

RICE STRAW FOR ENERGY IN SOUTH AND SOUTH EAST ASIA

A Case Study in Vietnam

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INTRODUCTION

Asia produces and consumes 91% of the world's rice. Every kilo of rice results in a kilo of straw as by-product, totaling almost 550 million tonnes each year. In the flooded rice fields of South and South East Asia, where two or even three crops are produced each year, incorporation into the soil is not feasible or desirable due to CH₄ emissions from its decomposition. In countries such as the Philippines and Vietnam, 80% of the rice straw is simply burnt in the field, causing problems for health and environment.

Although this may appear to be an available bio-energy resource, its use is hampered by social, economic and technical challenges that are under-researched. This poster outlines logistical issues of gathering and transporting rice straw to a hub for bio-energy use and highlights some technologies that may form part of a solution.

RICE STRAW AVAILABILITY

Table 1: Percentage of rice straw burning in Vietnam

Province	Rice production, 1000 t	Potential RS, 1000 t	% RS burning on field
(Mekong Delta)			
Bac Lieu	990	594	50 – 70%
Ca Mau	550	330	70 – 80%
Can Tho	1,360	816	30 - 50%
Kien Giang	4,400	2,640	60%
Soc Trang	2,100	1,260	60 – 80%
Tra Vinh	1,000	600	70%
(Central/Northern VN)			
Quang Ngai	100	60	20%
Vinh Phuc	335	200	20%

Source: Survey, December 2013



Fig. 1: Open field rice straw burning

LOGISTICAL ISSUES

- ❖ Rice straw is a bulky; low-value feedstock
- ❖ Unlike rice husks, straw is left in the field, adding to collection costs
- ❖ Wet paddy fields hamper mechanised collection
- ❖ Rice is increasingly harvested by combines, which spread straw on the field behind them, making it difficult to gather

POTENTIAL SOLUTIONS

Gathering from the Field

Rice straw baler (Fig.2) demonstrated in The Mekong Delta

Capacity: 600 kg/h.

Baling cost: 300 VND/kg (or US\$15/ton) (Fig.3)



Fig.2: Z-755 Rice straw baler

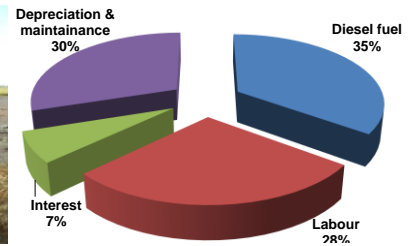


Fig.3: Baling cost components

Densifying as Pellets

Pelleting system (Fig. 4) with capacity of 1 ton/hr with a rotary mortar and static mould, with pressure of 80 MPa and temperature of 105°C.



Fig. 4: Pellet machine



Fig. 5: Pellets from rice husk and straw

Table 2: Specifications of pellets from rice husk and straw

Rate Straw/Husk	Moisture Content (%)		Pellet dimension		Density (kg/m ³)	Gross calorific value (MJ/kg - dry basis)
	Straw	Husk	Diameter (mm)	Length (mm)		
100% husk		14.3	8.5	54.7	533	17.4
50% husk/ 50% straw	16.1	13.8	8.6	51.4	351	15.9
100% straw	15.8		8.6	40.8	260	14.8



Fig. 6: Rice husk/straw pellet boiler

Pelleting cost: 1200 VND/kg (or \$60/ton)

Wholesale pellet value: 1900 VND/kg (\$90/ton) within Vietnam, or 2300 VND/kg (\$100/ton) for export.

CONCLUSIONS

- Rice straw is a large potential renewable fuel, yet most is still burnt in the field as a waste by-product, releasing greenhouse gases and causing health and environmental problems.
- To tackle this problem and bring benefit to small-holder farmers, more technologies and pro-poor business models must be demonstrated, applied and adapted.
- This new, 3-year rice straw energy project funded by the UK Government will continue to research the underlying issues and seek to identify potential inclusive solutions.

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