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Background

1. Drivers of Global Economy

Oil and Gas



2.5 million gallons of water is needed to drill and fracture a horizontal well

Water is the key raw material in chemical industry. It used for heating and cooling products, equipment, and also for steam production

Chemicals



Pulp and Paper



Manufacturing one ton of paper requires approximately 17,000 gallons of water. Pulp and Paper Industry remains the largest producers of wastewater

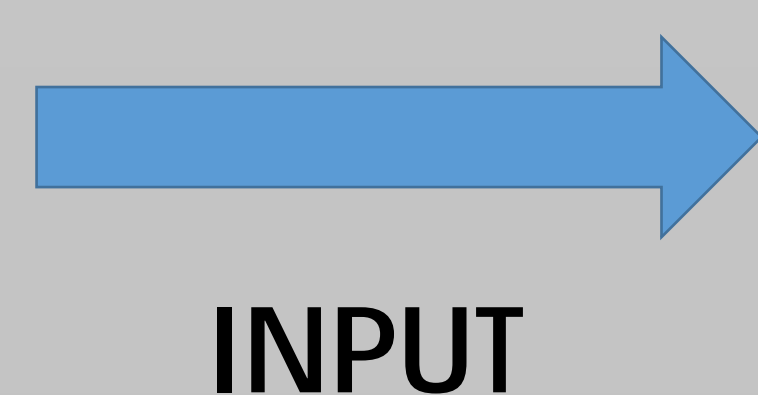
Water is the starting material for production, processing and formulation of pharmaceutical products

Pharmaceuticals



2. Story of Industrial wastewater

Direct surface freshwater, Groundwater and water from municipal sources



Industrial Processes

Industrial wastewater with high organic content, high metal content, high acidity/alkalinity, high/low pH



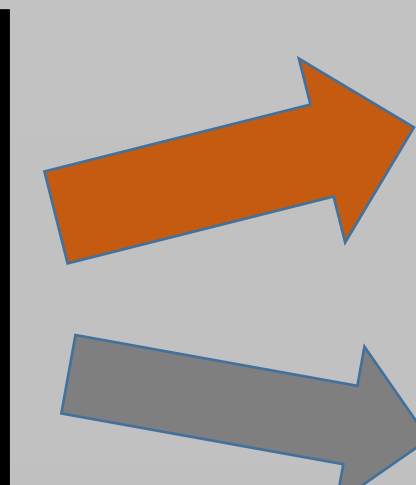
OUTPUT

Sewage Treatment Plant

Toxic Industrial wastewater



Sewage Treatment Plant



Sludge (Solid)

Discharge into water bodies

Contributions

Research

Wastewater effluents from Paper and Pulp mills have shown to have a great impact on the fish reproduction system. Use of existing high-tech advanced sewage treatment facilities fails to completely isolate the hormonally active substances present in the Industrial wastewater. Identifying the source of such hormonally active substances in the production process, and isolating them is an extra step towards long-term profitable growth from waste recovery.



Responsibilities as an R&D Industrial Intern

- Assisting in setting up the pilot scale process
- Conducting experiments and sample collection
- Compiling data and reporting it to the project team
- Conducting literature survey to improve experiment process

Objectives Achieved

- 3 successful lab-scale trial runs of isolating hormonally active substances from pulp and paper mill waste
- Pilot process set up
- Project trial document

Outside the box contributions

- Evaluation of Total Reduced Sulfur Compounds emissions from the pilot process
- Trial runs to eliminate Total Reduced Sulfur compounds from the waste effluents
- Process parameters optimization to achieve efficiency

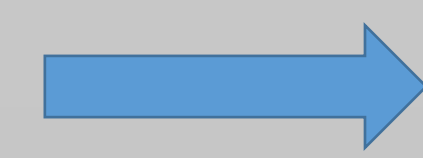
Sustainability for Industrial Processes

- A shift that focusses not just on waste treatment, but waste utilization is required to stay in this competitive market
- Identification and characterization of the waste stream from each process is required to achieve efficiency. A final product gives birth to different by-products and complex waste streams that are often overlooked in the effluent treatment process
- A zero waste process is not a myth and can be achieved easily

Takeaways for you

- Minimize waste and maximize output
- Respect the law of conservation of energy "energy can neither be created nor destroyed, it can only be transformed from one form to another"

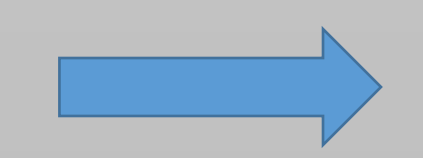
Waste Recovery



Energy (Fuel & electricity)

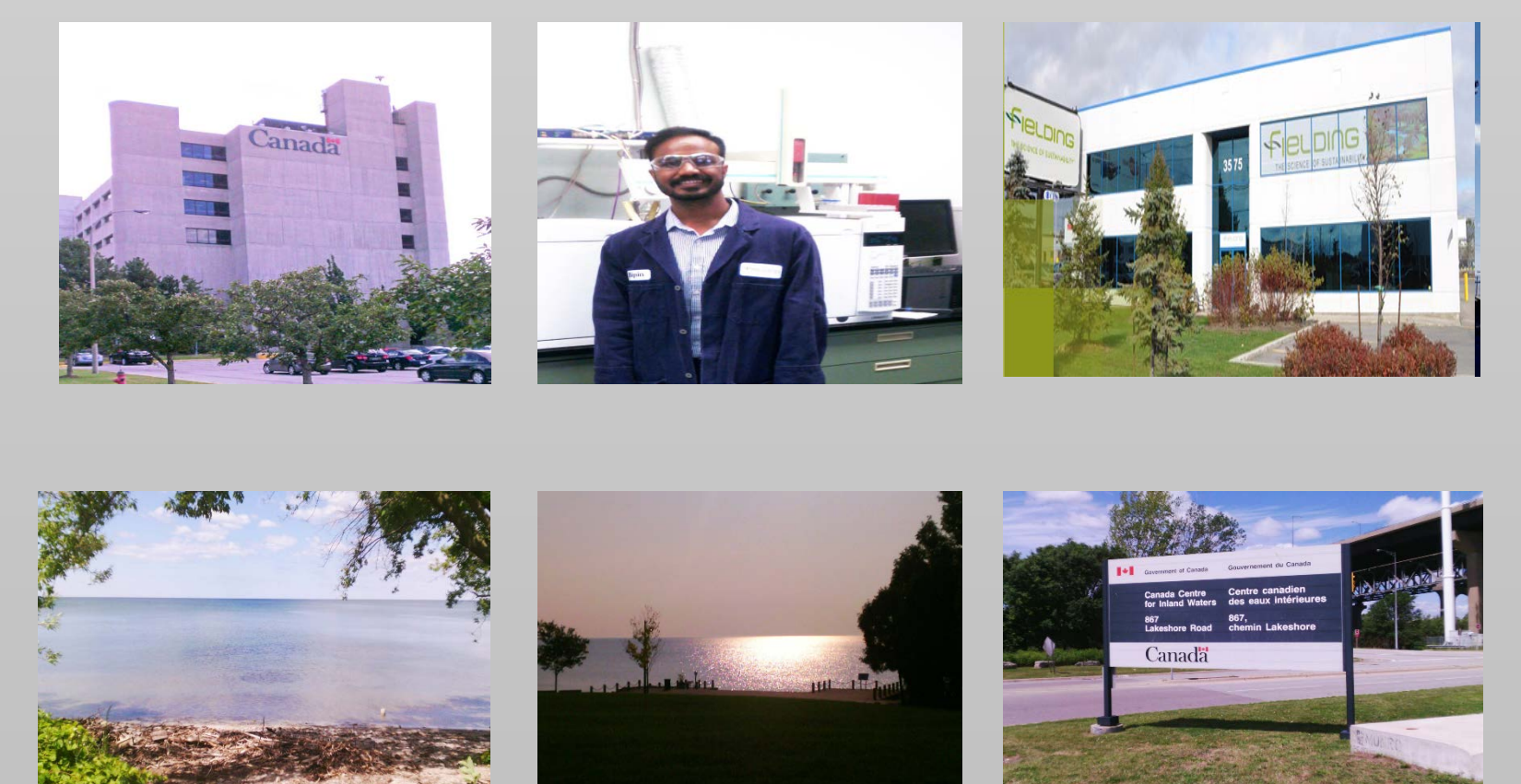
- Consider Industrial waste as a business opportunity "One company's waste is raw material for another company"

Sludge



Fertilizers

Summer Experience



Did you know?

- Microalgae can be used for treating Industrial wastewater
- Orange peel contains D-Limonene (a liquid hydrocarbon) that improves metabolism and helps weight management
- A chemical free product is a myth. Everything from water to the human body is made up of chemicals.
- It takes 2400liters of water to create a hamburger
- In Canada 150 billion liters of untreated and undertreated water is dumped into waterways every year