

## Keywords

South-south, stacking, integrated portfolio, hybrid flexi-fuel options.

**Paradigm shift** on the “cooking issue”, rejecting the binary approach of clean and dirty, not only focused on stoves or ‘chasing tiers’ but on an integrated portfolio of options, for both urban and rural settings with multiple approaches.

**Integration** of cleaner cooking with other policies, programmes and initiatives, recognising the different pathways, complemented with emerging ingenuity, participatory approaches, and local technology development to achieve a clean cooking space.

**Creation and diffusion** of Regional Cleaner Cooking Innovation Hubs in the Global South focused on participatory research and development (R&D) where researchers work with users.

**Appropriate financial** incentives for implementation programs that reward sustained adoption and use, funded by public and private investment and subsidies for cleaner biomass cooking.

## Paradigm Shift

### Caveats of pushing ‘silver bullet’ cooking fuel solutions in a rapidly changing global context.

More than a third of humanity relies on cooking with solid fuels, typically using inefficient and smoky stoves with extremely unhealthy and climate forcing emissions. Attention at policy level is focussed on replacing biomass fuels with cooking gas and electricity, with limited success.

First, the UN acknowledges that, despite policy interventions aimed at increasing access to “modern” fuels, the absolute number of biomass users for cooking will actually increase globally by the year 2030.

Second, even when available to local populations, modern fuels are usually stacked with traditional fuels and devices, reducing or even eliminating their positive health and other impacts.

Finally, to avoid dangerous climate change, many nations have agreed to radically reduce fossil fuel use in the coming two decades. Within this period, technology and investment will aim to reach a radically different energy system. How will the fossil fuel industry respond? What will be the availability and price of LPG over the next few decades? For many analysts, the current rapid increases in fuel prices are signals of a new period of high energy prices. Also, the major economic crises related to the Covid pandemic, particularly in more exposed developing economies, aren’t going to go away soon. Subsidies on LPG (e.g. India) and electricity have been removed and there have been huge price hikes in gas, electricity and coal. As a result, many households are switching back to open fires either fully or partially.

### Our Approach

We argue that the only way to achieve cooking energy security for everybody by 2030 is to promote a diversity of integrated solutions, including proven cleaner options fueled by biomass. Biomass options should be promoted as for many million people, particularly the poorest, this fuel will be the only accessible fuel for decades. Most biomass for domestic energy is harvested sustainably and its renewability can be enhanced with investment in sustainable fuel supply chains and with better landscape management (i.e. biomass comes from many sources, not only

forests, including residues from agriculture, etc.).

There are many proven solid biomass stoves that can provide tangible benefits to local users and the global environment.

We challenge the notion that ‘clean and dirty fuels’ can be defined a priori. This is because ‘dirty emissions’ from incomplete combustion are not inherent in the fuel but a matter of how you refine and burn each fuel in a specific device.

We also question the concept that a single ‘stove-fuel’ combination that is ‘clean’, narrowly defined in terms of its local health impacts, can provide long-lasting and widespread solutions for most people that currently rely on solid fuels. The binary analysis of cooking patterns and preferences being clean or dirty is not realistic, especially if one considers the daily parallel use of multiple fuels and devices.

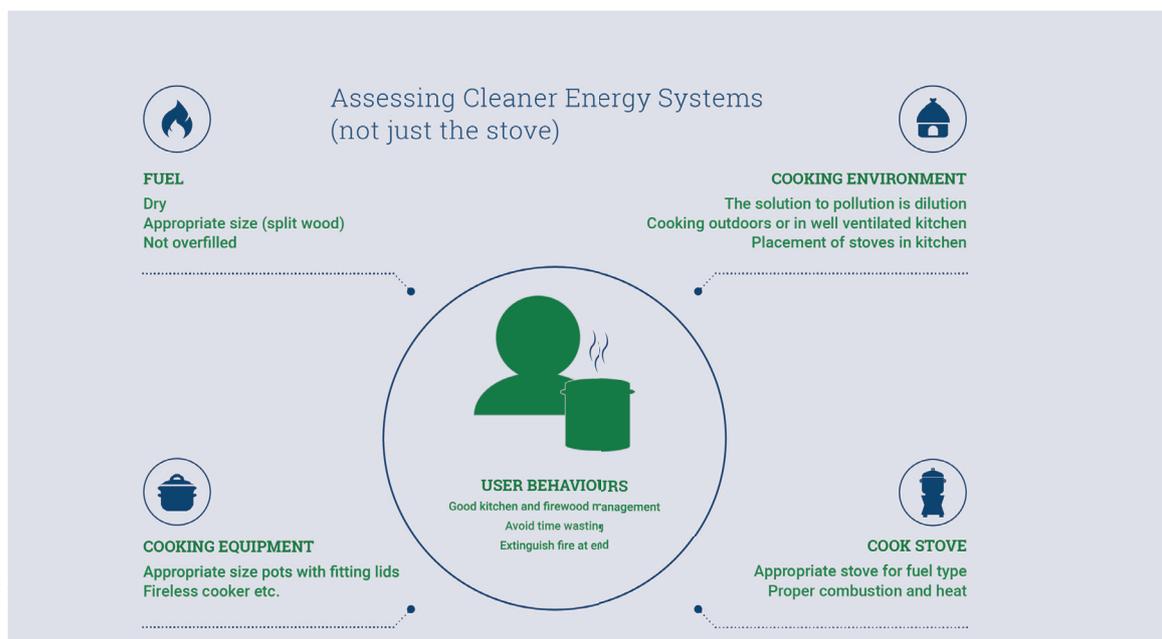
We urge transition to cleaner cooking systems based on proven solutions that meet local needs, beginning with the poorest. To reach this goal, context-based participatory innovation where researchers and designers work with users need to be promoted.

### From stoves to cooking systems and “healthy” households

The cleaner cooking challenge is often addressed by placing the responsibility solely on one stove-fuel combination to make the place of cooking ‘clean’. We contend that **we need to assess and improve the entire household energy system**, starting with an understanding of the services provided by traditional fires that are to be replaced or upgraded (Graph 1).

Open fires serve many uses (e.g., cooking, water heating for bathing, heating during winter, smoking food, roof protection etc.) that cannot be covered by a unique improved stove-fuel combination

**Graph 1:**  
Cleaner energy systems



(see Graph 2). As a result, people STACK new and traditional stoves and devices. Therefore, **more effective interventions should develop and promote “cleaner stacking options”**.

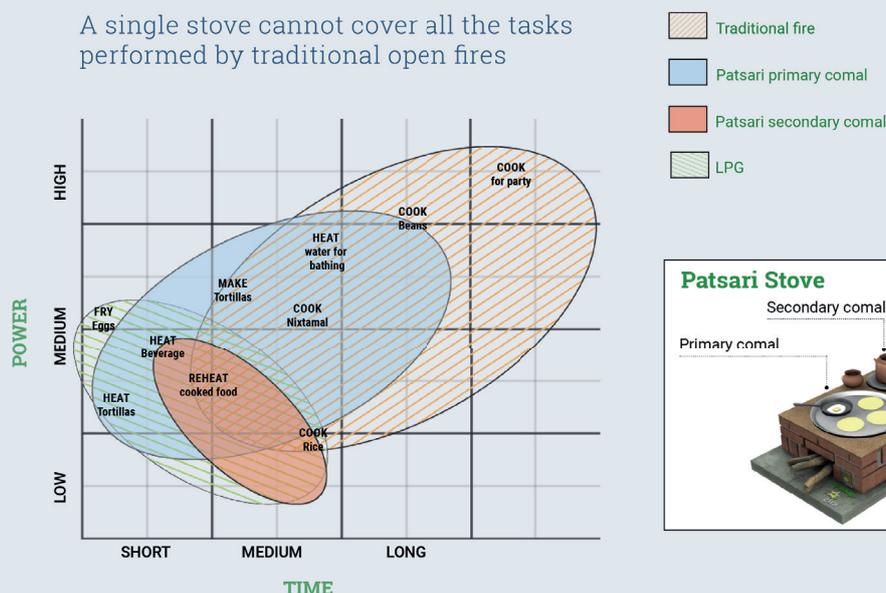
Also, interventions need to look beyond changing stoves and fuels. There are multiple cost-effective and simple options that have been largely neglected by the international development community that can have similar or more health and/or environmental impacts. Examples of these options include retrofitting existing stoves so they burn more cleanly, improving ventilation where people cook, drying wood, or improving cooking practices (Box 1).

**Box 1:**  
Improving the cooking system:  
beyond changing stoves or fuels.

### Interventions beyond stoves and fuels:

- With a simple accessory such as the JetFlame fan, even in the most basic stoves, the combustion efficiency can be radically improved.
- Ventilation can be greatly improved just by moving the cooking outside by using portable devices, or through the use of a cleaner chimney or eaves spaces.
- Improved practices can be promoted, such as using only dry wood or pellets, soaking beans overnight and using a lid while cooking for better nutrition and efficiency.
- For non-combustion fuels like electricity, extractor hoods are required because of the way people cook, which shows how some emissions are independent of the fuel and device.
- Making use of cooking equipment such as pressure cookers, food warmers and retained heat cookers, etc., can also be encouraged.

A single stove cannot cover all the tasks performed by traditional open fires



**Graph 2:** An example from Mexico of why it is difficult to replace traditional open fires, with its variety of ‘services’ albeit inefficiently delivered, with ONE improved cook-stove<sup>2</sup>.



### Health impacts: from stoves and fuels to kitchens and the household energy system

The household indoor air quality that the World Health Organisation prescribes, very often cannot be achieved by interventions narrowly addressing the cooking stove-fuel dynamics. It requires a broader and deeper understanding of the ‘kitchen’ (i.e. the physical, familial, cultural space in which cooking happens). As in most communities across the world, at the centre of the ‘kitchen’ are women, interventions should see them as an active co-creator rather than a passive recipient of technology.

Cookstoves have been graded on ‘tiers’ of performance and “health impacts”, based primarily on thermal efficiency and emissions tests conducted in controlled laboratory conditions. Consequently, there is a ‘chasing the tiers’ tendency in research, technology dissemination and policy making that focuses on technical parameters that do not capture the reality of parallel use of multiple fuels and devices. Also, isolated lab tests can validate technological development but have limited value in understanding real world household energy dynamics.

### Context-based solutions - different pathways - leaving no one behind

The design of interventions should be governed by the principle of “leaving no-one behind”,

meaning reaching every single household and institution, not just the majority. Reaching the hard-to-reach and those who can least afford access should be a priority. In Malawi, for example, many ultra-poor and labour-constrained households received cleaner cookstoves to reduce the burden of sourcing firewood through a national social protection programme called the Social Cash Transfer Programme. In this case the most vulnerable, as identified by local authorities, were specifically targeted as a strategy to include everybody.

We need to understand a ‘galaxy’ of preferences and needs based on local realities, such as specific cooking practices, the availability of local fuels and resources, seasonality of supply, load sharing of electricity, among others. From this understanding and appreciation, we can propose a multitude of solutions.

Which are the best solutions and the way to get them implies different things for different people. Many viewpoints come together on the issue of air quality, so it is paramount to avoid working in isolation and recognise the interdependence of the environment, public health, climate, gender, self-help and self-sufficiency.

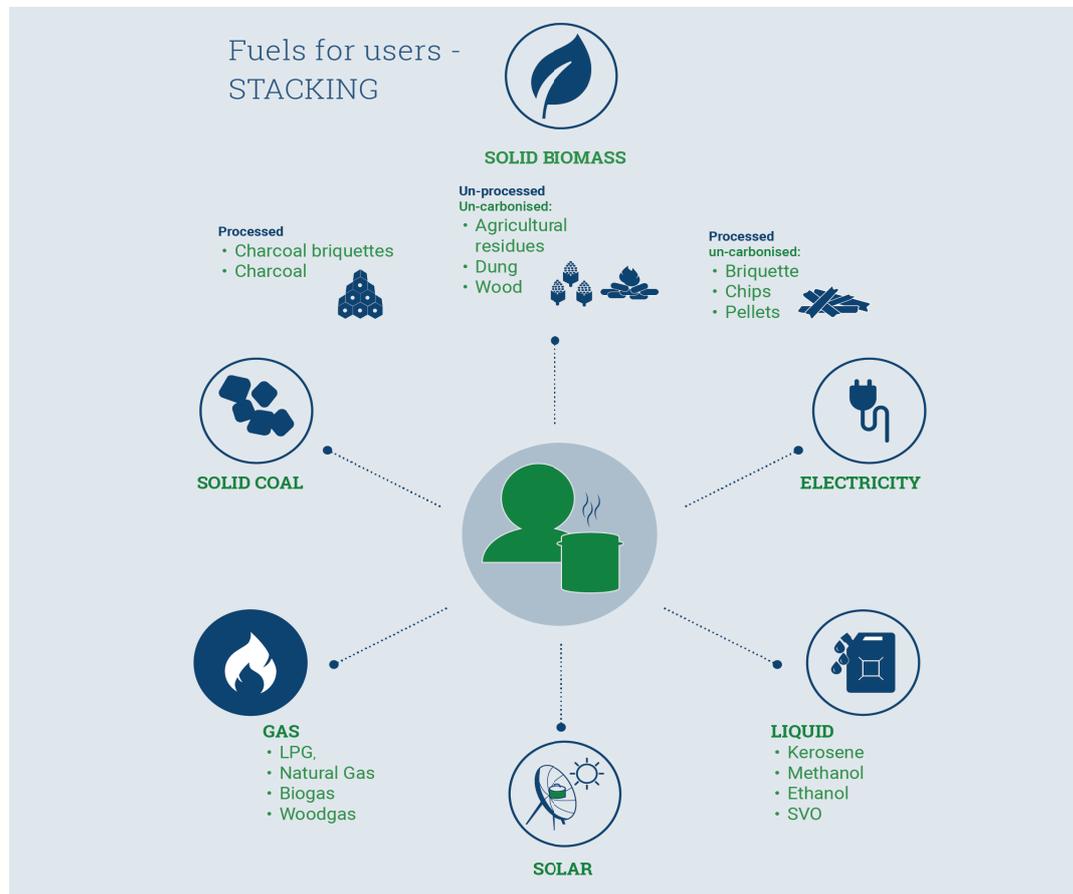
Cleaner cooking practices can be integrated into many public health and education programmes. They can be used as an ‘entry point’ tool to promote better nutrition and better-balanced

diets. Indeed, sustainable fuel supply chains can be a part of agricultural, forestry and natural resource public and private initiatives.

### Ambient and Household Air Quality’

The air quality in and around where people live, particularly in tropical countries where there isn’t such a clear divide between household and ambient, is also critical. In highly urbanising areas of India, for example, ambient air quality itself varies between poor and extremely poor, mainly as a result of industrial, vehicular and crop burning pollution. In such a context, what effect would the ‘cleanest’ stove-fuel combination, even if extensively used, have for people’s health? Unless there is a concerted effort focused on improving overall air quality, the health benefits of clean cooking energy cannot be fully achieved. If we think of smoke from residential use of solid bio-fuels as ONE of the MANY contributors to air pollution that changes the overall perspective. If a low-cost, user-friendly cook stove results in lower than baseline pollution it should be considered as an effective intervention towards solving the air pollution problem (which requires many other things to happen, most of them totally unrelated with the ‘kitchen’).

Graph 3 Stacking:



### Not just rural... Hybrid model - the renewable stack

In a climate changing world, electricity and cooking gas aren't necessarily the 'final destination' even for urban households. Currently, almost 1.8 billion people globally, who have access to electricity, for example, continue to mainly use solid biofuels. What's more, for those currently reliant on fossil fuels, there can and should be an urban transition to renewables.

It is not irrational to consider off-grid renewable energy options for urban populations to prepare for fossil-fuel-free net-zero cooking. In India, Samuchit Enviro Tech, OrjaBox and Chakrakar Lifestyle Solutions, for example, are working with urban households and small eateries to promote decentralised renewable energy for cooking by using solar cookers and cleaner cookstoves operating on locally available waste biomass, renewable charcoal and biogas from food waste and toilet waste.

In an urban setting with different levels of purchasing power there can be a combination of stoves and fuels, with hybrid and flexi fuel options, using various payment modes, such as rental and pay-as-you-go, which offer flexibility and autonomy.

#### Box 2: The OrjaKsahm Concept

Through 'cooking for climate' events, renewable energy enthusiast Vishakha Chandhere promotes the OrjaKsham (Energy Enabled) concept and established a model renewable energy kitchen set up fueled by solar energy and biofuels made from urban organic waste. This was done to demonstrate the concept of a renewable energy fueled urban food stall. The facility is currently being used for demonstrations and training. Her company OrjaBox also rents out the devices before sale, so that people can experience the device and taste the food prepared this way.

### Appropriate Policies and Incentives - Unsustainable subsidies...

To be easy to access and use, cleaner ways of cooking that are convenient, need to be affordable. Without the large subsidies and with existing price hikes in LPG, many people can't afford to buy gas and their only other

option is using firewood - often on open fires.

Also worrisome is the scarce funds that are currently spent on R&D in biomass cookstoves. For example, the Indian Government's policy of only subsidising LPG, effectively ended the public investment in Research and Development (R&D) for improving biomass fueled cooking energy systems, which serve half of the country's population as their main source of cooking energy. The top-down policy, involving massive contracts to oil and gas companies, proved unsustainable for the fuel it promoted. What's more, it didn't sustain the intended change in behaviour.

Using public funding and incentive mechanisms to foster household energy transition to cleaner cooking system can be justified from various angles. The World Bank estimates the health, environmental and fuel costs of not investing in cleaner cooking are trillions of US dollars annually. Learning from PMUY in India and given that billions of people will rely on burning biomass for their everyday cooking needs for decades to come, public investment in making cooking with biomass cleaner is necessary and urgent.

Appropriate financial incentives for cleaner cooking interventions, in the form of credits or subsidies, should be:

- payable on demonstration of sustained adoption and use of cleaner cooking practices
- independently verified
- target and serve last mile, most difficult to reach, labour constrained and those most vulnerable
- delivered by local social enterprises with access to working capital and reasonably priced finance.

We need investment in R&D for those that do not use cooking gas and rely on solid biomass. Not every household will switch everything over to electricity. Promoting Regional Innovation Hubs is urgently required where researchers work with users on people-centred design to meet local needs and preferences (See Innovation Hubs Digest). South-South cooperation, innovation and learning needs to be facilitated and these Hubs can advance training and capacity-building and provide inputs for the green education curriculum.

## Moving forward: Towards sustainable cooking for all (really!)

- Paradigm shift on the “cooking issue”, rejecting the binary approach of clean and dirty, not only focused on stoves or ‘chasing tiers’ but on an integrated portfolio of options, for both urban and rural settings with multiple approaches.
- Integration of cleaner cooking with other policies, programmes and initiatives, recognising the different pathways, complemented with emerging ingenuity, participatory approaches, and local technology development to achieve a clean cooking space.
- Creation and diffusion of Regional Cleaner Cooking Innovation Hubs in the Global South focused on participatory research and development (R&D) where researchers work with users.
- Appropriate financial incentives for implementation programs that reward sustained adoption and use, funded by public and private investment and subsidies for cleaner biomass cooking.

The Cleaner Cooking Coalition (CCC) promotes universal access to sustainable cooking energy - Our focus now is driving global recognition of the immediate need to transition to cleaner cooking on our journey towards ‘clean’ renewable solutions - leaving no-one behind.

### Contact

CCC welcomes feedback via:  
info@cleanercooking.org  
@CookingCleaner

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## NOTES

1. Environmental Burden of Traditional Bioenergy Use, Annual Review of Environmental Resources, Masera, O. et al, 2015.
2. Ruiz, Ilse & Masera, Omar. (2015). Patterns of Stove Use in the Context of Fuel–Device Stacking: Rationale and Implications. EcoHealth. 12. 10.1007/s10393-015-1009-4.
3. <https://www.sciencedirect.com/science/article/pii/S0386111221000133>
4. It was estimated by IEA that in 2020 more than 2.6 billion people lack access to clean [cooking](#) facilities, relying instead on solid biomass, kerosene or coal as their primary cooking fuel while 770 million people lacked access to [electricity](#) in 2019.
5. In India, more than 95% households now have access to LPG connection, with a rapid increase driven by the Pradhan Mantri Ujjwala Yojana (PMUY) since 2016. This programme, which had an initial budget allocation of ₹80 billion (\$1.1 billion), drove a 56% increase in the national consumption of LPG between 2014 and 2019. It is reported that, since July 2019, PMUY, without official communication, has not paid the subsidy into targeted gas users’ bank accounts.

