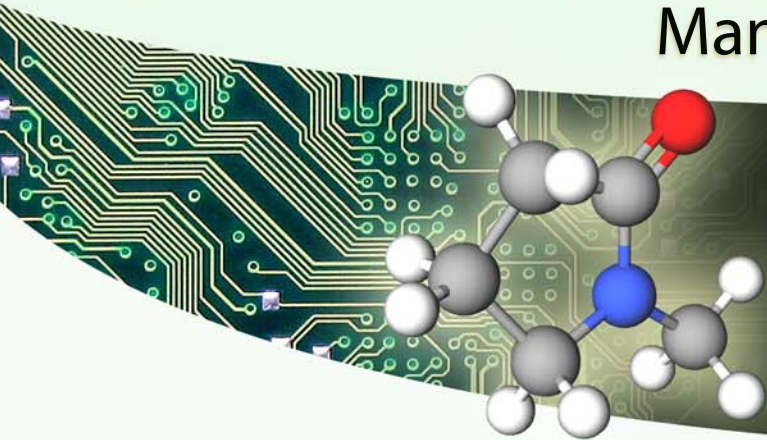




# Green Engineering Design for Solvent Waste Reduction in the Manufacture of Resin Precursors



Through support from the U.S. Environmental Protection Agency Pollution Prevention Program, Rowan University has partnered with DuPont to conduct a case study to evaluate sustainable manufacturing options for the production of resin precursors. The case study's proposed green alternative could reduce emissions significantly while saving over \$1 million per year.

## Current Process

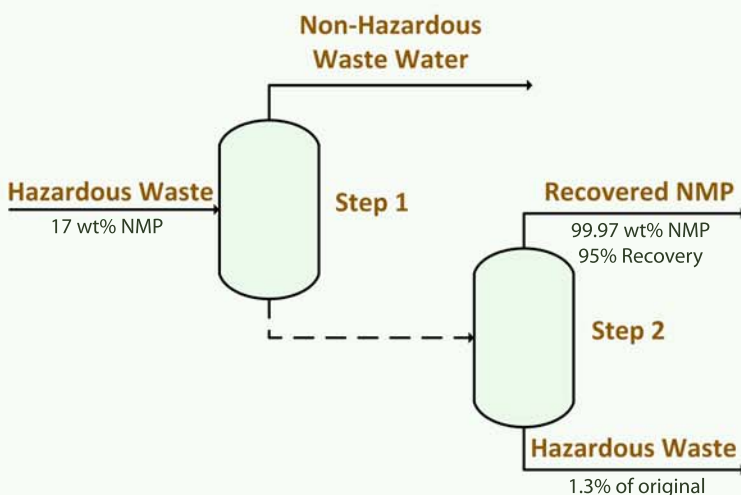
DuPont's resin precursor manufacturing process uses N-methyl-2-pyrrolidone (NMP) as a solvent. Hazardous waste containing 17% NMP is sent off-site for incineration.

## Background

Solvent use is a major source of waste in the specialty and fine chemical industries. Solvents like NMP can facilitate reactions and are also used in separation and purification processes. Since solvent waste is typically disposed of, there are opportunities to recover solvent waste for reuse, reducing the cost and carbon footprint of manufacturing processes.

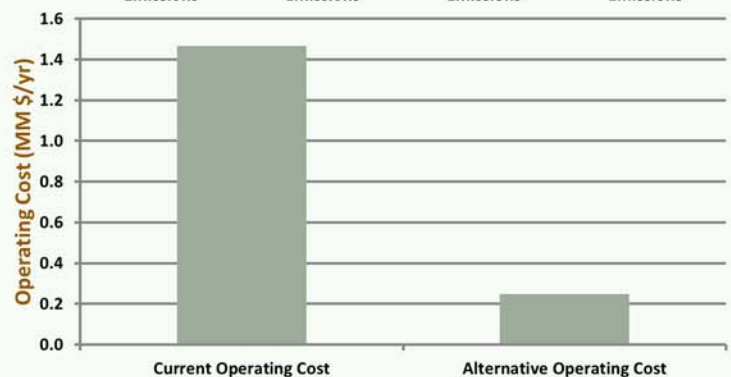
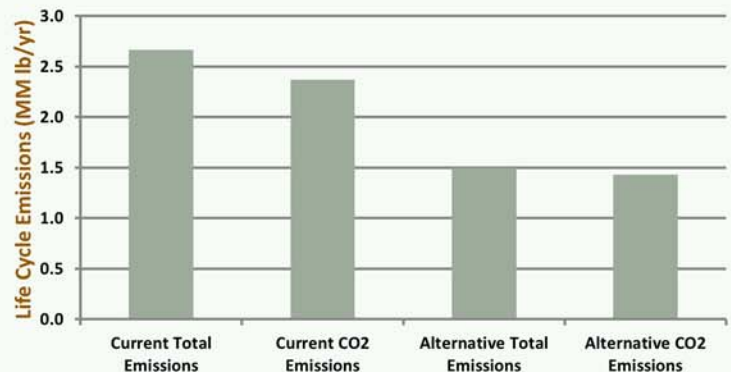
## Proposed Alternative Design

The proposed alternative uses a distillation process to recover NMP from the process waste. This is accomplished by using one distillation column operated sequentially in a two step process. The first step removes most of the water and acidic components. The second step separates the NMP from the remaining hazardous waste.



## Process Comparison

The current process was compared to the alternative from both an environmental and economic perspective. An LCA was performed on both processes in order to determine the life cycle emissions for each case. The alternative could reduce the total and CO<sub>2</sub> life cycle emissions by 44% and 40%, respectively. By recovering NMP, operating costs could be reduced by 84%, saving \$1.2 million on a yearly basis. The design of similar alternatives could easily replicate these results across the specialty and fine chemical industries.



Click below to view the case study:

Pastore, Savelski, Slater, Richetti,

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