

# UPGRADE TO EXISTING EFFLUENT TREATMENT PLANT

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## EXECUTIVE SUMMARY

- OBJECTIVE** Design an upgrade to the current AV Group Atholville Mill effluent treatment plant to reduce TSS, COD, BOD and temperature to meet newly proposed Pulp and Paper Effluent Regulations
- RESULT** The design implementing Electro-Fenton oxidation to remove organics, tertiary filtration, and cooling was able to reduce the TSS, COD, BOD and temperature of the effluent to within proposed parameters
- COST** The upgrade will require an estimated Total Capital Investment of \$8.4 M and Total Annual Cost of \$2.7 M



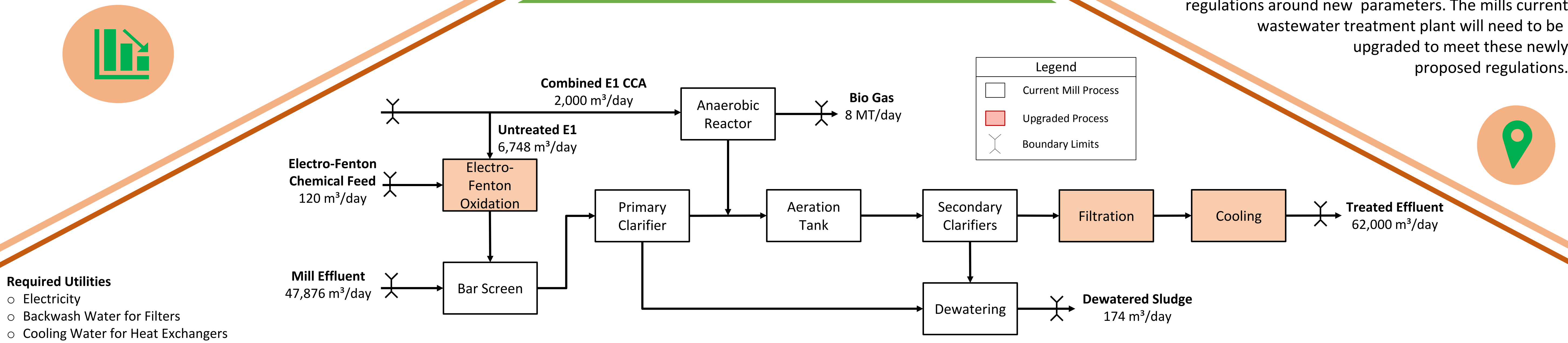
### ABSTRACT

- The wastewater treatment plant at AV Atholville must reduce discharge of TSS by 76%, COD by 74%, BOD by 79% and temperature by 13°C.
- The design proposes using Electro-Fenton Oxidation as pre-treatment in high refractory organics streams. Tertiary granular media filtration will be used to further reduce suspended solids. And finally parallel heat exchangers are used to cool the effluent to within the proposed limits.

### BACKGROUND

The AV Group N.B. – Atholville mill, a magnesium bisulfite pulp mill located in Atholville, New Brunswick. The mill produces dissolving grade pulp for markets worldwide and is used in the production of viscose staple fiber, used to make rayon clothing and textiles. The federal government proposed new effluent regulations to reduce environmental impact from the pulp and paper industries effluent, that if adopted, would come into effect in 2021. These proposed regulations are more stringent than currently regulated parameters and outline regulations around new parameters. The mill's current wastewater treatment plant will need to be upgraded to meet these newly proposed regulations.

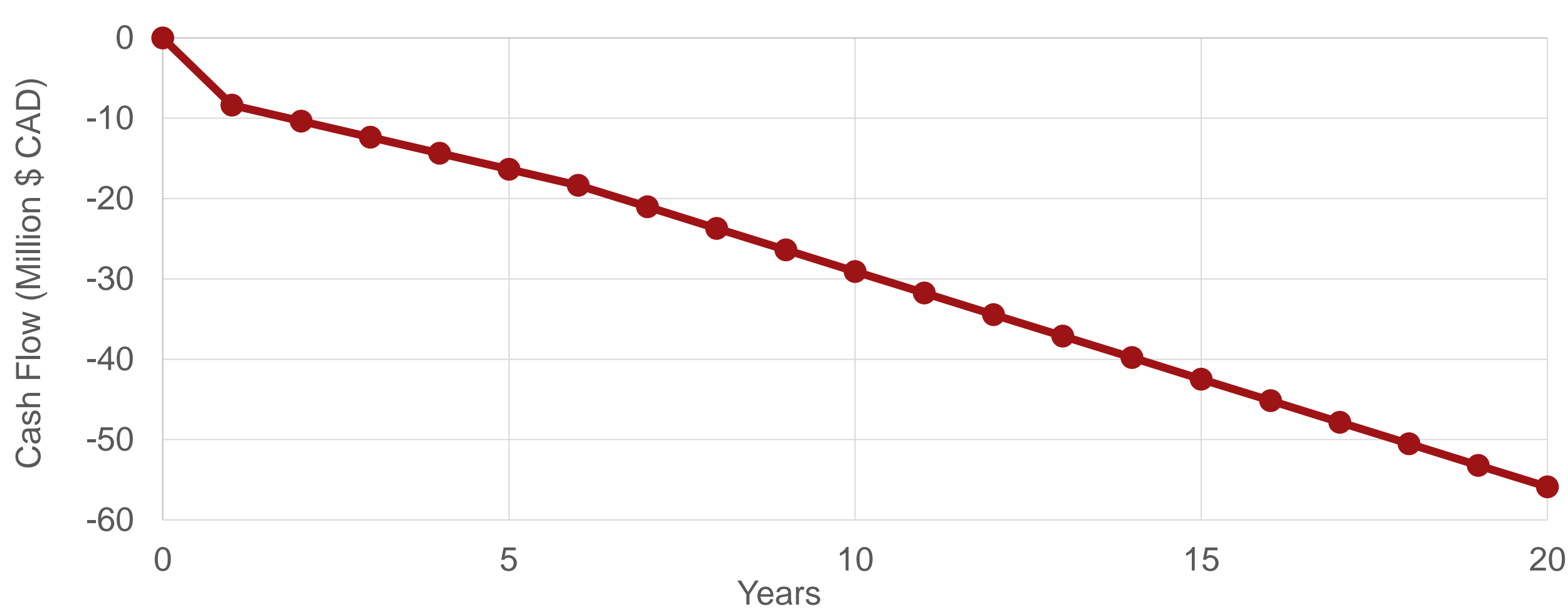
### PROPOSED DESIGN



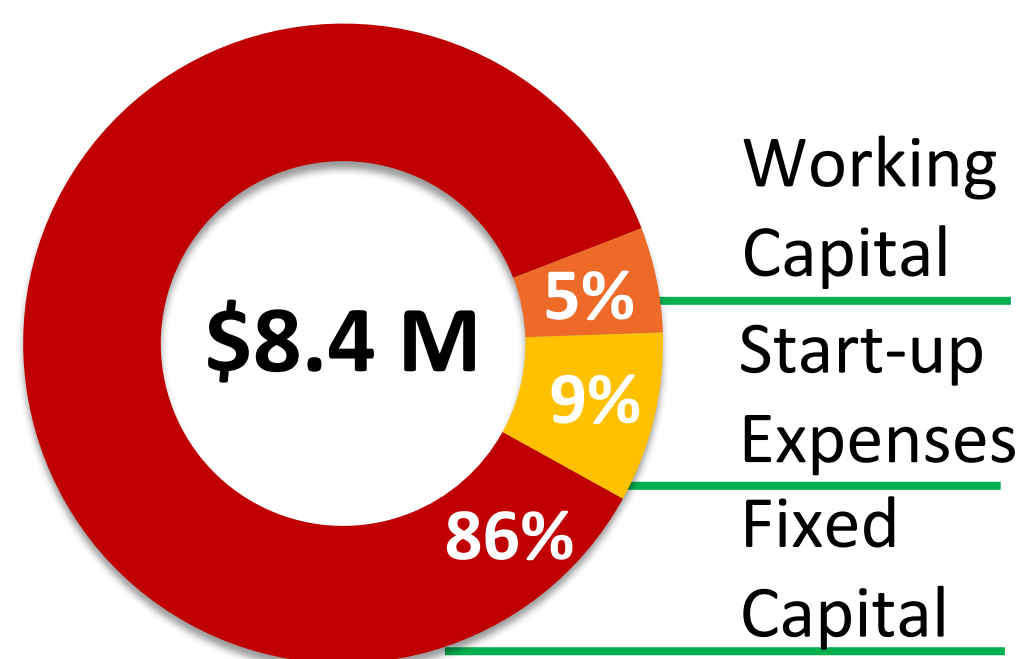
- Required Utilities**
- Electricity
  - Backwash Water for Filters
  - Cooling Water for Heat Exchangers

### ECONOMICS

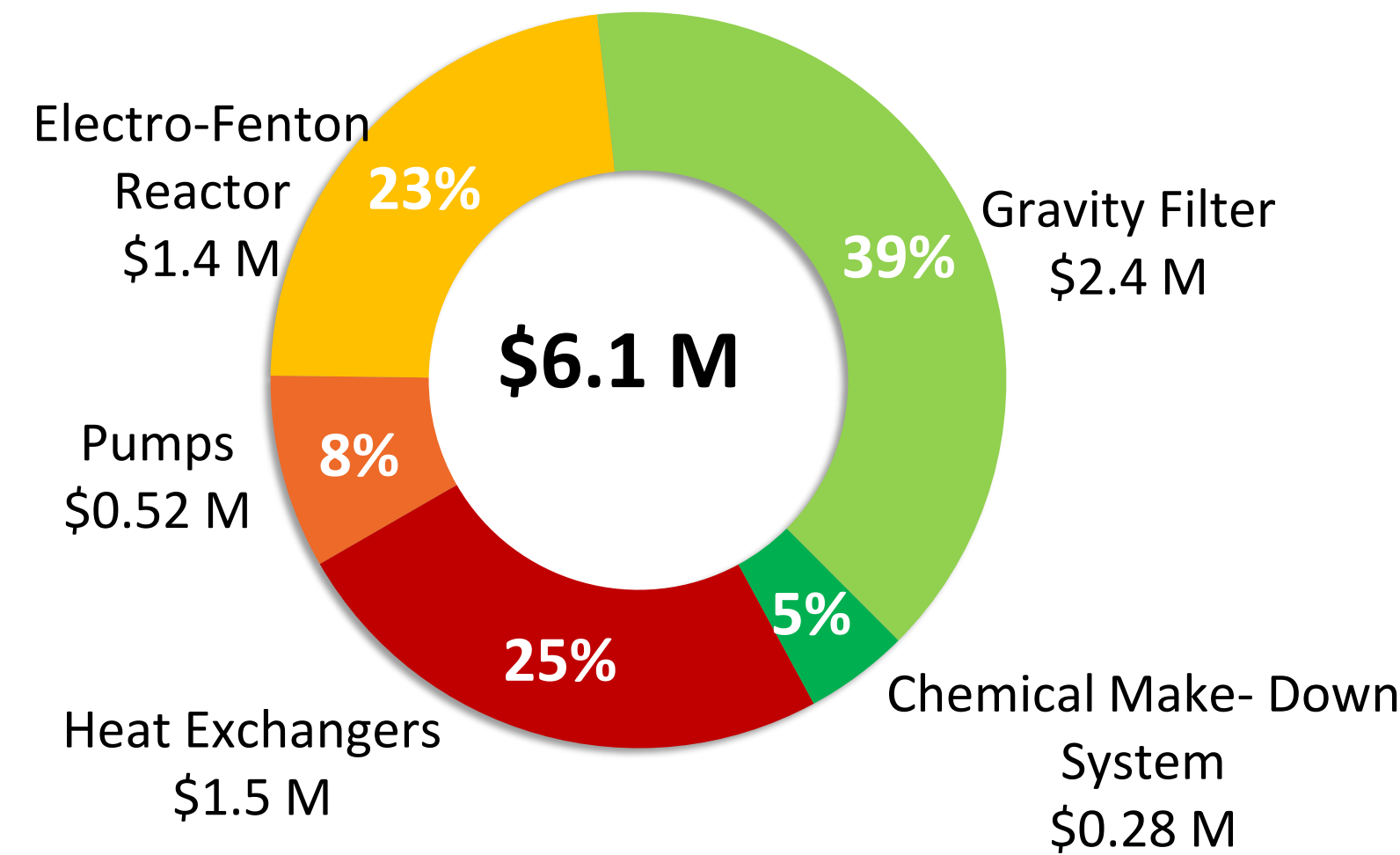
#### Cumulative Cash Flow



#### Total Capital Investment (\$M CAD)

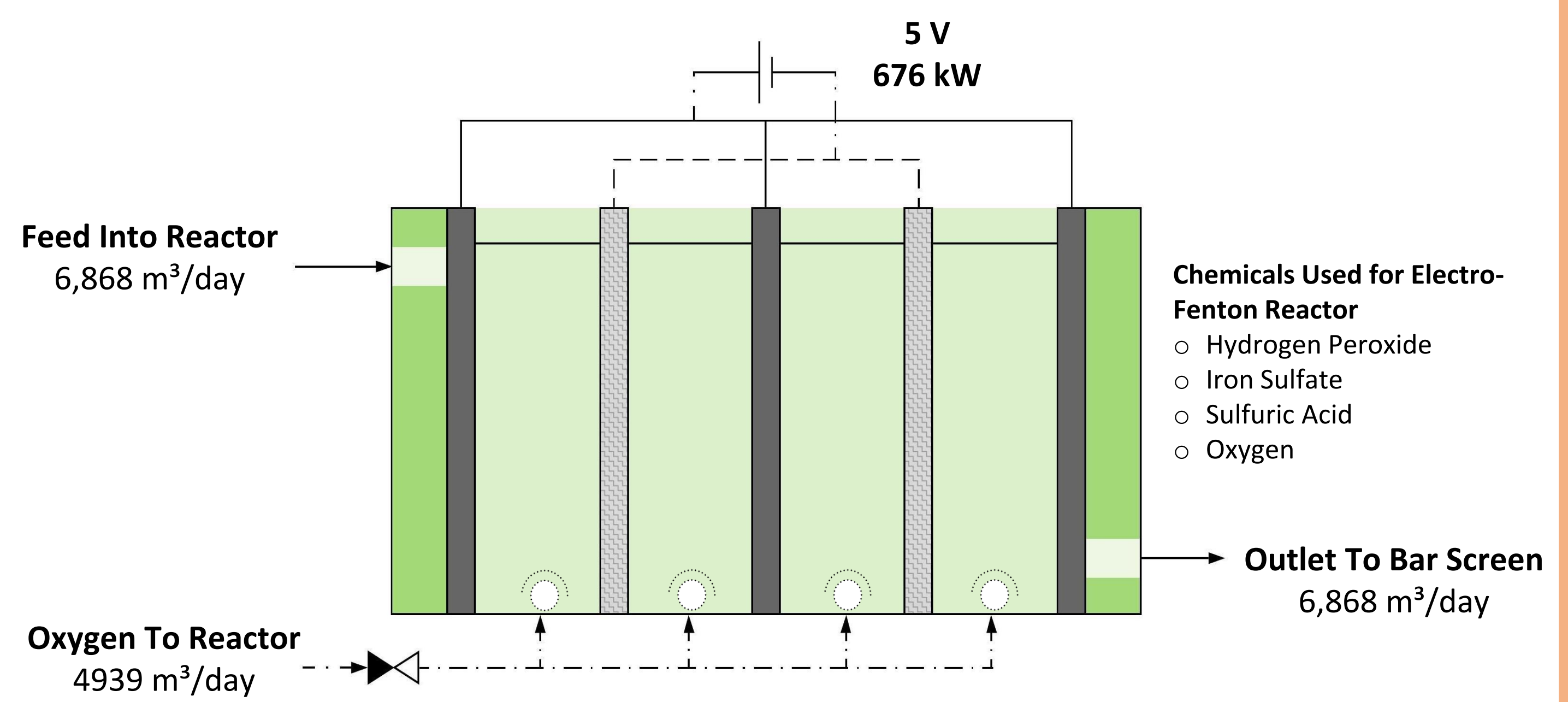


#### Equipment Bare Module Costs (\$M CAD)



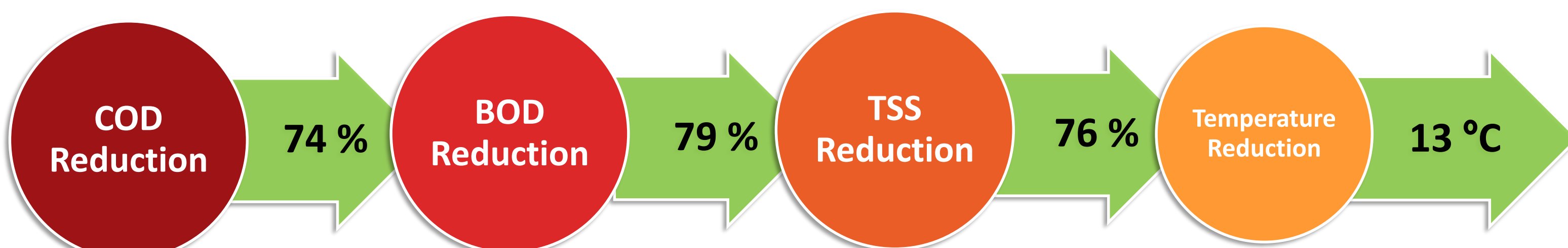
### ELECTRO-FENTON OXIDATION

#### Electro-Fenton Reactor



- Electro-Fenton Oxidation is an upgraded process of classical Fenton technology where current is applied through an iron catalyst
- The reactor operates optimally at pH around 3 and temperatures ranging from 35-40 °C
- Electro-Fenton is utilized to treat refractory organics in the E<sub>1</sub> stream from the mill bleach plant
- The reactor has series of cells which consist of a carbon felt cathode and a platinum mesh anode
- Oxygen is fed through the bottom of the reactor with a throttle valve to assist in the generation of hydrogen peroxide which reduces chemical feed costs

### CONCLUSIONS AND RECOMMENDATIONS



- In conclusion, a combination of Electro-Fenton oxidation, filtration, and cooling was able to meet the specified target effluent limits
- It is recommended to perform a more detailed analysis into the operating conditions of the Electro-Fenton reactor, determine the particle distribution in the final effluent, and determine the fouling in the heat exchangers due to the use of river water