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## Green Ammonia Value Chain

Yoshihiro Menju  
IHI Corporation

Fuel ammonia is in the spotlight as one of the next-generation energies for achieving carbon neutrality as it does not emit CO<sub>2</sub> during combustion. In the IHI Group, the renewable energy - derived green ammonia production business is positioned as the core of future decarbonization business.

In addition, considering the future mass consumption of fuel ammonia, IHI is engaged in a wide range of activities to build a value chain that extends not only to the production of green ammonia, but also to the transportation, storage, and utilization technology development.

For ammonia production, in other words the upstream part of our value chain, IHI is conducting surveys and studies for cost-effective green ammonia production in countries such as India and Australia, as both have abundant renewable energy resources. For transportation and storage, or the midstream part of the value chain, IHI is developing ammonia fuel ships that do not emit CO<sub>2</sub> during transportation, and the conversion of LPG tanks and large storage tanks for the construction of large ammonia receiving terminal. Finally, in the downstream part of the value chain, IHI is developing technologies to utilize ammonia, such as boilers, gas turbines, and gas engines.

IHI Group is determined to contribute to the realization of a sustainable society by establishing a green ammonia value chain and promoting decarbonization globally.

## Operation experience of No.5 Recycling Boiler

Tatsuhiko Ohira  
Iwaki Daio Paper Corporation

Iwaki Daio Paper started commercial operation of No.5 recycling boiler (Mitsubishi Heavy Industries Power IDS Co., Ltd.) on February, 2023.

A feature of the No.5 recycle boiler is that by setting the steam temperature to around 300°C, the temperature of metal is kept away from the corrosive range, reducing high-temperature corrosion of the boiler tubes caused by chlorine. Its greatest strength is that this allows the use of a wide variety of waste materials, such as fuel derived from waste that would be difficult to use with conventional equipment and would otherwise be landfilled or simply incinerated.

During the commissioning run, a big clinker was generated. This is because the co-firing of RPF and heavy fuel oil A locally raised the temperature of the fluidized sand too high around the burner, and the molten fluidized sand mixed with "combustion ash" and "agglomeration generated in the bed." This problem was resolved by reviewing the fuel combination and has not recurred. Furthermore, thinning of the thermal spray coating that protects the in-bed evaporator tubes has been showing signs of wear since the beginning of the test run, and we are working with the manufacturer to take measures to extend the life of the tubes, with the goal of expected continuous operation.

This article provides an overview of the recycling boiler's equipment, operational experience, and trouble cases.

**Go green with pumps!**  
**-Realize energy saving and carbon dioxide reduction!-**

Yota Fujimoto  
Torishima Pump Mfg. Co., Ltd.

Due to soaring fuel prices and the promotion of carbon neutrality, interest in energy saving within factories is increasing. Particularly in the paper industry a large amount of water is consumed such as raw water in the pulping process, boiler water, and various types of cooling water, and therefore the pumps that transport the water consume a large amount of electricity. This shows that it is important to achieve energy savings with pumps in factories. However, pumps are not often considered as means for energy saving, because it is difficult for user to select optimum pumps which are not standard products and lifespan of pumps is so long that they are rarely replaced.

Our company has greatly contributed to energy saving with developing high-efficiency pump and giving advice for energy saving with pumps. Based on our experience, we will introduce in this article our activities of proposal for energy-saving and methods for energy saving with pumps used in the paper industry for three systems: the white water system, the boiler area and the cooling water system, such as adopting high-efficiency pumps and optimizing pump specifications.

**Energy saving by converting factory raw water pumps to inverters**

Yoshimasa Ikeda and Mitsuhiro Murata  
Iwakuni Mill Nippon Paper Industries Co., Ltd\*<sup>1</sup>

Nippon Paper Group operates under the slogan “Shaping the future with trees” as a comprehensive biomass company with the goal of creating new value never seen before and contributing to better living and cultural progress. As part of our activities, we are working to reduce greenhouse gas emissions by 54% compared to FY2013 in FY2030, with the aim of achieving carbon neutrality in FY2050.

This paper reports on the significant energy savings achieved by converting two raw water pumps (wire-wound high voltage motor) used at a water source from commercial power supply drive to inverter drive. It also introduces the troubleshooting measures taken for vibration, noise, and instantaneous voltage drops during lightning strikes that occurred when the two pumps were upgraded one by one.

**Steam Driven screw-type air Compressor system for Energy-saving**

Masaru Sakakida  
Industrial Machinery Dept.3 Gr. Iatsubo Corporation

The recent rise in electricity costs due to the high cost of electricity and fuel has placed a heavy burden on industry.

This paper introduces a technology for operating compressors using waste steam.

This technology was developed more than 10 years ago and has many installations.

Due to the recent high energy prices, the cost benefits are now even greater than before, so a faster return on investment can be expected.

## **Operating experience of Biomass boiler**

Shuhei Yomo

Tonegawa Division Paper Mills Rengo Co.,Ltd.

Environmental initiatives are becoming increasingly important for all companies. Rengo formulated “Eco Challenge 2030” that targets reduction of CO<sub>2</sub> emissions derived from fossil energy by 46% by FY 2030 compared to FY 2013.

To achieve this target, Tonegawa Division commenced operation a new biomass boiler for power generation that utilizes fuel source such as waste woodchips, RPF, and scrap tires in October 2022.

The steam conditions of new boiler were planned to be equivalent to the existing gas boiler, and the existing boiler is currently utilized as a backup.

This report shows overall of the new biomass boiler, operational experiences and trouble cases since commissioning.

## **A report on technical exchange meeting with IPPTA (Indian Pulp and Paper Technical Association)**

Terunobu Fukui<sup>\*2</sup>  
JAPAN TAPPI<sup>\*1</sup>

39 people from the Indian Pulp and Paper Technical Association (IPPTA) came to Japan and technical exchange events that included mill tours, theme presentations, and a social gathering were held. For the mill tours, from March 4th to 6th, they visited Rengo Co., Ltd. Yashio Mill, Ichikawa Co., Ltd. Kashiwa Mill, Oji Materia Co., Ltd. Fuji Mill, Nippon Paper Crecia Co., Ltd. Koyo Mill and Hokuetsu Corporation Niigata Mill. The theme presentation and social gathering were held on March 7th at the Kmiparupukaikan in Ginza, Tokyo.

In the theme presentation, IPPTA made a presentation regarding the status of India's pulp and paper industry, with the following main points:

- There are 569 paper mills in India.
- Production capacity in 2022-23 is 32 million tons, and both production and demand are approximately 26.5 million tons.
- By raw material used, recycled fiber accounts for approximately 80%.
- Paper demand will grow significantly in line with future growth in GDP.

The Japanese side made presentations on the following seven themes.

- (1) Issues in the Japanese paper industry and initiatives towards net zero CO<sub>2</sub>
- (2) Measures to secure fiber (wood and recovered paper) for future
- (3) Measures to improve the industry image
- (4) Water management strategies, Water saving initiatives
- (5) Equipment reliability measures and initiatives towards predictive maintenance
- (6) Initiatives to improve automation using AI and operator skills
- (7) Collaboration with Government, Industry, Institutions and Society