

Sustainability Assessment of Improved Cookstove Dissemination



The Development Assistance Committee of the Organisation for Economic Co-operation and Development (OECD-DAC) defines sustainability as “1) the continuation of benefits from a development intervention after major assistance has been completed, 2) the probability of continued long term benefits, and 3) the resilience to risks of the net benefit flows over time.”¹

Thus, a development project would be considered sustainable if its achievements continue in the long term. It needs to generate measurable impact and outcomes even after all external support has ended. Therefore, an *ongoing* project’s sustainability can only be estimated by approximating the project’s long-term impacts.

Since the late seventies, stove projects have been carried out all over the world. Thus, experiences on dissemination and promotion of improved cooking stoves are numerous. Many of these projects and experiences have been evaluated by the implementing agency or by donors. One comprehensive evaluation of successes and failures was carried out by the World Bank in 1994.²

Over the last 30 years, GIZ³ has gained a lot of experiences in supporting the dissemination of efficient stoves. Based on its own lessons learnt and with reference to the World Bank review, GIZ’s programme on Poverty-oriented Basic Energy Services (HERA) has now developed a detailed list with indicators for assessing sustainability.

GIZ HERA differentiates between two sustainability categories:

1. Sustainability criteria which assess whether the changes induced by the project are sustainable or not; and
2. Sustainability factors, which influence the probability of achieving sustainable results.

a) Sustainability criteria

Four elements are used as measurable sustainability criteria for improved cookstove programs: penetration rate, usage rate, maintenance rate, and replacement rate. The importance of building up markets for improved cooking stoves (ICS) is one of the lessons learnt during the last decade. However, not only are the production and sale of a big number of improved stoves important, but also the stoves’ usage and, ultimately, their replacement when broken are vital elements for a sustainable stove market.

¹ „Glossary of Key terms in Evaluation and Results Based Management“ OECD-DAC Working Group on Aid Effectiveness. 2002.

² „What makes people cook with improved biomass stoves? An international review of stove programs.“ Barnes, Openshaw, Smith, van der Plas. May 1994. World Bank Technical Paper Number 242

³ Until January 2011 Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH was known as Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ).

b) Sustainability factors

There are many factors which may positively or negatively influence the penetration, usage, maintenance, and replacement rates of improved stoves. GIZ HERA differentiates between five different categories of factors. These are factors which:

- influence producers to continue producing and selling ICS,
- promote continued high demand for ICS,
- encourage ICS users to use, maintain and replace their stoves and,
- enhance a supportive political framework for ICS markets,
- reduce market vulnerability.

However, it is difficult to determine the relevance and influence of each factor. Depending on the context of the project and the approaches used, these factors can play very different roles. Therefore, the weight given to each factor must be carefully thought out.

This framework for sustainability assessment refers mainly to local artisanal or semi-industrial stove production. Many of the factors might also apply for imported stoves. However, the import of products raises further questions that are not fully considered here, as GIZ's focus has been on supporting the development and promotion of local production and demand.

Sustainability Criteria for Improved Stove Dissemination	Comment	What to measure?
Penetration rate	The higher the penetration of ICS amongst the target group, the more sustainable is the achievement (self-sustaining market; motivation through example by others)	Penetration rate: $\frac{[(\text{ICS owners} \times 100)]}{(\text{total sample size})}$
Usage rate	Experience shows that some households acquire an ICS for other reasons than its usage. Hence the ICS ownership alone is not a reliable indicator for the sustainability of the behavioural change. The higher the usage of the ICS, the more accepted is the technology by the users; hence a more durable change of behaviour is achieved.	Usage rate: $\frac{[(\text{ICS users} \times 100)]}{(\text{ICS owners})}$
Maintenance rate	Continuos maintenance, including minor repairs, shows appreciation by the users and a preparedness to invest resources into the preservation of the ICS.	Maintenance rate: $\frac{[(\text{ICS maintained} \times 100)]}{(\text{ICS users with decision on maintenance})}$
Replacement rate	If an ICS is damaged beyond repairs, the household is exposed to the ultimate sustainability test: going back to the baseline stove or replacing the old ICS with a new one.	Replacement rate: $\frac{[(\text{ICS replacement households} \times 100)]}{(\text{households with replacement decision})}$

Sustainability Factors for Supply			
=> Factors which influence ICS producers to continue producing and selling ICS			
Sustainability Factors	Indicators	What to measure?	Comments
Stove production and sales continue on the same or a higher level (sales figures) after project implementation	Absolute and relative number of stoves produced and sold are the same or higher compared to the project's end	Number of stoves produced; Number of stoves sold; compared to "baseline" (production and sales at the end of the project implementation)	
Capacities of all actors of the ICS value chain (technical skills, business skills) and knowledge-transfer	<p>Business skills: Record keeping of purchase, production, sales figures Pricing</p> <p>Technical skills: Quality of stoves</p> <p>Maintenance services</p> <p>Competence to instruct users in the right usage</p>	<p>Existence of a business plan Existence and quality of record keeping Producers/retailers consider costs of stove materials, labour, marketing in pricing their products</p> <p>Quality of stoves according to production manual (and national/ international standards)</p> <p>Existence and quality of maintenance services (# of stoves maintained and user's satisfaction)</p> <p>Producer's own knowledge of right usage? Did consumers receive training?</p>	

	<p>Institutionalized training of producers (through existing producers and institutions)</p> <p>Degree of internal/ self-organization</p>	<p>Number of producers trained by existing producers or an institution/ NGO</p> <p>Producer/retailer associations - existence of responsibilities, tasks, budget?</p>	
Capacities of producers and retailers in marketing activities	<p>Consumer data: producers/retailers collection, monitoring of, and response to consumer data</p> <p>Producers receive feedback from users (through documents, oral responses, etc) on product usability</p> <p>Variety of marketing activities carried out by producers/retailers</p> <p>Inclusion of flexible consumer payment options</p>	<p>Knowledge of producers/retailers about usual customers, his/her needs and preferences regarding cooking technologies</p> <p>Awareness/knowledge of producers/retailers of users' feedback</p> <p>Marketing penetrates rural markets and urban slums through localized techniques (roadshows, demonstrations)? Public mediums used for promotion (billboards, radio)? Attractive brand been created?</p> <p>Does producer/retailer accept payment in instalments and/or in kind?</p>	

Sustainability Factors	Indicators	What to measure?	Comments
Stove production and sales/ trade is profitable	Price cover costs and creates profit for every actor in the stove value chain	Profit of producers of stoves or stove components (Income from stove sales minus material, labour costs of stoves produced, retailing and marketing costs, and, if so, taxes) Profit of sales persons (Income of stoves sold minus costs for purchasing stoves and retailing costs, e.g. stocking, publicity)	
Low vulnerability of input supply	Access to raw material	Availability of raw material (constantly available during the last 5 years and outlook for the future?) Price development of raw material during the last 5 years and outlook	
Stove producers and sales persons feel responsible for own business (ownership)	Producer's perception of their own business Producers make independent, informed business decisions	Producer's perception regarding his or her business Explanation of producers concerning their business decisions Investments, risk-taking of businesses	
Availability of access to (micro-) credits for producers and sales persons if needed	Micro-credits are accessible for producers and sales persons on reasonable conditions	Producers can make investments (if necessary) due to access to micro credits Producers can pay back credits	

Sustainability Factors for Demand/ Purchase

=> Factors which promote continued high demand for ICS from target households

Sustainability Factors	Indicators	What to measure?	Comments
High/ increasing "problem pressure" promotes continuous high demand for ICS (e.g. commercial/ high risk access to fuel)	Commercialized access to wood fuel in intervention area	Markets for wood fuel: Price of wood and its development Number of people buying fuelwood	
	Increasing pressure on wood resources	Number and percentage of people using wood fuels Statistical numbers for deforestation	
	Realisation of fuel wood scarcity	Perception of fuel wood scarcity	
	Awareness of health problems due to high indoor air pollution	Perception of health problems due to high indoor air pollution	
	Women face risks during fuel collection	Perception of risks during fuel collection	
Technical potential of ICS for convenient use	ICS accepts different types and shapes of fuel, is easy to light, heats water fast, respects traditional cooking habits and is safe	Time to boil (Water boiling test), safety protocols, appropriateness to cook traditional meals, fuel flexibility and easy lighting of stove	

Sustainability Factors	Indicators	What to measure?	Comments
Positive perception of ICS by target group	User's satisfaction with ICS: Better performance than baseline stoves Appealing appearance /design Purchase/ installation is "affordable" ICS is perceived by target groups as "convenient"	Awareness about benefits of ICS (efficiency, reduction of emission, saving of money and time) Users' perception of the ICS as modern and attractive Users' perception of convenient use Users' willingness to pay for ICS Purchasing power and consumer payback time	

Sustainability Factors for Demand/ Continued Use

=> Factors which encourage ICS users to use, maintain and replace their stoves

Sustainability Factors	Indicators	What to measure?	Comments
Users realize (observe) the benefits of using ICS	ICS performs better (benchmarks) than baseline stove Correct usage of stove Living conditions of women have improved Users can assess benefits of ICS use themselves and consider them as relevant for themselves	Saved fuel and time, reduce emissions and effort, increase safety (e.g. KPT), saved fuel costs correct usage of stove (regarding fuel and technology) Living conditions of women (less workload, less smoke, better working conditions in the kitchen) Users' awareness about benefits and relevance	Performance of a stove in a household is not only a function of the technology itself: correct user behaviour is also contributing to the users' realisation of the benefits of an improved stove.
ICS maintenance services are available, accessible and affordable	Households are able to access and afford maintenance services	Households' knowledge about maintenance services Location and accessibility of service providers Households' willingness and ability to pay for services Prices of maintenance services Condition of stove	If applicable. For example some stoves cannot be maintained and repaired.

Sustainability Factors	Indicators	What to measure?	Comments
Replacement of ICS or spare parts is accessible and affordable	Households are able to access and afford new stoves or stove parts	Households' knowledge about where to get new stoves or stove parts Location and accessibility of producers Households' willingness and ability to pay for stoves or stove parts Prices of stoves and spare parts	
ICS have predictable (good) quality	Variation between stoves of the same type is small with regard to: <ul style="list-style-type: none"> - Durability - Efficiency and Emission - Performance Long term (autonomous) quality control	Existence of, and producers' knowledge and usage of standardized production processes for stoves and stove parts (e.g. tools, moulds or industrial production) Life span WBT, CCT (using IAP meter for emissions) Institutions carrying out quality controls	

Sustainability Factors for Political Framework and Civil Society/ Social Environment

=> Factors which enhance a supportive environment for ICS markets

Sustainability Factors	Indicators	What to measure?	Comments
Recognition and Acknowledgement by politicians	Politicians perceive cooking energy as a relevant topic for domestic policies	Opinion of politicians from various sectors (energy, health, environment, forestry, agriculture, education, culture, gender etc.) Ranking of political priorities in various sectors (see above) Cooking energy outlook for the next 10 years	Governing as well as oppositional politicians have to be taken into consideration
Reflection of cooking energy in national policies and strategies with focus on enabling framework conditions for ICS markets (cross-sectoral: energy, health, environment, forestry, agriculture, education, culture, gender etc.)	Cooking energy is integrated in national policies and strategies: PRSPs, sectoral strategies, strategies contributing to UN conventions, etc. Existence of specific cooking energy strategies: BEST, national access targets, etc.	Literature reviews, PRSPs, BEST, sectoral strategies, etc.	

Sustainability Factors	Indicators	What to measure?	Comments
National strategies and policies are implemented to encourage ICS use and market development	Existence of national programmes: R&D, public R&D institutes, national standards for ICS, national campaigns, national awareness raising etc. (Government takes no direct role in production or distribution of ICS and spare parts) National funds for implementation are existent and accessible	Activities of public stakeholders (research institutions, public testing centres, National Bureaus of Standards, schools, forestry departments, extension services, local governments etc.) and respective financial budget lines	
Regulative mechanisms are supportive for a sustainable stove market	Taxation is influencing positively ICS value chain: raw materials (local and imported), stoves, income No import barriers on raw material for local production	Tax portion in production costs Financial plans for cooking energy in any ministries	Non-transparent regulative mechanisms (e.g.. abrupt changes in taxation) can influence negatively the stove market
Recognition and Acknowledgement by civil society/social environment	Representatives of civil society (relevant NGOs, faith groups, associations) perceive cooking energy as a relevant topic for their field of work Product is well known in civil society Members of civil society raise awareness on ICS High % of population knows about benefits of ICS Producer associations represent interests of producers and take influence on regulative framework for stove production	Opinions of civil society representatives. Knowledge/ attitude of civil society with regard to ICS. Existence of campaigns and materials Knowledge and opinions of population. How does society value technology? Existence of producer associations and screening of activities Economic viability of producer associations w/o drastically reducing profit of producers	

Factors which reduce market vulnerability

Sustainability Factors	Indicators	What to measure?	Comments
No direct (cash) subsidy for producers and on stove price	Prices reflect material, production and labour costs of stoves including all parts, plus retailing costs, plus profit margin	Cost calculation of stoves and stove parts	
Subsidies only in combination with clear definition of target group and exit strategies	Existence and implementation of economical viable exit strategies for the removal of the subsidy All partners know and support the exit strategy Reduction of subsidies over time Replacement of subsidies with commercial financing schemes	Planning documents Knowledge of partners Strategies for selection of target group (Existence of microfinance schemes)	
Competition between producers	Existence of different producers in one region Client can choose between different stove producers	Number of producers	

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