

EXPLORING SUSTAINABLE BIOMASS

IN VIETNAM'S APPAREL SUPPLY CHAIN

THE CLEAN ENERGY INVESTMENT ACCELERATOR (CEIA) PARTNERED WITH A FORTUNE 500 APPAREL AND FOOTWEAR COMPANY to investigate using rice husks as an alternative fuel to coal in supply chain manufacturing facilities in Vietnam.



CEIA'S RESEARCH FOCUSED ON ANALYZING THE ECONOMIC VIABILITY OF RICE HUSKS, a rice paddy waste product separated from the paddy at the rice production facility, in place of coal, as well as understanding Vietnam's rice husk supply and demand dynamics.

HEAT IS INTEGRAL TO THE TEXTILE MANUFACTURING PROCESS
Thermal energy typically represents **75% TO 90% OF TOTAL**

ENERGY use in textile dyeing and finishing facilities. In Vietnam, **COAL IS CURRENTLY THE PRIMARY FUEL** used for industrial heat processes and its use has been increasing over the past decade, increasing the urgency to find effective substitute fuels.



DECARBONIZING HEAT IS AN ESSENTIAL STEP IN REDUCING EMISSIONS IN APPAREL AND FOOTWEAR MANUFACTURING.

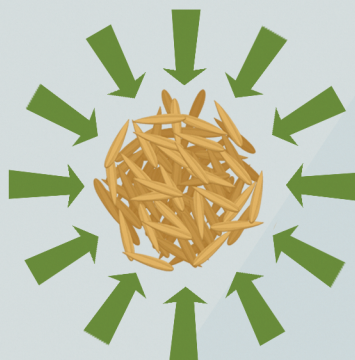
Finding and using viable substitutes can reduce supply chain factory emissions and play a key role in companies meeting their commitment to the **UN FASHION INDUSTRY CHARTER FOR CLIMATE ACTION** to reduce absolute supply chain greenhouse gas (GHG) emissions by **30% BY 2030 FROM A 2015 BASE YEAR.**

THE ECONOMIC EVALUATION OF FUEL SUBSTITUTION includes evaluating current and expected future market prices of coal and rice husks. According to CEIA's analysis of 12 facilities:



\$0.018/kWhe

companies paying more than this price for coal have viable cost and emission savings opportunities for converting to rice husks as boiler fuel



THREE OF 12 FACTORIES

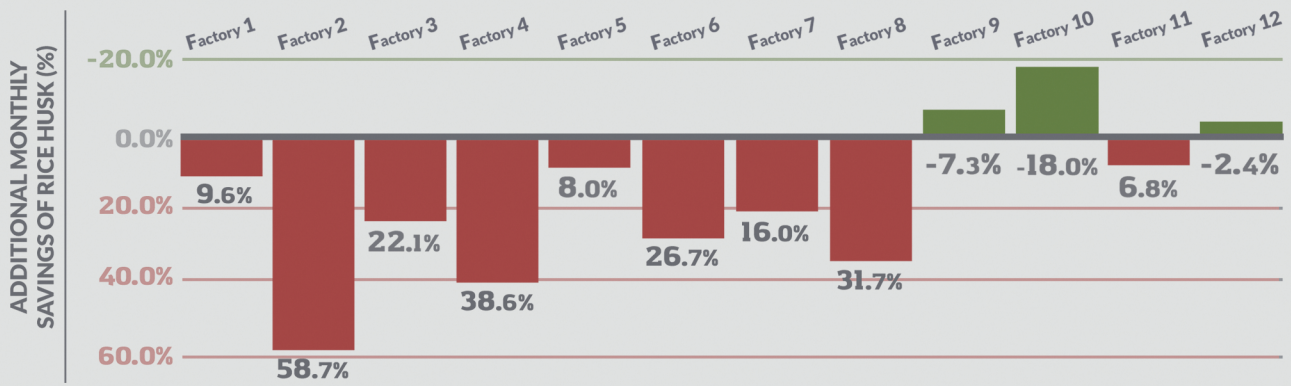
surveyed demonstrated attractive economics for using rice husks in place of coal



NINE OF 12 FACTORIES

had coal energy costs from \$0.012 to \$0.016/kWhe and would need to pay a premium of 7% to 59% to fully replace coal with rice husks

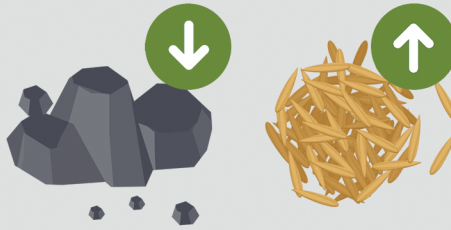
COAL VS RICE HUSK: IDENTIFYING COST-EFFECTIVE OPPORTUNITIES FOR RICE HUSKS



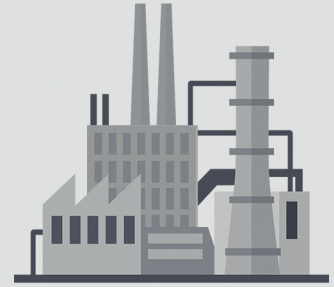
Availability of rice husks in Vietnam MAY LIMIT WIDESPREAD
CONVERSION across textile manufacturing



20,000 GWhe
theoretical annual energy
supply from Vietnam's
rice husks.



70-80%
of rice husks in the
country have current uses.



6,000
apparel factories could
consider conversion to
rice husks.

INSIGHTS AND RECOMMENDATIONS

When considering a transition to rice husk as a fuel, brands and manufacturers should prioritize facilities with higher coal prices and access to stable rice husk availability and pricing. The selection of sites should be a collective process in order to minimize disruption to the wider biomass market.

Rice husk, as is the case with other biomass feedstocks, should only be used when sourced from sustainable production.

Biomass fuels like rice husks are one of many potential substitutes for fossil fuels that apparel and footwear textile manufacturers should consider for their thermal energy needs in Vietnam.

A facility should have a clear understanding of its current thermal energy costs (\$/kWhe) and gather competitive price quotations from multiple rice husk suppliers.

Biomass can reduce GHG emissions but is dependent on several factors including the type of crop, how much carbon is sequestered before harvest, and emissions of fuel it is substituted for.

Depending on heat process needs, facilities should also explore the techno-economic feasibility of alternatives including: electric boilers, solar thermal water heating, heat pumps, and other emerging technologies.