

SMART Factories Case Study 05:

Coal Phase-Out and Transition to Biomass Fuel at Wan He Garment Company Limited

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About the Study

This case study focuses on Wan He Garment Company Limited's transition from coal to biomass fuel, illustrating the significant challenges and benefits encountered throughout the process. The goal is to share insights that will encourage other factories to consider similar changes, guide preparation for potential obstacles, and implement strategies for a successful transition to sustainable energy sources.



Scope of the Study

This case study encompasses data on coal and biomass (rice husk) consumption and factory production rates over two years, from 2022 to 2023.



Issued Photo



Achievement Photo

Factory Profile



Wan He Garment Company Limited is a large-scale garment manufacturing facility established in 2016, employing approximately 4,101 workers. The factory specialises in producing various sweater types, with a monthly output of over one million pieces in 2023. Wan He primarily exports to Europe, with H&M as a significant client accounting for 95% of the output and LC Waikiki for the remaining 5%. The factory operates on a "Cut, Make, and Pack" (CMP) model, involving linking, washing, drying, and packaging processes.

Assessment Summary:

Addressing Challenges and Solutions

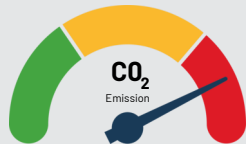
Wan He's switch to biomass fuel aimed to cut environmental impact and meet sustainability standards, but it came with challenges. The initial investment was high due to the need for specialised equipment. Fuel costs also rose, as biomass can be pricier than coal in areas with few suppliers. The installation required temporary factory shutdowns, which affected production and needed careful timing. Securing a reliable fuel supply was essential, so Wan He had to find trustworthy suppliers of sustainably sourced rice husk pellets. Finally, sourcing sustainably took extra effort, as unsustainable biomass could undo the benefits of replacing coal.



Problems Identified in Initial Assessments

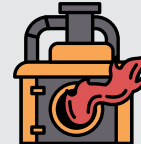
Key issues within Old System

High Level of Carbon Emissions



Coal-fired boiler produced high levels of carbon emissions and pollutants, contributing to environmental degradation and negatively impacting worker's health.

Waste of Thermal Energy



The factory's steam condensate from processes like ironing was not reused, resulting in a significant waste of thermal energy.

Implemented Improvements



Transition to Biomass Fuel: The factory switched from coal to biomass pellets made from rice husks, which emit significantly fewer pollutants than coal. Biomass is a renewable fuel source, and using agricultural waste (such as rice husks) aligns with circular economy principles. By investing in new boilers compatible with biomass, Wan He achieved a major reduction in its carbon footprint.



Condensate Recovery System: The factory partially implemented a condensate recovery system, enabling the reuse of steam condensate from ironing processes. This reduced the need for additional water heating, saving both energy and costs.



Enhanced Insulation and System Efficiency: By insulating the boiler and upgrading the steam distribution system, the factory minimised thermal energy losses. These measures prevented heat dissipation along the distribution network, further enhancing the overall energy efficiency of the plant.



Preheated Boiler Infeed Air: Wan He installed a recuperator to preheat the infeed air for the boiler, further reducing fuel consumption. This adjustment increased energy efficiency by reducing the amount of biomass needed to maintain boiler temperature.



Analysis of Improvements

Each improvement led to substantial energy and cost savings for Wan He. For instance, recycling condensate from the ironing process raised the temperature of infeed water for the boiler, reducing fuel usage and saving the factory 21,302,496 MMK annually. Similarly, installing new energy-efficient biomass boilers and insulating steam lines minimised energy wastage and reduced operational expenses.



Annual Savings From Fuel Usage

21.3M MMK

1 USD = 1,368 MMK (2017)

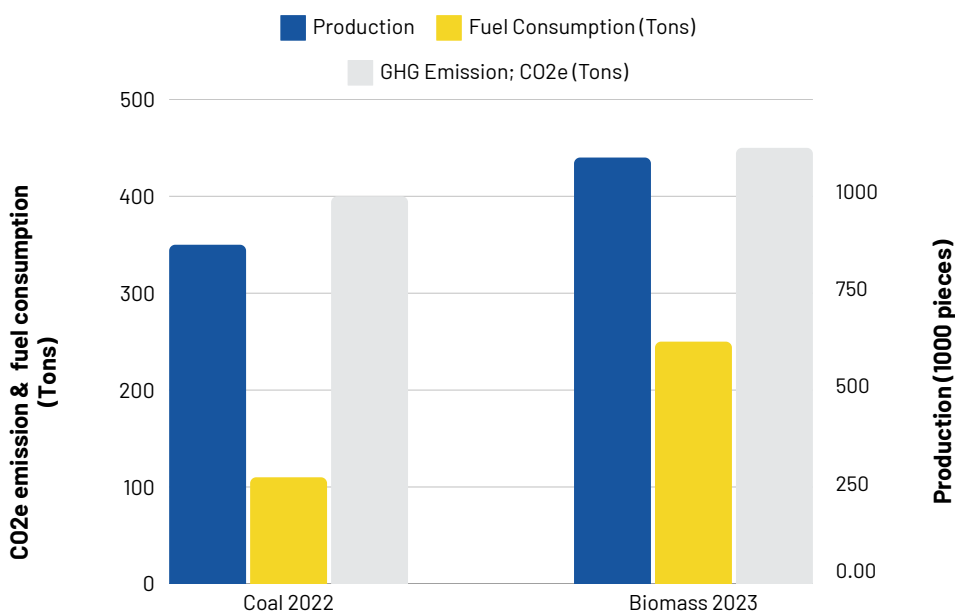


Improvement

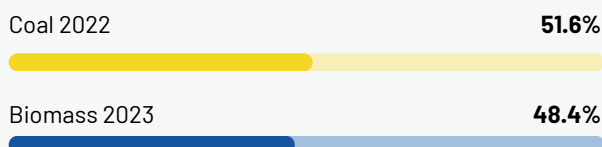
- Minimised heat Loss
- Reduced operational expenses
- Improved energy efficiency
- Reduced fuel usage



Impact in Actions



Total GHG emission; CO₂e





Transitioning from coal to biomass fuel and implementing condensate water reuse presented initial challenges like high costs, technical adjustments, and skill gaps, but overcoming them brought immense benefits—reduced emissions, fuel savings, and a safer, greener workplace that aligns with global sustainability goals.

Nicole, CSR Assistant Manager



Recommendations for Future Energy Efficiency

Despite the progress made, there is potential for Wan He to further enhance its energy efficiency and sustainability .



Adopt Solar Thermal Energy

To lessen reliance on biomass & allow solar heating to preheat water for the boiler, decreasing biomass fuel needs.



Install Steam and Water Meters

To monitor boiler efficiency, providing data for energy usage tracking and identifying improvement areas.



Optimise Condensate Recovery

To capture more energy from steam-intensive processes, helping reduce water heating costs.



Implement Energy Practices Training

To foster a culture of energy awareness, helping workers identify and reduce energy waste in daily operations



Final Insights

Wan He Garment Company Limited's transition from coal to biomass fuel exemplifies a successful shift towards sustainable energy, highlighting both the challenges and rewards of such a transformation. Through careful planning and a commitment to energy efficiency, Wan He has achieved substantial reductions in environmental impact, operational costs, and workplace health risks. This case study offers a model for other factories considering a move toward cleaner energy, demonstrating that, with strategic investment and dedicated effort, sustainable practices can create lasting value for manufacturers in the garment industry.