



BUSINESS CASE

Increasing the wastewater treatment capacity of a pulp and paper mill.

Project highlights

Industry: Over 500,000 metric tons of specialized paper and 300,000 metric tons of kraft pulp.

Total investment: CAN\$2,700,000

Impact:

- 26% increase in organic load treatment capacity.
- 47% increase in ammoniacal nitrogen treatment capacity.
- Reduction in energy consumption.
- Greenhouse gas (GHG) emissions avoidance.

Products: 15 ECOFIXE modules and 10 BIOFIXE installed in the aerated lagoon.

Economic benefits:

- 44% less expensive to acquire than the closest solution.

Baseline



Aerated lagoons installation

The mill produces specialized paper and kraft pulp. The wastewater is treated biologically in a typical aerated lagoon installation. The following table presents the design parameters, the current situation and the needs to be addressed.

Wastewater treatment plant:

Parameters	Design	Current	Needs
Flow US gal/min (m ³ /d)	9,165 (60,000)	9,930 (65,000)	11,915 (78,000)
Organic load US ton/d (kg BOD ₅ /d)	34.1 (31,000)	38.5 (35,000)	46.3 (42,000)
Chemical oxygen demand US ton/d (kg COD/d)	97.5 (88,500)	109 (98,800)	151.7 (137,670)
Ammoniacal nitrogen mg/L (kg N /d)	4.5 (270)	5.5 (358)	6.5 (507)
Total suspended solids mg/L (kg TSS/d)	2020 (121,200)	2155 (140,075)	2400 (187,200)

Overview

The pulp and paper sector is an industry that has undergone major transformations in the last decade. Companies in this sector have had to redefine themselves to ensure their sustainability and growth.

Many of them have had to focus on new market segments where demand is increasing, such as specialized paper, packaging, tissue and cellulosic fibre.

Despite these significant changes, the pulp and paper industry remains a pillar of the North American economy.



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Challenges

The company had been in operation for more than 40 years and had reached the full treatment capacity of its wastewater treatment facilities. However, there were plans to invest in a major project to increase the plant's production capacity and to introduce a new manufacturing process. Without an upgrade of the wastewater treatment facilities, these initiatives would have been impossible.

In addition to the lack of processing capacity, the company was also facing a limited supply of energy. Therefore, the solution had to be energy efficient, or even energy saving, while increasing the performance of the existing installations.

To do so, the management team sought to implement a solution that corresponded to the company's values. The protection of the environment and the respect of the community being paramount.

The traditional solution

Among the solutions evaluated by the company, increased aeration in the lagoons was considered. However, the powerful surface aerators already in place consumed all the energy available on site. Additional aerators involved costly work to increase the amount of energy available. This operation was also complex and the increase in capacity was still limited.

A second option was the use of bacteria in the aerated lagoons. This solution had limited increases in treatment capacity and sporadic results. It would have required the company to introduce an additional consumable and to repeat the bacteria add-on operation on a regular basis. Financially, this option was also expensive.

Finally, the expansion of the aerated lagoons themselves was an option that was quickly discarded by the company since it was unsustainable both financially and energetically.

The ECOFIXE and BIOFIXE solutions

The ECOFIXE and BIOFIXE are biological wastewater treatment systems that increase the treatment capacity of biological reactors by 20 to 60%.

They are installed directly in the biological reactor instead of involving the construction of new lagoons. The ECOFIXE module is specifically designed for organic load removal, whereas the BIOFIXE module is designed to maximize the removal of ammoniacal nitrogen even under extreme conditions.

Each module contains one enclosure, equipped with a flotation system. It is also anchored on each bank of the aerated lagoon where the system is installed. The enclosure features a fixed bed media (bacteriological support) on which the biomass develops.

Each module is equipped with a fine-bubble aeration system placed under each module, which helps to oxygenate the biomass, while ensuring maximum oxygen transfer. The aeration system is more efficient than standard coarse bubble aeration, that's why the ECOFIXE and BIOFIXE systems reduce the installation's energy consumption. Once installed, the ECOFIXE and BIOFIXE systems are self-sufficient, and do not require an operator to be present. Both systems can be installed without interrupting the treatment process during installation.

ADVANTAGES OF THE SYSTEMS

- No additional land required;
- No chemicals;
- Fast and simple installation (within a week);
- Modular;
- Sturdy;
- Energy efficient;
- Low operating costs;
- 100% of the flow treated;
- Stable and constant performance.

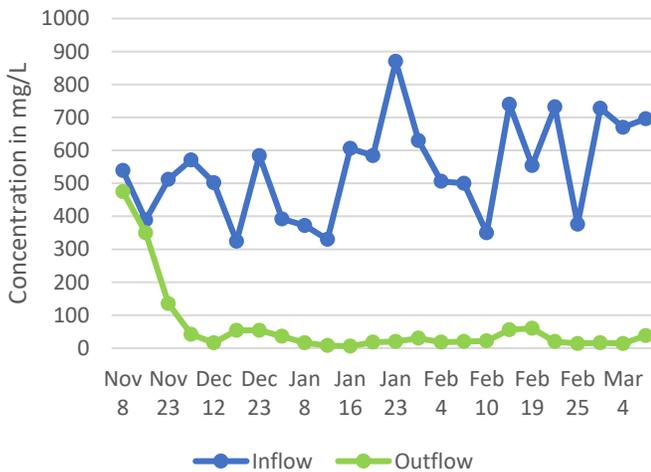


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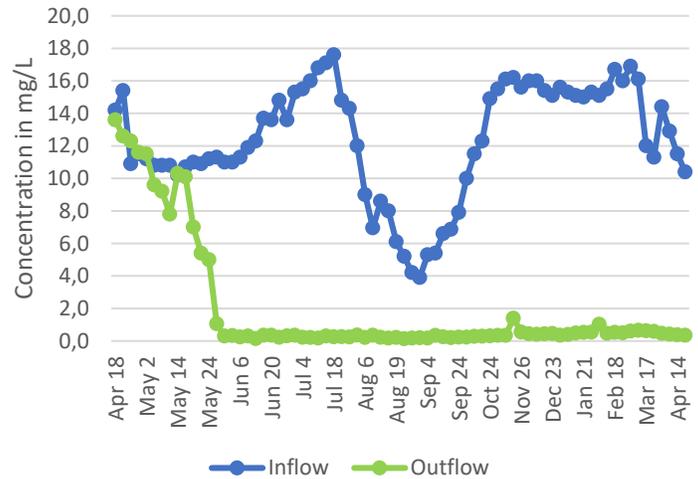
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Performance

Organic load (BOD₅) removal by ECOFIXE



Ammoniacal nitrogen removal by BIOFIXE



The pulp and paper mill must meet discharge standards set by provincial and federal authorities. Effluent from the mill is discharged directly to the river located a few kilometres from the mill. Therefore, government regulations stipulate that the company's effluent quality must reach 50 mg/L of BOD₅ per year. The discharge standard for ammoniacal nitrogen is set at 1 mg/L in summer and 5 mg/L in winter. For suspended solids, the standard is 100 mg/L throughout the year.

The ECOFIXE and BIOFIXE systems are prefabricated in the factory and transported to the site for assembly. Since assembly is simple and requires no specialized tools, a reliable local general contractor can complete the work efficiently. Technologies Ecofixe is always on site to supervise the assembly and commissioning of the modules. The 15 ECOFIXE modules and the 10 BIOFIXE modules were assembled in 8 days and installed in 2 days.

The treatment process in place, which includes two spill basins upstream from both aerated lagoons, is efficient and well operated by the management team in place. Discharge standards have always been successfully met. Despite all that, the company's growth and expansion projects made it necessary to implement a solution to increase the wastewater treatment capacity to maintain effluent quality.

As a result of the implementation of Technologies Ecofixe's solutions, the company has increased its treatment capacity by 26% for organic load treatment and 47% for ammoniacal nitrogen treatment.

IMPACT ON GHG EMISSIONS

Did you know that biological wastewater treatment is a source of GHG emissions such as methane and carbon dioxide? The expansion of aerated lagoons therefore increases GHG emissions, which in turn contribute to climate change. By optimizing the installations already in place, the ECOFIXE and BIOFIXE solutions avoid the emission of additional GHGs.

The company chose the ECOFIXE and BIOFIXE systems to meet current and medium-term needs. This gives the company an important advantage, as it will always be possible to add new modules if the installations reach their full treatment capacity. This allows our client to use their funds wisely and amortize their investment more quickly.

An independent third party has demonstrated that the ECOFIXE system emits 80% less GHGs than a comparable MBBR installation over its lifetime.