JAPAN TAPPI JOURNAL

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Tokyo Gas's Initiatives toward the Social Implementation of e-methane (synthetic methane)

Yuji Kobayashi Tokyo Gas Co.,Ltd.

Tokyo Gas is aiming to achieve CO_2 Net-Zero by 2050, and is promoting initiatives related to advanced carbon neutral fields such as renewable energy, e-methane, and hydrogen. In particular, e-methane can utilize existing LNG infrastructure, and can achieve smooth decarbonization while reducing additional social costs. Tokyo Gas has set a target of introducing e-methane equivalent to 1% of its own city gas demand volume by 2030, and is promoting initiatives aimed at the social implementation of emethane.

This paper highlights various projects, particularly focusing on e-methane social implementation, including establishment of supply chain, demonstration tests and the advancement of innovative methanation technologies.

Since March 2022, Tokyo Gas has conducted demonstration tests at its Yokohama Techno-station, collaborating with Yokohama city to implement the Sabatier reaction to synthesize e-methane. The CO_2 required for production is sourced from local waste facilities, while hydrogen is generated from renewable energy sources such as solar power.

Tokyo Gas aims to establish a comprehensive e-methane supply chain to support carbon neutrality in industrial thermal energy sectors, particularly where electrification is challenging in Japan. The benefits of utilizing existing LNG infrastructure met with the potential for results in energy security and lower societal costs are emphasized.

Tokyo Gas is also exploring various domestic and international projects. Domestically, it is examining partnerships with companies like Oji Holdings and Oji Paper to produce domestically-sourced e-methane. Internationally, it is investigating the commercialization of e-methane from facilities in the United States, Australia, and Malaysia, leveraging local resources and existing LNG infrastructures.

In addition to production, there are ongoing efforts of an international alliance called "e-NG Coalition," consisting of companies from Japan and abroad to promote emethane's global development and standardize certification criteria for calculation of greenhouse gas emissions or something. This coalition aims to enhance cooperation among stakeholders to facilitate the energy transition and the establishment of international market standards.

Tokyo Gas recognizes that the successful implementation of e-methane requires addressing several challenges, including securing affordable and stable Feedstock supplies, the establishment of large-scale methanation plants, and organizing bilateral CO_2 counting rule.

In conclusion, e-methane represents a viable path toward decarbonizing thermal energy demands in Japan, leveraging existing LNG infrastructures. Tokyo Gas is committed to ensuring a responsible transition to carbon neutrality by advancing emethane production technologies and fostering collaborations that enhance energy security while meeting the challenges of climate change.

Operational Improvement technology in black liquor evaporators

Mitsuru Komatsu

Steam Technology Section CSV Technology Department Kurita Water Industries Ltd.

Kurita Dropwise Condensation Technology has been installed to over 140 paper machines in the world. From these references, the improvement of steam consumption by $5\sim10~\%$ and other new values were also confirmed, such as the improvement of the paper machine speed, the decrease of electric power, the cut of maintenance operation, the decrease of loss products, the time saving of pre-heating and so on.

In recent years, this technology has been installed not only to paper machine, such as a pulp sheet machine, black liquor evaporator, condenser of power boilers, a corrugator in cardboard factories. In this study, the target equipment was a black liquor concentration evaporator in a pulp mill. As a result of applying this technology, the heat transfer coefficient was improved and the amount of steam used per unit of black liquor processed was reduced by 13%.

Kurita believes that we can contribute to create the new value for society and companies, by installing this technology and maximize heat transfer efficiencies of more factories.

In this paper three topics which I was concerned to the development were briefly.

Energy-saving of dissolved air flotation equipment through the introduction of microbubble generation equipment

Keisuke Otsuki Fuji Mill, Oji Materia Co., Ltd.

Oji Group has formulated the "Environmental Vision 2050" and "Environmental Action Goals 2030" with a focus on net-zero carbon, and is committed to improving energy efficiency and effectively utilizing renewable energy to promote GHG reduction. Energy-saving activities in the paper industry are not only important for cost reduction but also as part of efforts to address environmental issues, particularly in the wastewater treatment process where achieving both cost reduction and environmental measures is challenging. The Fuji factory has been promoting energy-saving activities as part of efforts to achieve the roadmap for GHG emission reduction by 2030, and has decided to introduce the "OMC Microbubble Generation Device (Equipment Name: Airjec)" as part of these efforts. By using this device and conducting repeated tests, it is possible to achieve significant energy-saving effects while maintaining the same processing conditions as the existing dissolved air flotation equipment and downsizing peripheral equipment, thereby achieving a balance between cost and the environment. This article introduces the overview of the microbubble generation device and reports on the implementation effects and operational experience at our Fuji factory.

Energy Saving Project in Hachinohe Mill

Takenori Yawata Hachinohe Mill, MITSUBISHI PAPER MILLS LIMITED

Mitsubishi Paper Mills Group has set a goal of reducing domestic energy-related CO_2 emissions by 40% compared to fiscal 2013 by fiscal 2030, and is working to reduce total and fossil energy consumption, with each mill implementing energy-saving project. This article introduces the project in the Hachinohe Mill, which has the highest energy consumption in our group.

Energy Saving by Modifying Drainage System of Each Paper Machine

Yuya Hirashima

Mishima Plant, LINTEC Corporation

As global warming is an environmental problem worldwide, Japan aims to reduce greenhouse gas emissions by 46% by fiscal year 2030 compared to fiscal year 2013, and will take on the difficult challenge of achieving 50% reduction. In addition, Japan declared that it aimed at carbon neutral by 2050, and the law was revised to promote decarbonization society. LINTEC Corporation, which is based in Japan, has set the achievement of a decarbonization society as a priority issue to be addressed as a company-wide effort, and has set the goal of "reducing CO2 emissions by 50% or more from the fiscal year 2013 level by 2030." CO2 reduction activities so far have resulted in a 51% CO2 reduction in fiscal year 2023. Currently, the goal is set at "75%" and efforts are being made to further reduce CO2. This paper introduces a case of energy saving and CO2 reduction by the modification of the drainage system of No. 1, 2 and 3 paper machines at Mishima factory of LINTEC Corporation.

Introduction to Linear Turbine Vacuum Pump

Luo shi gang

Okusho Techinology Japan Co., Ltd.

Currently, carbon neutrality efforts are being actively carried out around the world. In addition, the global situation continues to be unstable, and various factors such as soaring prices of raw material and fuel continue to increase the demand for improved production efficiency and energy conservation.

Paper mills consume a lot of electricity in the equipment of stock preparation process, fan pump, drive devices for paper machine, vacuum line, etc. Among them, the vacuum line could not replace conventional equipment such as roots blower and turbo blower, and the development of energy-saving vacuum equipment would be desired.

Among them, applying the technology of linear motor which had been researched and developed in Japan and Germany, China Yisheng Linear Technology Co., Ltd developed the rotating linear turbine vacuum pump with magnetic bearings in 2018.

Since magnetic bearings are used to support the shaft non-contact, energy loss such as friction is very small, and high-speed rotation is possible. In addition, by being directly connected to motor, there is little mechanical loss such as belt and gearbox, and transmission efficiency is very high. On the other hand, its low noise can greatly contribute to reducing environmental impact and workload.

While many paper mills in China are using linear turbine vacuum pump, with the introduction of linear turbine vacuum pump at paper mills in Japan, this equipment can greatly contribute to energy conservation.

Labor-saving and dewatering improvement by press felts and Felt production to reduce

CO₂ emissions

Dieter Jochinger ANDRITZ Fabrics and Rolls GmbH (Austria) Application Engineering PF Drying EMEA Management Shingo Ohashi ANDRITZ Fabrics and Rolls Limited

In recent years, due to rising energy costs and labor shortages, the demand for energy saving and labor saving has continued to grow. In addition, environmental initiatives are also desired as a matter of social responsibility. As a general PMC/Roll manufacturer, we have achieved energy savings with advanced fibers, and labor savings with seam felts have been extended to shoe press, wet bottom and hygiene paper in our felt division. For the environment, we have started the "PURE" project to reduce CO_2 emissions by manufacturing pressfelts from recycled materials, including used felts. We present these items this time.

A Report of the International Symposium on Wood Science and Technology 2025 (ISWST2025, Sendai)

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The Japan Wood Research Society (JWRS) held the International Symposium on Wood Science and Technology 2025 (ISWST2025) at the Sendai International Center, Sendai, Japan from March 17th to 19th to celebrate its 70th anniversary. JWRS had held international symposia to celebrate its 50th and 60th anniversaries at Pacifico Yokohama, Yokohama, Japan in 2005 and Tower Hall Funabori, Tokyo, Japan in 2015, respectively.

The ISWST2025 provided a memorial speech, 2 keynote speeches, 14 invited speeches, and 287 presentations (140 oral and 147 poster) to a total of 417 participants (including 143 students and 94 attendants from abroad (24 countries)). Dr. Junji Sugiyama (Kyoto University, Kyoto, Japan) gave the memorial speech titled "Learning from wood again". Dr. Emma R. Master, (University of Toronto, Toronto, Canada) gave a keynote speech titled "Biocatalytic upgrading of renewable biomass to chemicals and new bio-based materials". Dr. John A. Parrotta (International Union of Forest Research Organization (IUFRO)) gave the other keynote speech titled "Enhancing the role of forest science in promoting sustainable development of eco-living". The ISWST2025 covered the following subjects and sessions: Wood Physics; Timber Engineering; Wood Chemistry; Composite Materials and Adhesion; Cell Formation and Wood Structures; Biodegradation and Preservation of Wood; Biorefinery and Bioeconomy; 2025 WWD Symposium & IUFRO Forest Products Culture Colloquium Session; Wood in Health and Wellness. Each session included an invited speech. Fifteen students received the "ISWST2025 Best Poster Award"s in the closing ceremony.

This article summarizes the content of the two keynote speeches and several presentations from three sections that are relevant to the Japan TAPPI Journal: Wood Chemistry, Composite Materials and Adhesion, and Biorefinery and Bioeconomy.