

Business Case Study of Retained Heat Cooker

Introduction

In Bangladesh cooking fuel for domestic use is primarily dependent on biomass. Wood is the main source of cooking fuel; however crop residues and dry cow dung is preferred by low income families. The traditional cooking habit causes inefficient biomass consumption, exposure to smoke and risk of fire hazard. The overuse of biomass is significantly contributing to the deforestation process. As 6% of the total population has access to natural gas, LPG demand is expected to rise particularly in cities.

Cooking Habit and Fuel Consumption

MICS show that solid fuels is widely used as a main source of energy for domestic cooking in Bangladesh (88.2 per cent), particularly in rural areas (96 per cent versus 58.3 per cent in urban areas), although the main place of cooking is mostly in a separate building (57.8 per cent) or outdoors (21.2 per cent). Overall, a majority of households in Bangladesh were using solid fuels for cooking (88.2 per cent), use of wood was playing a major role (67.6 per cent). Use of solid fuels was much lower in urban areas (58.3 per cent) than in rural areas, where almost all households (96 per cent) use solid fuels. Dhaka division shows much lower use of solid fuels for cooking by households, 75.9 per cent, which may be due to a bigger proportion of richer class in the urban population as it covers Dhaka city, and availability of other fuels in this division. Almost all households in Barisal division (98.3 per cent) use solid fuel for cooking. Though, the LPG usage data (3% at urban region) in 2012-2013 was low, currently the demand has risen in cities due to no expansion of natural gas connection to households.

Table 1: Per cent distribution of cooking fuel used by the household, Bangladesh, 2012-2013

Division	LPG	Biomass/Solid fuels
Barisal	0.7	98.3
Chittagong	0.8	91.1
Dhaka	0.7	75.9
Khulna	1.0	95.9
Rajshahi	1.3	92.9
Rangpur	0.8	95.9
Sylhet	0.1	91.1

Table 2: Percent distribution of cooking fuels by region

Region	LPG	Biomass/Solid fuels
Urban	3.0	58.3
Rural	0.2	96.0

*Collected data: Multiple Indicator Cluster Survey 2012-2013, Progotir Pathey, Bangladesh Bureau of Statistics (BBS), Statistics and Informatics Division (SID), Ministry of Planning

Type of food generally cooked by each household:

- Rice/Khichuri/Polao
- Chicken/Beef curry
- Mixed vegetables curry
- Fish/Chicken with potato or vegetables curry
- Daal with vegetables
- Fish/ vegetables fry

Households prefer to cook each meal and heat the leftover using stoves. Considering household member's preference and availability, meal for lunch and dinner is cooked together during day time. The remaining food from lunch is generally heated for dinner.

Table 3: Percent distribution meal generally cooked by households

Type of meals	Households
Breakfast	36.0
Lunch	14.0
Dinner	18.0
Lunch and dinner together	33.0

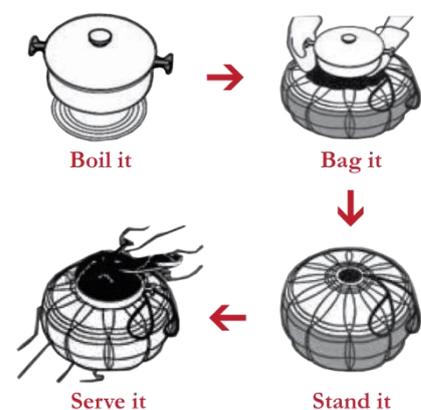
*GIZ survey

Alternative Solution Addressing Fuel Savings

The fuel choice by the households is influenced by the income, family size, educational status and the occupation of the household members. Considering reduction in cooking time, fuel consumption and health risk REEEP has been promoting an alternative cooking solution called Retention Heat Cooker (RHC). REEEP programme implemented by Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH on behalf of the German Federal Ministry for Economic Cooperation and Development (BMZ). With the support of Bangladesh's Ministry of Power, Energy, and Mineral Resources, GIZ is working to create an atmosphere of sustainable energy. Under this programme, GIZ has reviewed the existing technology of traditional stoves and developed a simple solution based on locally available materials.

What is Retained Heat Cooker?

RHC is a standalone, non-electric insulated bag designed to reduce the amount of fuel required to cook food. Instead of being placed on a stove for the entire duration, food is heated to a boiling temperature and transferred to the cooker. It uses the principle of thermal insulation to continue the cooking process and keeps food warm, without requiring additional heat.



Step 1: Heat the pot of food on the stove until it reaches the boiling stage.

Step 2: Place the food inside the cooker.

Step 3: The cooker's insulating properties finishes the cooking process.

Step 4: Bring out the pot from the cooker and serve the food.

Approach

The intervention started with technical tests comprising RHC's performance, fuel savings, material and food quality, and local cooking habit.

Technical Development (2013 to 2016)



Technical Performance test by Islamic University of Technology



Food nutrition test by Dhaka University



Kitchen Performance test by Dhaka University

Market Development (2014 to Present)



Market

Identify service providers



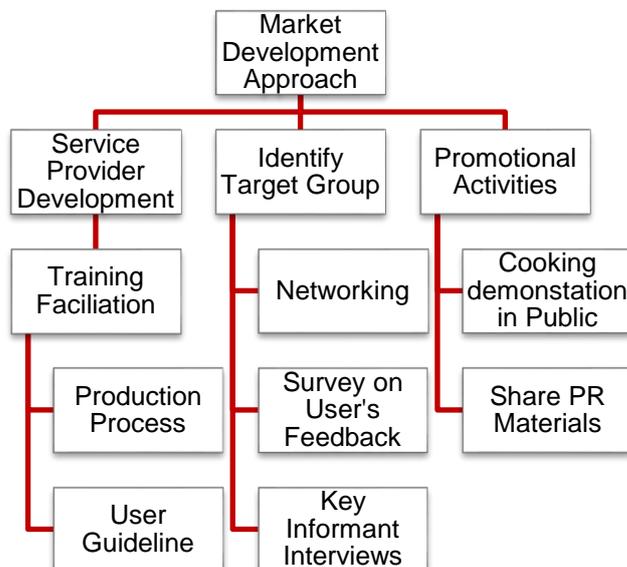
Identify users



Create market demand

Development

GIZ has identified best possible methods through activities and results from pilot phase.



Identify Service Provider

Local NGO or entrepreneur, skilled in stitched handicraft identified as potential RHC producer. It is perceived Female entrepreneur has a clear understanding on local cooking habit.

Case Study of Kheya

Kheya is a Satkhira based NGO which has taken the initiative, with support of GIZ, to produce RHC since 2015. The female owner of the enterprise Ms. Josna is convinced about the opportunity to scale up RHC in the market. They have successfully proven a full-fledged production capacity. At present their preferred channel partner is NGO which has proved to be more effective as they have a strong network and can access more people within a short time.

Kheya's in-house capacity,

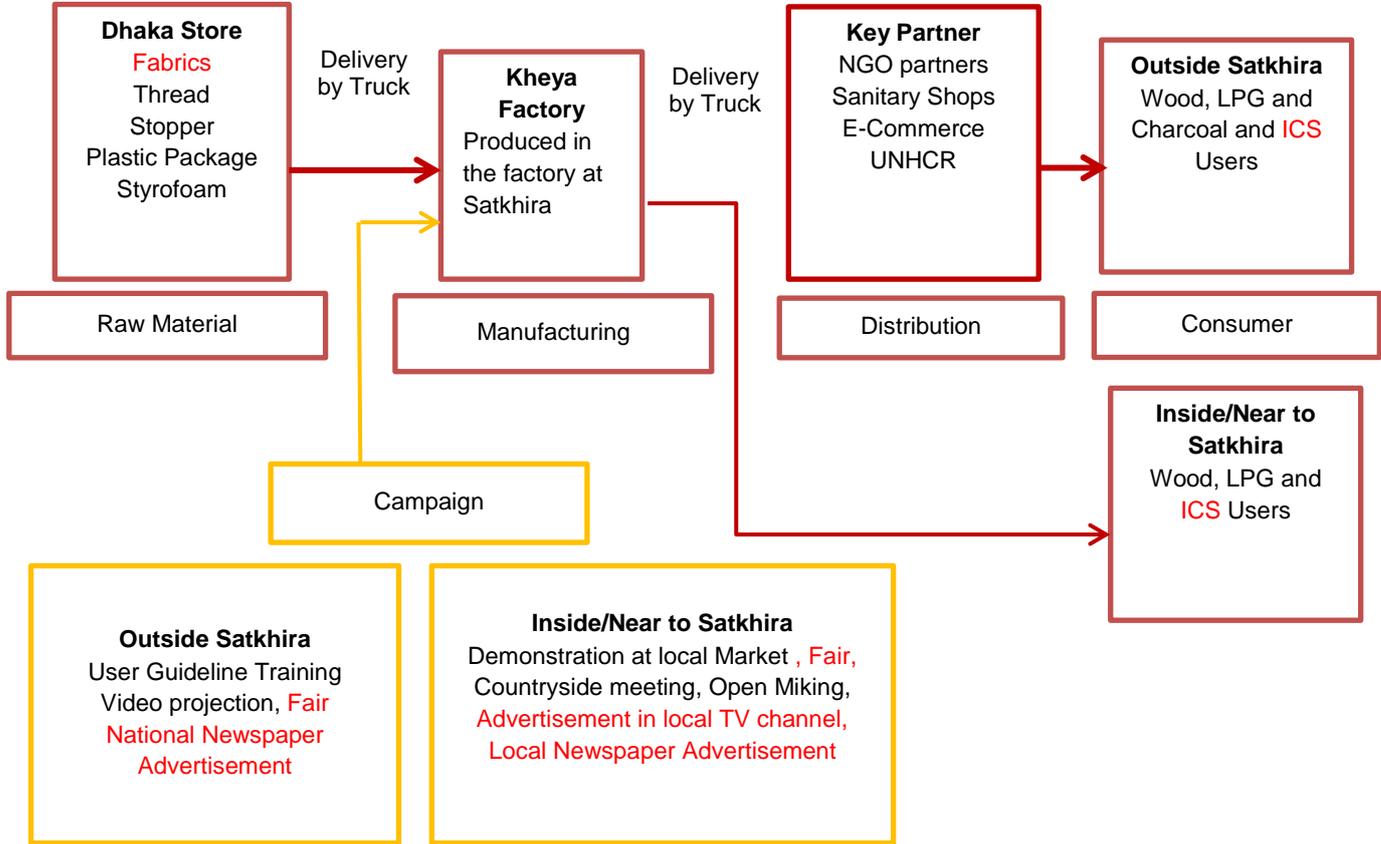
- *Monthly production:* 1100-1200 units of RHC
- *Monthly sale:* **1000** units of RHC
- *No. of active partners:* 22 NGO's and 3 sanitary shops

Market Approach of Kheya	
Value Propositions	<ul style="list-style-type: none"> • Saves fuel • Saves cooking time • Environment friendly • Keeps food hot or cold
Customers	<ul style="list-style-type: none"> • LPG users • Biomass users
Product Development	<ul style="list-style-type: none"> • RHC • by-products (Kitchenware)
Location	<ul style="list-style-type: none"> • 30 Districts coverage
Value Propositions	<ul style="list-style-type: none"> • Saves fuel • Saves cooking time • Environment friendly • Keeps food hot or cold

Business Approach of Kheya	
Key resources	<ul style="list-style-type: none"> • Financial resources • Fixed assets • Human resources
Cost structure	<ul style="list-style-type: none"> • Raw material cost • Labour cost • Electricity cost • Management salary • Transportation cost
Key activities	<ul style="list-style-type: none"> • Procure raw materials • Production of RHC • Production of by products • Sales of RHC and by products • Promotional activities
Supply channel	<ul style="list-style-type: none"> • Direct sales to end users

	<ul style="list-style-type: none"> • Through NGO partners • Through sanitary shops
Revenue streams	<ul style="list-style-type: none"> • Sale of RHC • Sale of By products

Value Chain of Kheya



Business Case of Kheya

Human Resources	No. of male Staff: 7 No. of female Staff: 16 Roles and responsibilities: <ul style="list-style-type: none"> • Executive Director and Chief Trainer of RHC • Accounts Officer • Trainer of RHC • Marketing Officer • Senior Technician • Operator (Styrofoam crusher) • Sewing machine operator • Technician
Remuneration and Allowance	Salary Lunch Allowance Snacks Allowance

Electricity : Solar Panel (50w, 50w, 100w)	Fan: Solar Access, Light: Solar Access Mobile charging : Solar Access
House Rent:	Styrofoam store room rent: 1500 BDT/ month
Machineries and tools	<ul style="list-style-type: none"> • Sewing Machine • Styrofoam crusher • Packaging Machine • Cutter • Cutter Table • Scissors • Chair • Projector • Laptop • RHC measurement tool
Production	<ul style="list-style-type: none"> • Clothe :Micro fabrics: 2.5 yard/unit, Price:80- 100 BDT/Yard • Average price of Sewing thread, plastic packaging: 25 BDT per unit) • Styrofoam (Waste) filling per unit: 0.7 kg, Price: 60 -80 BDT/Kg
Sell Price/Production cost for each unit	<ul style="list-style-type: none"> • Raw Material : 355 BDT • Labour (Technical): 50 BDT • Over Head (Management and Administrative): 20 BDT • Factory operation and maintenance: 50 BDT • Total Production Cost per Unit: 475 BDT • Profit Margin: 50 to 75 BDT • Minimum Sell Price per Unit: 550 BDT
Distribution	<p>For RHC Delivery:</p> <ul style="list-style-type: none"> • Truck Rent: 15000- 20,000 BDT (800 to 1200 Unit capacity) • Labour for loading and unloading: 1000 BDT <p>For Production</p> <ul style="list-style-type: none"> • Raw Material courier from Dhaka: 3500 BDT to 5000 BDT • Styrofoam carrying from Dhaka by truck: 15000-17000 BDT
Marketing	<ul style="list-style-type: none"> • Leaflet printing: 5 BDT each piece • Brand Tag: 5 BDT each piece • National Newspaper advertisement 20000 Tk/add • Advertisement in local TV channel (cable connected) Tk. 8,000 for 2 months
By Product	<ul style="list-style-type: none"> • Kitchen ware
Other business	<ul style="list-style-type: none"> • Hospital • Handy craft products • Microcredit • Other NGOs Activities • Government VGD Programme
Health and Security	<ul style="list-style-type: none"> • Fire Bucket Sand • Mouth Mask for staff • Fire extinguishers

Network	<ul style="list-style-type: none"> • UNO family, UP chairman, School, NGOs, shops, Sanitary
Partners	<ul style="list-style-type: none"> • Sanity Shop Owners (Bondhu Chula): 3 shops • NGO: 20 NGOs • Development Organization: UNHCR and GIZ • E-Commerce: Aponjon International Ltd- Online Shopping

Identify Target Group

Through pilot phase, technical test and surveys potential users are identified as a target group,

- *Type of occupations:* Public and social service
- *Education level:* Minimum college degree or equivalent
- *Food cooking habit:* Bosha Vaat (Rice), Khichuri, Daal, Meat (bhuna and curry)
- *Type of fuel:* LPG, Wood

Survey Results

GIZ survey shows that willingness or at least consideration to use RHC is found by users with University level education (49.4%) or public/social profession (74.2%). The acceptance of RHC is found mostly for cooking Bosha Bhaat/ Rice (98.5%) on a daily basis. However, Daal and other rice related food are cooked with RHC either weekly or monthly varying between 60% to 94% users.

Table: Percentage distribution of RHC users by level of occupation and education

Occupations	Households	Education	Households
Self-employed (agriculture)	5.4	Able to sign only	2.7
Employed labour (other)	1.4	Up to class V	18.2
Self-employed (other business)	16.3	School education or equivalent	8.8
Housewife	0.7	College education or equivalent	20.9
Public/social service	74.2	University education	49.4

*GIZ survey

Table: Percentage distribution for frequency of RHC usage

Food Item	Frequency of RHC usage
Bosha Rice	<ul style="list-style-type: none"> • 98.5% users confirmed of RHC usage, Daily • 1.5% users confirmed of RHC usage, Weekly
Bhuna Khichuri	<ul style="list-style-type: none"> • 93.8% users confirmed of RHC usage, Weekly

Food Item	Frequency of RHC usage
	<ul style="list-style-type: none"> 6.2% users confirmed of RHC usage, Monthly
Latta Khichuri	<ul style="list-style-type: none"> 64% users confirmed of RHC usage, Weekly 32% users confirmed of RHC usage, Monthly 4% users confirmed of RHC usage, Family Events
Polao	<ul style="list-style-type: none"> 10.7% users confirmed of RHC usage, Weekly 52.6% users confirmed of RHC usage, Monthly 36.7% users confirmed of RHC usage, Family Events
Dal	<ul style="list-style-type: none"> 55.8% users confirmed of RHC usage, Weekly 44.2% users confirmed of RHC usage, Monthly
Fish	<ul style="list-style-type: none"> 17.2% users confirmed of RHC usage, Daily 82.8% users confirmed of RHC usage, Weekly
Chicken	<ul style="list-style-type: none"> 50% users confirmed of RHC usage, Weekly 50% users confirmed of RHC usage, Monthly
Beef	<ul style="list-style-type: none"> 40% users confirmed of RHC usage, Weekly 60% users confirmed of RHC usage, Monthly

*GIZ survey

In the table daily fuel savings ranges from 25% up to 35% while cooking with Retained Heat Cooker for individual stove. However, LPG stove users show significant fuel savings of 35.81% compared to biomass users.

Table: Average fuel savings from stove of each type using Retained Heat Cooker

Type of Stoves	Daily Fuel Savings per stove	
	Average (kg)	Percentage (%)
Bondhu Chula	0.53	28.49%
Traditional	0.51	25.78%
LPG	0.18	35.81%

Promotional Activities

Increase number of Service provider to ensure sustainable market	<ul style="list-style-type: none"> Training on Production Training on User Guideline Assist in promotional activities
Establish network with potential partners who can contribute in dissemination	<ul style="list-style-type: none"> NGOs Small and medium size enterprise Development aid organization Private/Public/Educational institute
Develop and distribute PR products through partners and established networks	<ul style="list-style-type: none"> Distribute leaflets both in Bangla and English Project video in meetings, workshop and training session to introduce the product Cooking demonstration in public place (Mela, Uthan

boithok, community meeting, school program, bazar etc.)

Socio Economic Aspects

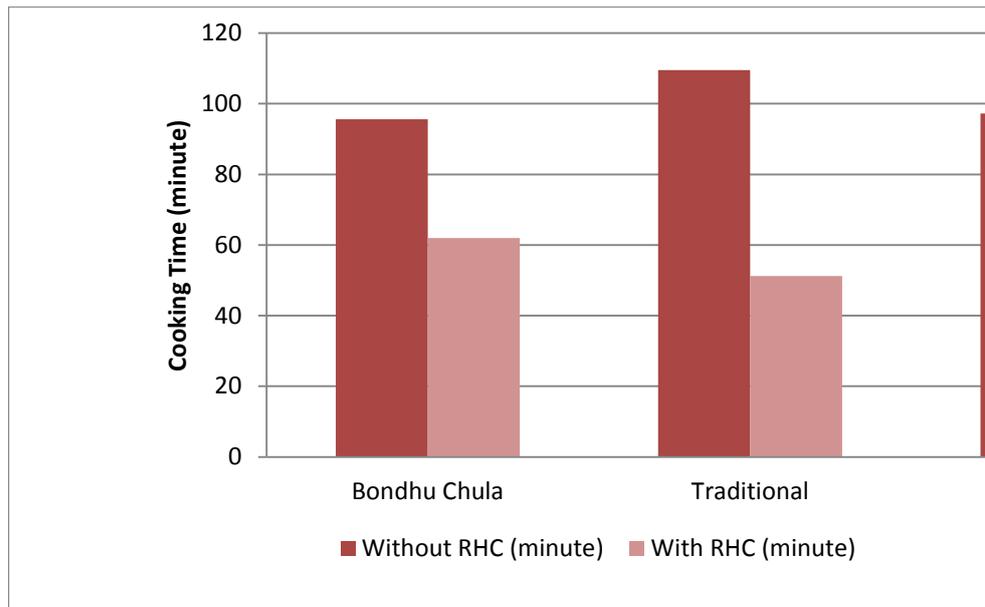
Low fuel consumption, reduction of fuel cost and cooking time savings are the primary significance identified from RHC usage.

Cooking Time Savings

Significant percentage of cooking time savings has been informed by RHC users. Particularly, LPG users (60%) save the most cooking time compared to Biomass users (varies from 35% to 50%). As a result the primary users are spending the additional time for productive and leisure activities.

Activities	Households
Household work	69.8
Watching TV	24.2
Look after children	44.3
Sewing	1.3
Reading	3.4
Chatting	8.7
Others	1.3

Table: Average time needed to cook per day



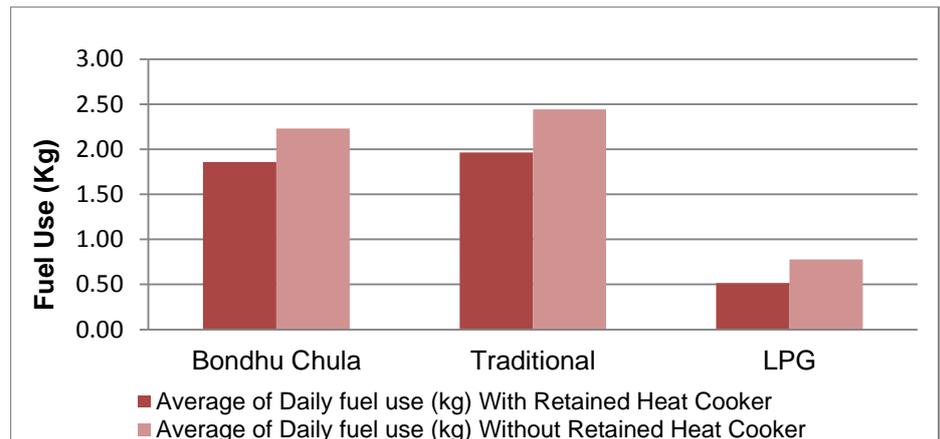
Fuel and Cost Savings

As mentioned earlier, LPG stove user shows significant fuel savings 35.81% compared to biomass users. Therefore, the monthly expenditure of LPG is reduced up to 20% considering the price of 12 KG LPG cylinder from 900 BDT to 1200 BDT. It is estimated after adapting RHC user is spending monthly 780 BDT (approx.). Generally urban households purchase biomass fuels, particularly wood. However, majority of rural households collect around 50% of the monthly biomass. Therefore, the cost savings varies from 15% to 25% the local wood price.

Table: Monthly fuel cost before and after using RHC

Type of Fuel	Monthly fuel cost in BDT	
	Before using RHC	After using RHC
LPG	1200	780
Biomass (Particularly wood)	583	437.25

Table: Average Fuel consumption with and without RHC



Expected Results

The intervention focuses to contribute in achieving different level of results to ensure sustainable approach. Therefore, an outline is designed that is expected to contribute in fuel reduction, employment generation, and waste recycle.

Table: Levels of results expected from the intervention activities

Outputs	Results from intervention activities	<ul style="list-style-type: none"> • Female entrepreneur produces RHC • Female entrepreneur sells RHC • Dissemination of RHC as an energy efficient product
Outcome	Results from RHC dissemination	<ul style="list-style-type: none"> • Income generation • Less fuel consumption • Reduction of fuel cost • More efficient time management for users. • Recycle of Waste Styrofoam (which is non degradable)
Impact	Results for the country	<ul style="list-style-type: none"> • Improved living conditions • Less effect on natural fuel • Positive effect on environment