Policy Scenarios for Achieving Universal Modern Energy Access by 2030

Dr. Shonali Pachauri (Energy Program, IIASA; Vienna, Austria)
Yu Nagai (Energy Program, IIASA; Vienna, Austria
Technische Universität Wien; Vienna, Austria)

Challenges

- About 20% of earth's population is unelectrified. Another, almost equivalent number has irregular and unreliable access to electricity.
- Over 40% of global population depends on traditional solid fuels (unprocessed biomass – firewood, crop and animal residues – or coal and charcoal) for cooking and heating.

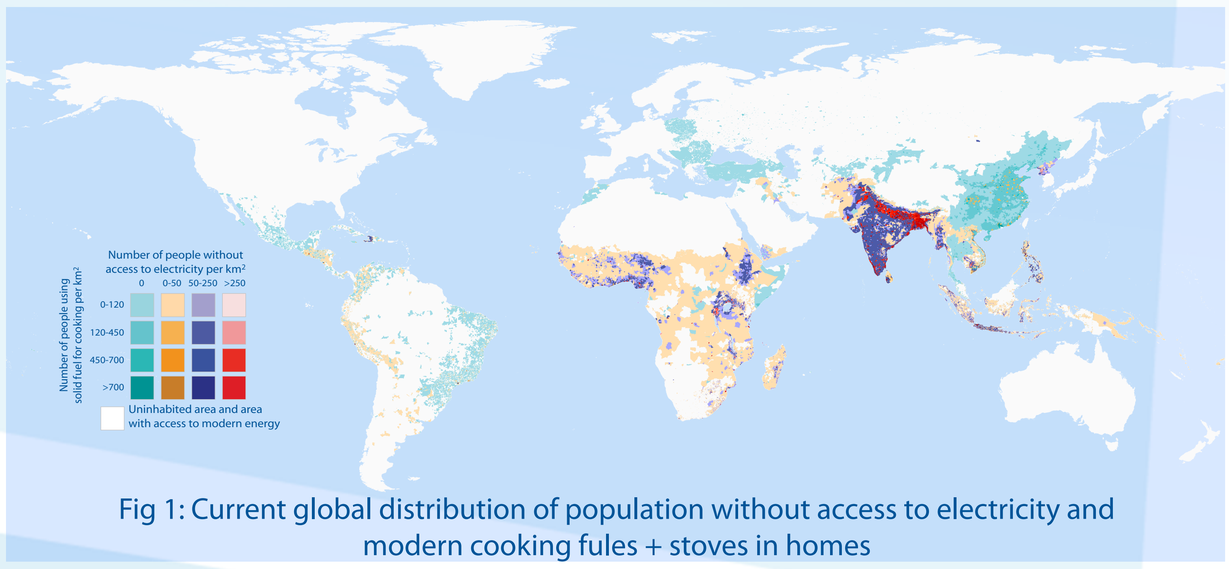

Fig 1: Current global distribution of population without access to electricity and modern cooking fules + stoves in homes

- A lack of access to modern energy has negative consequences for human health, well-being, and productivity. It also contributes to damages to the local and global environment.
- Without additional new policies and targets, we estimate by 2030:
  - The number of people dependent on solid fuels may rise from current levels due to population growth;
  - About 800 million people in rural South Asia and Sub-Saharan Africa will stay unelectrified.

Analysis - Methods & Model

We started with a bottom-up assessment of existing energy demands, choices, access, income levels and ability to pay of diverse household groups, distinguishing between rural and urban regions and five or more expenditure quintiles or classes. We focused on those regions where the existing access gap is the largest.

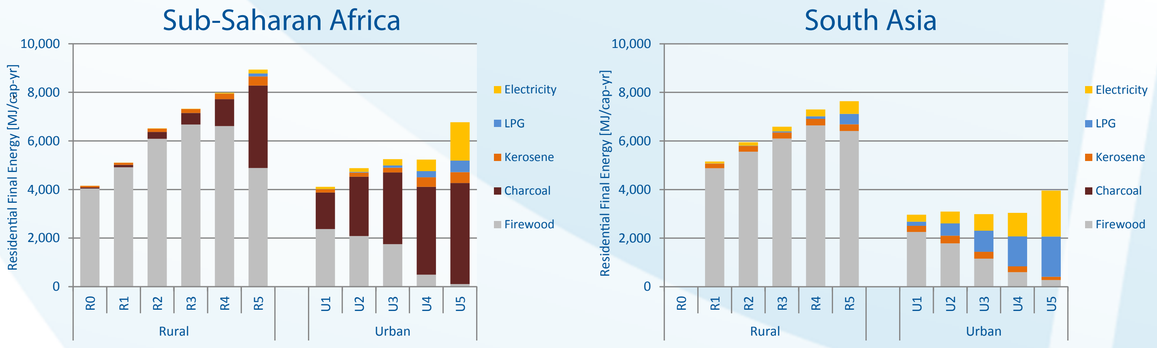

Fig 2: Household energy use patterns across rural and urban expenditure quintiles in 2005

Using IIASA projections of urbanization, income growth and population growth, we then estimated how household energy demands were likely to develop over the next two decades.

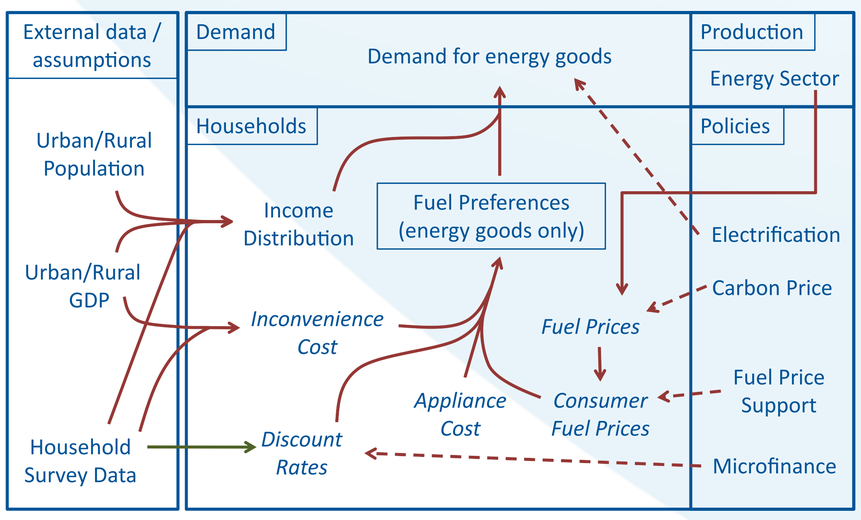

Fig 3: Schematic overview of the MESSAGE-Access Model

These data inputs and projections were used to calibrate a dynamic linear optimization model – MESSAGE-Access to assess the likely impacts of alternative policy scenarios for achieving access goals by 2030.

Results – Costs Significant, But Potential Benefits Multiple

We estimate that universal access to modern cooking stoves and fuels and complete rural electrification by 2030 is achievable in South and Pacific Asia and Sub-Saharan Africa if additional investments of USD_{2005} 62 billion are made annually (~ 5% of global energy sector investments today).

Dedicated policies and targets will be needed to achieve these goals. Universal access to modern cooking stoves and fuels can most effectively be achieved only when policies that lower modern fuel costs (e.g. subsidies on LPG) are implemented in combination with policies that lower modern stove costs (either through cheaper credit from microfinance institutions or grants for stove purchases).

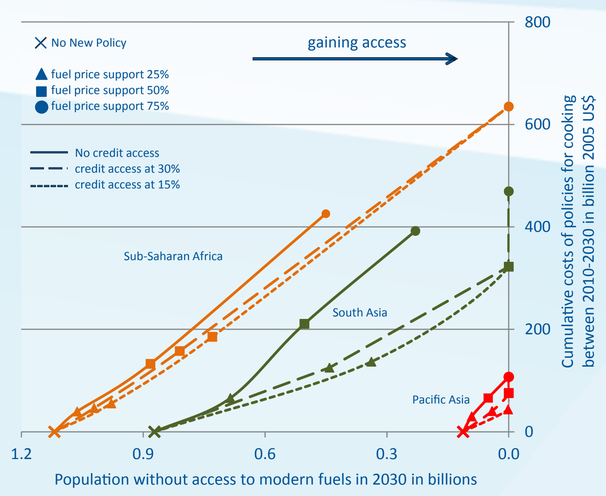

Fig 4: Relative cost-effectiveness of fuel price support (FPS) policies and microcredit schemes for stove prchases

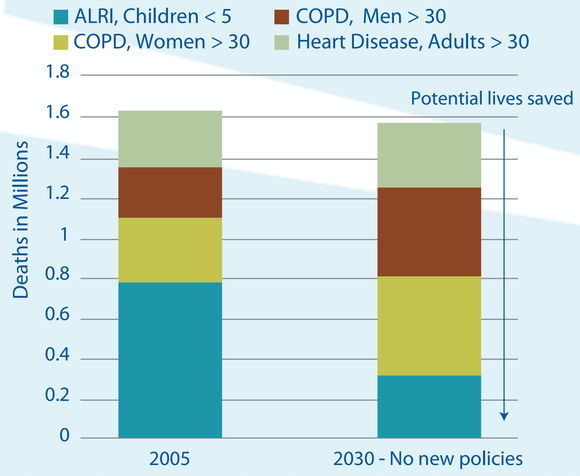

Fig 5: Premature deaths attributable to solid fule use in homes

The successful implementation of such policies can result in multiple benefits. The most important of these are improvements in human health. About 1.5 million lives could be saved in 2030, if all households gain access to modern fuels and stoves.

Household demand for electricity and modern cooking fuels will rise due to improved access to these energy carriers, but total household final energy use could decrease because of large efficiency gains of transitioning away from the current inefficient use of traditional solid fuels and kerosene/paraffin. The total greenhouse gas emissions impacts are thus also, likely to be negligible.

Conclusions and Policy Implications

- Ambitious targets and dedicated policies are vital to achieving universal modern energy access goals by 2030.
- Additional investments of USD_{2005} 62 billion per year are required till 2030, necessitating extra financing from governments, the international community and private sector.
- Technological options and program design need to be context specific, locally accepted and integrated with wider developmental and poverty alleviation efforts.
- Significant capacity building is required to support deployment of new technologies in remote rural regions and provide innovative financing mechanisms to make these technologies affordable at a commercial scale.
- Tying income generation policies to energy access policies is desirable to raise living standards and improve the viability of such efforts in the longer term.

For Further Details Refer to:

Riahi, K. et al., 2012: Chapter 17 - Energy Pathways for Sustainable Development. In *Global Energy Assessment - Toward a Sustainable Future*, Cambridge University Press, Cambridge, UK and New York, NY, USA and the International Institute for Applied Systems Analysis, Laxenburg, Austria, pp. 1203-1306.

Pachauri, S. et al., 2012: Chapter 19 - Energy Access for Development. In *Global Energy Assessment - Toward a Sustainable Future*, Cambridge University Press, Cambridge, UK and New York, NY, USA and the International Institute for Applied Systems Analysis, Laxenburg, Austria, pp. 1401-1458.