

BEYOND FIRE

HOW TO ACHIEVE ELECTRIC COOKING

Achieving sustainable cooking is one of the great challenges of our time. An estimated 4 million premature deaths are caused each year by indoor air pollution due to existing cooking practices still widespread in many parts in Southeast Asia, Latin America, and Africa. Also, the use of firewood and charcoal for cooking puts significant strain on already stressed forest resources and is the single largest source of greenhouse gas emissions (GHGs) in certain developing countries, significantly exacerbating the negative effects of global climate change.

UNDERSTANDING THE CHALLENGE

Over the past decades, the focus in the cooking sector has been on promoting improved cook stove technologies. This has however failed to fundamentally transform the sector. Cultural/behavioral aspects have hampered the uptake of clean cooking technologies and new appliances have never truly competed with traditional ways of cooking and have often failed to scale.

COMPARING SOLUTIONS

Recognizing the clean cooking challenge in terms of impact and finding solutions, in 2016 Hivos and the World Future Council (WFC) looked into alternatives that provide long-term answers rather than quick intermediate fixes. In doing so, the two organizations commissioned research that compared existing cooking technologies. At that time, the report concluded that sustainable solutions are available but some, including electric cooking, were still too expensive to compete with the traditional way of cooking and there was a need for further R&D and market development.

Last year, Hivos and WFC decided to recommission the analysis in light of current cost trends, resulting in a new report: 'Beyond Fire: How to achieve electric cooking'. This new study calculates the costs range for cooking with various different appliances in which both the upfront costs, as well as the ongoing usage-related costs are taken into account.

Cooking appliances examined are solid fuel based stoves (wood and charcoal) gas based stoves (LPG, biogas and power to gas) and electric cooking (electric hot plate, induction stove, slow cooker and pressure cooker) in both mini-grid contexts and via solar home systems.

3 bn

citizens worldwide rely on open fires and simple stoves to cook their food.

93%

of households in Sub-Saharan Africa rely on wood energy for their daily cooking needs.

1 GJ

or 35kg charcoal, or 60kg firewood is used per person per year.

30%

of the population in Sub-Saharan Africa lives on less than USD 1.25/day.

ELECTRIC COOKING, A VIABLE SOLUTION

The findings of the research shows that the costs of sustainable cooking with electricity both in mini-grid contexts and via solar home systems is well within the range of cost-competitiveness of traditional cooking alternatives such as LPG, firewood and charcoal. The World Bank's bottom-up research from 2014 across Sub-Saharan Africa indicate that households spend on average between EUR 1 – EUR 31/month on cooking fuels.

Looking specifically at electric cooking with **Solar Home Systems (SHS)**, the cost analysis shows that the costs per household currently range from EUR 5 to EUR 15 per month, depending on the specific system configuration and usage patterns (over a 20-year period, with regular inverter and battery replacements). Without factoring in such replacements, the entry-level cost for a SHS equipped to supply cooking needs ranges from EUR 15 – 54 per household per month.

Depending on the size and total electricity demands of the village, the costs per household of cooking with a **mini-grid** currently range from approximately EUR 4 to EUR 36 per month (assuming 2-hours of cooking per day on average). This indicates that mini-grids have tremendous potential to help households reduce their reliance on firewood and charcoal and transition to more sustainable forms of cooking. In addition, including cooking loads into mini-grid environments could also help improve the economics of mini-grid systems by creating more demand, particularly during the daytime when demand is quite low.

For both SHS and mini-grids, especially slow and pressure cookers have a tremendous cost-saving potential in the long run, despite their higher upfront costs. Slow cookers and pressure cookers household cooking costs range between EUR 15 and 21/month for SHS and between EUR 3.56 – 9.53/month for mini-grids (see bar chart below).

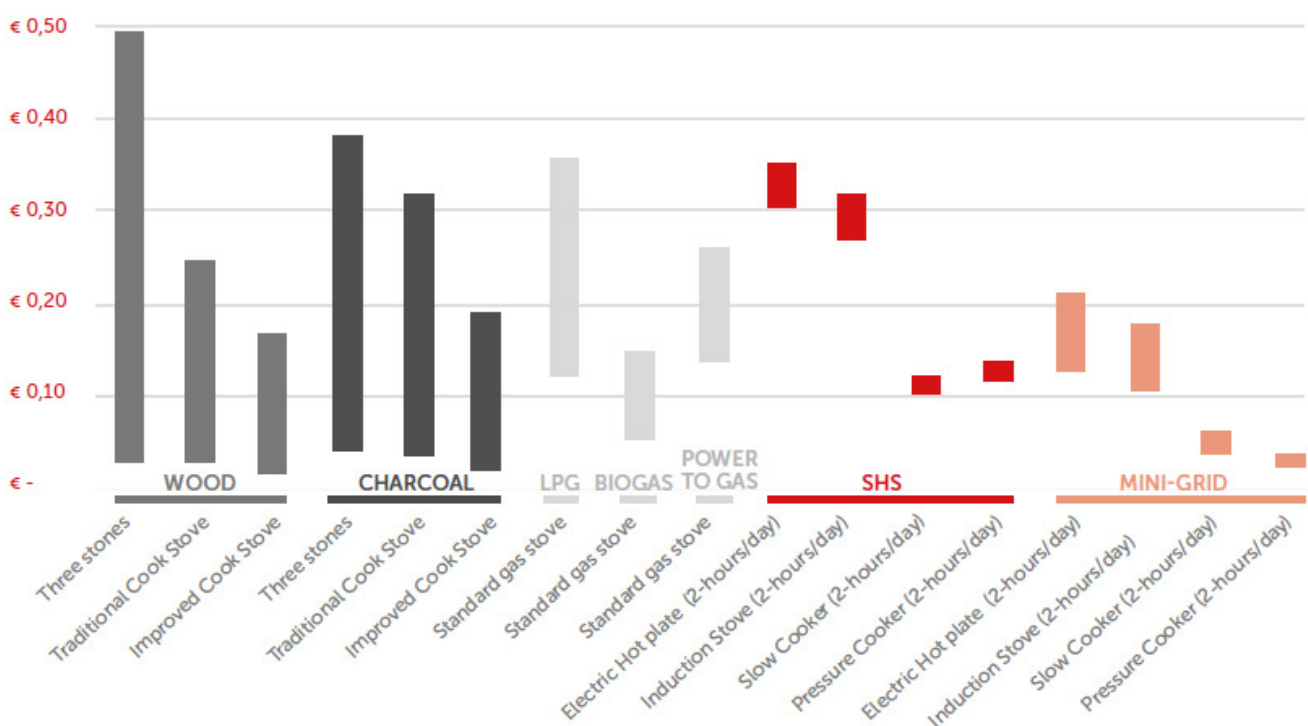


SHS
5-15 EUR/Month



Mini-grid
4-36 EUR/Month

Cost Ranges of Various Cooking Technologies (person/day in EUR)



DROPPING COSTS

One of the reasons for the significant improvement in the economic viability of electricity-based cooking options is the rapid cost declines that have occurred in both solar modules and battery costs in recent years. Since early 2016, the cost of solar and storage systems have dropped by between 30-50%, and continue to decline as markets scale-up and technologies improve. But maybe even more significant is the use of high-efficiency cooking appliances, which helps to reduce electricity consumption as well as the total size of the solar PV and battery systems required to run cooking appliances. The system-level savings of adopting high-efficiency end-use appliances have the potential to mirror the transformative effects that low-cost LED lighting has had in the off-grid solar sector.

82%

Cost decline for solar since 2010

76%

Cost decline for Lithium Ion battery packs since 2010

6 STEPS TO ACHIEVE SUSTAINABLE COOKING

In order to really transform the cooking sector into healthy and sustainable practice and put electric cooking firmly on the map, a long way still has to be traveled. The upfront costs in purchasing electric cooking technology is a big hurdle to overcome. To accelerate the transition:

- 1. Governments need to set clear goals to transition away from firewood and charcoal.** The current energy strategies being developed by national governments and donor community for most of Africa and Asia are not doing enough to drive a meaningful transition away from firewood and charcoal toward sustainable cooking solutions.
- 2. Stakeholders spanning governments, foundations, donors, investors and others involved in financing projects in the cooking sector need to allocate more resources to provide affordable consumer finance.** This is critical to support the transition toward sustainable cooking.
- 3. Governments should introduce policies and incentives to reduce upfront costs.** This can involve targeted grants to encourage adoption or an approach that involve the targeted use of tax or duty exemptions, such as those frequently offered on solar PV components, or on high-efficiency cooking appliances such as electric pressure cookers.
- 4. Governments should undertake root-and-branch reform of fossil fuel subsidies, which often benefit middle and upper-income residents, and re-allocate them to support a rapid scale-up in sustainable cooking technologies.** Re-allocating fossil fuel subsidies to accelerate the transition toward sustainable cooking would bring massive and lasting benefits to sustainable development, and would contribute significantly to re-balancing the major inequities that continue to persist between urban and rural regions.
- 5. Governments and donors around the world need to fund a greater range of R&D projects, including projects to demonstrate the viability of sustainable cooking solutions.** Such initiatives could focus specifically on providing further analysis of cooking with different electric appliances such as slow cookers, pressure cookers and even infrared cookers, as well as to support the scale-up of new business models in the cooking sector.

6. International climate finance should be mobilized to play a far greater and more direct role in supporting the transition to sustainable cooking, including through innovative mechanisms such as the Green Climate Fund and the wider use of climate bonds. Scaling up sustainable cooking represents one of the most significant opportunities worldwide to generate major climate change mitigation and adaptation “win-wins”: reducing reliance on traditional fuels such as firewood and charcoal, improving human health, while helping to preserve forest ecosystems and improve (or maintain) overall ecosystem resilience.

In light of the estimated USD 110 Billion in annual costs to human health, to the environment, and to local economies caused by the use of solid fuels like wood and charcoal for cooking, it is finally time that the transition to sustainable cooking be given the priority it deserves. Although this transition is still in its infancy in many parts of the world, there are promising signs that the technical and business model innovations are already available to make the transition possible worldwide. With sufficient political will at the highest levels, combined with appropriate financial resources, it is indeed possible to imagine a world that has truly and finally evolved “beyond fire”.

'Beyond Fire: How to achieve electric cooking' was commissioned by Hivos and World Future Council and prepared by Toby D. Couture (E3 Analytics) and Dr. David Jacobs (IET - International Energy Transition GmbH)

The publication is freely downloadable from our website:

<https://greeninclusiveenergy.org/publication/beyond-fire-how-to-achieve-electric-cooking/>



WWW.GREENINCLUSIVEENERGY.ORG

About WFC

The World Future Council consists of 50 eminent global change-makers from governments, parliaments, civil society, academia, the arts and business. We work to pass on a healthy planet and just societies to our children and grandchildren with a focus on identifying and spreading effective, future-just policy solutions. The World Future Council was launched in 2007 by Jakob von Uexkull, Founder of the 'Alternative Nobel Prize'. It operates as an independent foundation under German law and finances its activities from donations.

About Hivos

Hivos is an international organization that seeks new solutions to persistent global issues.

With smart projects in the right places, we oppose discrimination, inequality, abuse of power and the unsustainable use of our planet's resources.

Hivos works towards a green society that has no expiry date. A society powered by renewable energy.

Hivos
people unlimited