

Cleaner Production Case Study

Waste Heat Recovery Fakir Apparels Limited

This series showcases success stories of PaCT partner factories in the Bangladesh textile sector, which have implemented Cleaner Production projects.

Valuable Waste Heat

The textile sector is a highly energy-demanding industry, particularly the dyeing and finishing processes that continuously require large quantities of energy to generate hot water and steam. However, a significant fraction (20-50%) of the required energy also gets wasted to the environment via exhaust gases from boilers and dryers, steam condensate, cooling water, wastewater effluent, and more. This waste heat, which is either low grade (<100°C), medium grade (100°C–400°C), or high grade (>400°C), is an expensive resource that can be recovered and reused.

Waste Heat Recovery

Waste Heat Recovery (WHR) offers textile industries an economic and green solution to save valuable energy. WHR system works by extracting and reusing waste energy from industrial processes, which otherwise is dissipated to the environment. The recovered heat can either be used for on-site power generation, to preheat combustion air, or to generate steam.

Potential sources for waste heat recovery in textile factories include

- Exhaust gas from generators (high grade heat)
- Boiler blowdown flash steam (high grade heat)
- Hot condensate flash steam (high grade heat)
- Wastewater (low grade heat)
- Jacket cooling water (low grade heat)

Factory Overview

Fakir Apparels Ltd. (FAL), located in Fatullah, Narayanganj is a pioneer in dyed and finished knitwear fabric. Supplier to leading brands including H&M, Primark, Espirit, and C&A, FAL partnered with Bangladesh PaCT in 2014 with the aim to achieve resource efficiency through the adoption of best practices in dyehouse processes. By implementing smart, resource efficient technologies, FAL has successfully managed to reduce its water consumption by more than 70%, from 174 L/kg fabric in 2014 to 52 L/kg fabric in 2016, which is even better than the best practice level. FAL is now highly motivated to further reduce consumption of other resources within processes.



The Bangladesh PaCT: Partnership for Cleaner Textile is a holistic program that supports textile wet processing factories in adopting cleaner production, and that engages with brands, government, communities, financial institutions, and other stakeholders to bring about systemic, positive environmental change for the Bangladesh textile wet processing sector, its workers, and surrounding communities, and to contribute to the sector's long-term competitiveness.

Benefits of Waste Heat Recovery

- Enhanced Resource Efficiency
- Reduced energy costs
- Reduced GHG emissions

FAL's water consumption trend



Environmental Benefit		Financial Benefit	
Inlet Temperature; Outlet Temperature	470°C 125°C	Investment	USD 177,000
Energy Savings	27,460 kWh/year	Cost Savings	USD 208,620/ year
Natural Gas Savings	2,595,840 m ³ /year	Payback Period	10 months
Additional Steam generated	3.5 tonne/hr		
Other benefits: Improved resource efficiency			

Waste Heat Recovery at FAL

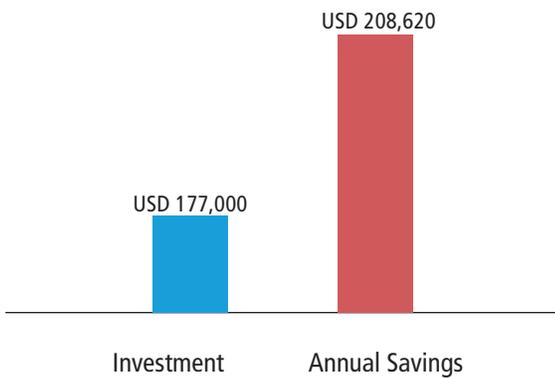
FAL operates four natural gas-fired generators to supply energy to its facilities. The generators also emit large volumes of exhaust gases that are high in temperature. Prior to the installation of a WHR system, FAL was releasing the hot exhaust gases directly to the environment. FAL was not only losing valuable process energy; the factory was consuming more boiler fuel to generate energy, and causing greater environmental pollution.

Smart Use of Waste Heat

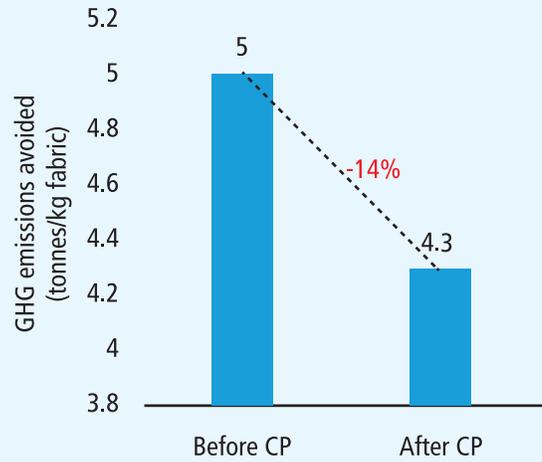
FAL invested in a simple but highly effective WHR system comprising of an Exhaust Gas Boiler (EGB). The EGB extracts heat from the exhaust gas streams at approximately 470°C through heat exchange, and further utilizes it to produce steam. The steam is then supplied to various units including the garment steam ironing section, dyeing, and finishing units.

The WHR system has significantly reduced FAL's energy and gas demand by 27,460 kWh/year and 2,595,840 m³/year, respectively. The factory now enjoys USD 208,620 in annual savings from waste heat recovery alone.

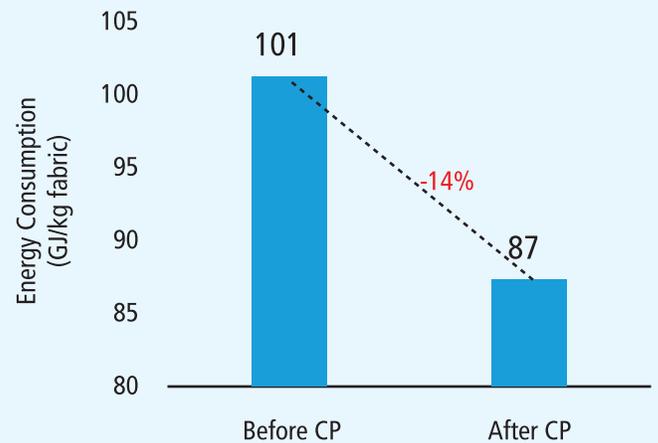
FAL's Investment versus Annual Savings



GHG Emissions Avoided at FAL



FAL's Energy Consumption



Debasish Kumar Saha
Executive Director
Fakir Apparels Ltd.

"Improving resource efficiency and minimizing environmental impacts are top priorities for FAL. We are now shifting our focus on reducing the loss of valuable resources by implementing smart recovery technologies."

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