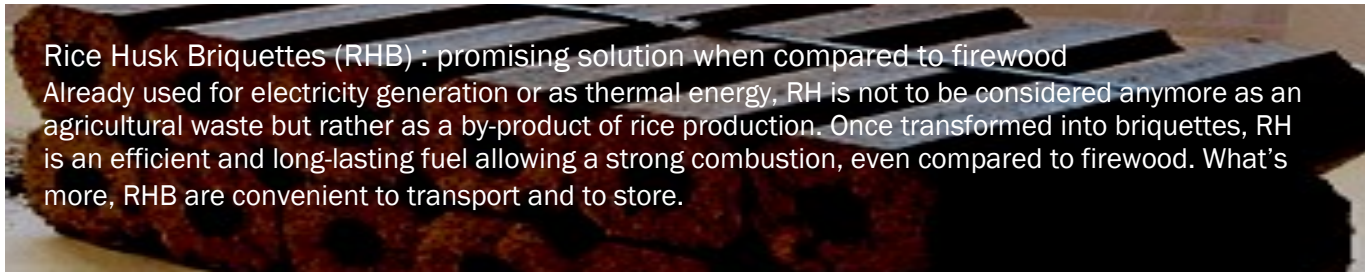
Realizing the potentials of agro-residues to profit the smallholder farmers

Alternative biomass fuel market is growing in Cambodia as early adopters observe increases of heat efficiency and burning quality.



Rice Husk Briquettes (RHB) : promising solution when compared to firewood

Already used for electricity generation or as thermal energy, RH is not to be considered anymore as an agricultural waste but rather as a by-product of rice production. Once transformed into briquettes, RH is an efficient and long-lasting fuel allowing a strong combustion, even compared to firewood. What's more, RHB are convenient to transport and to store.

Did you know?

Theoretically, any biomass can be used as a fuel without processing. However, in order to obtain an efficient fuel, it is sometimes necessary to process the residues. The type of processing needed will directly depend on the residue characteristics at the moment of its production but also on final users'needs.

Examples of agro-residues briquettes'applications for smallholder farmers

Chick brooding: Sustainable Green Fuel Enterprise (SGFE) is testing poultry brooding process using briquettes thanks to S-RET grant.

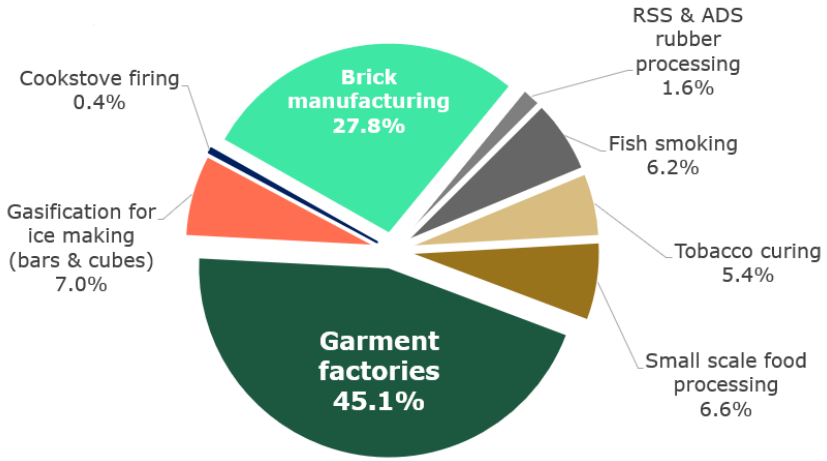
Drying processes: Scientists from the Tamil Nadu Agricultural University designed a biomass hot air generation system that could use RHB in support of solar fruits/ vegetables drying systems.

Market opportunity : industrial steam generation

With more than 300,000 metric tons of firewood used per year for steam generation in the garment sector, including a large part coming from forest clearing, RHB can be a solution to replace unsustainable (and sometimes illegal) firewood by a renewable biomass fuel.

According to the results of the on-site test made by GERES teams in the garment factories, around 225,000 MT of RHB would be needed to satisfy their biomass fuel needs, and therefore around 250,000 MT of RH, i.e 25% only of the RH produced by the Rice Millers that are members of the Cambodian Rice Federation.

Industries woodfuels consumption, The FloWood project ,2014 (GERES)



H&M is developing renewable energy targets to voluntarily drive its transition towards a carbon neutral supply chain, manage climate change risks, and increase climate resilience. They are currently financially supporting GERES' R&D and Tests in RH Briquetting.

In partnership with the Royal University of Agriculture and the Ministry of Agriculture, Forestry and Fisheries of Cambodia and with the financial support of the International Fund for Agricultural Development

Bringing together the conditions for a successful transition

Users choose fuel based on availability, affordability and convenience.

Prior steps to create a profitable and sustainable agro-residues briquettes value-chain:

- Study existing competing use of residues: exportation, fertilizers, livestock food, mulch, etc.
- Study collection system limiting labor and transportation to ensure a competing final price ;
- Include maintenance cost of pressing-machines (still significantly high) in business modeling.

5. Social
Client approach

1. Technology
availability in Cambodia

Briquetting technologies and products are well spread in Asia, particularly in China and India, but the market is at a low development stage in Cambodia.
SGFE produces 3 types of char-briquettes, including diamond char-briquettes made from 100% coconut shell charcoal sold for $0.75/kilo.
Rann Sa Rice Mill (near Phnom Penh) sells the metric ton of RHB for 70$.
Briquetting machines ($5000—$100,000) can be found in Thailand and Vietnam, several processes are suitable such as screw press, piston press or hydraulic press. More recent combustion devices take the best of RHB.

RHB and firewood comparative performance test results in a garment factory boiler (GERES, 2018)

	Rice Husk Briquettes	Forest Wood
Steam produced (MT)	9.9	9.7
Biomass input (MT)	3.008	4.002
Ration steam/biomass	0.30384	0.41258
cost (USD/MT)	70	52.38[12]
Cost of steam (USD/MT)	21.1688	21.6109

2. Human Resources
Actors involved

RHB value chain:
- Agro-residues **suppliers**: smallholder farmers and rice millers
- **Processors** into briquettes: farmers, rice millers, companies (to benefit from economy of scale)
- **Buyers** potentials: garment factories (most significant)
- **Marker facilitators**: agricultural materials resellers

4. Organization
From conception to distribution and maintenance

R&D and testing:
- Study processing for each crop (RH, cassava stems, sugarcane tops, maize stalks) ;
- Districts with higher production of one or two specific kinds of crops to invest in developing agro-residues briquettes using those specific crops (e.g. Kompong Cham and Tboung Khmum in cassava) ;
- Set up a business model where negociation with farmers for agro-residues supply include part of in-kind payment in briquettes to stimulate its use.

3. Information
How to spread the word?

3 information targets: residues suppliers, potential briquettes producers and targeted end-users.
Key consideration : confirmed added-value of agro-residues briquettes for residues suppliers, briquettes processors and end-users.