1 million tons displaced in rural, while over 6 million tons displaced in urban areas.
- Rural displacement of biomass < urban displacement, as fewer rural HHs gained access compared to urban HHs and average per capita LPG use in urban areas is higher than in rural areas.
- About 217 thousand tons of LPG used in 2011.
Net emissions – assumptions on fNRB

\[ f_{NRB} = 0 \]
\[ f_{NRB} = 0.3 \]

- Rural HH: -0.07 (fNRB = 0)
  - MtCO_{2e} = 0.53
- Urban HH: -0.41 (fNRB = 0)
  - MtCO_{2e} = -3.25
- National HH: -0.48 (fNRB = 0)
  - MtCO_{2e} = -3.79

Source: Singh et al. 2017
### Net emissions: accounting of GHGs

<table>
<thead>
<tr>
<th></th>
<th>Kyoto (fNRB = 0.3)</th>
<th>Non-Kyoto Climate Forcing</th>
<th>Kyoto + non-Kyoto</th>
</tr>
</thead>
<tbody>
<tr>
<td>MtCO$_2$e</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rural HH</td>
<td>-0.53</td>
<td>-0.70</td>
<td>-1.24</td>
</tr>
<tr>
<td>Urban HH</td>
<td>-3.25</td>
<td>-4.36</td>
<td>-7.61</td>
</tr>
<tr>
<td>National HH</td>
<td>-3.79</td>
<td>-5.06</td>
<td>-8.85</td>
</tr>
</tbody>
</table>

~5% of 2011 HH emissions

Source: Singh et al 2017
Net Emissions Estimation - Conclusions

The transition to LPG cooking in India reduced pressure on forests and achieved modest climate benefits, though uncertainties regarding the extent of non-renewable biomass harvesting and suite of climate-active emissions included matters for households emissions accounting and should be considered carefully in any analysis and policy-making.
Population Distribution in S.Asia –Current & in 2040 for Alternate Socio-Economic Futures

**Source:** Poblete-Cazanave & Pachauri 2018
Scenarios of Cooking Fuel Transition Under SSPs in South Asia in 2040

Source: Poblete-Cazanave & Pachauri 2018
Additional Policies to Accelerate a Transition Away from Solid Biomass Cooking

- R&D for improved combustion and conversion technologies
- Standards for improved stoves
- Grants or reduced-cost dissemination of clean stoves
- Fuel subsidies on alternative fuels, like LPG
- Targeted cash transfers to below poverty line households
- Information and education campaigns
- Incentivizing electric induction cook stoves
Key Insights

• Without new policies achieving the SDG 7 target of universal access to clean cooking by 2030 unachievable

• Futures with higher economic growth, more equitable income distribution and faster urbanization are likely to have more rapid transitions away from biomass cooking

• Policies that combine subsidies on cleaner fuels (LPG) with grants for the stoves and deposits are more effective

• The emissions consequences of shifting from biomass to LPG cooking are negligible and could be even negative if some biomass is unsustainably harvested

• The potential air quality and health benefits are large and synergies with other SDGs are also significant
Thank You!

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