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School: University of Washington, Tacoma
Business: The Boeing Company
Industry: Aerospace Manufacturing (NAICS 3364)
WASI Project: Environmental Heat Map and Sludge Drying



Company Description

The Boeing Company is a leading aerospace company servicing over 150 countries. Boeing is a top U.S. exporter and has been a leader in advancing economic opportunities and creating sustainable practices. They continue to innovate for the future, focusing on sustainability and community impact, by fostering their core values of safety, quality, and integrity.

Boeing Commercial Airplanes has been a leading manufacturer of commercial airplanes for decades. Boeing represents almost half of the world's fleet with more than 10,000 commercial jetliners in service today. Currently, Boeing manufactures the 737, 767, 777, and 787 families of airplanes.

Incentives for Change

Boeing is committed to reducing their total waste footprint. They created the Global Enterprise Sustainability (GES) organization, which guides Boeing's efforts to reduce waste and conserve environmental resources.

The Boeing Company has operational performance targets to meet by 2025, using 2017 as a baseline. These goals include reducing:

- Greenhouse gas emissions by 25 percent
- Water consumption by 20 percent
- Solid waste to landfill by 20 percent
- Energy consumption by 10 percent
- Hazardous waste by 5 percent

Project Description

Environmental heat map

The WASI internship project worked with the Boeing Auburn and Boeing Frederickson sites to create an environmental heat map. This heat map will track both ongoing and upcoming projects focused on reducing the environmental waste and utility consumption of the two facilities. These projects will help the two locations meet their operational performance targets by 2025.

The heat map will improve the data tracking and communication on different projects. This will allow teams to adjust more quickly. The heat map will also give Boeing the opportunity to identify and prevent potential delays or issues earlier in the planning phase.

Sludge drying

The WASI intern assisted with an Environmental Health and Safety (EHS) conservation project to minimize the sludge produced by Boeing's Wastewater Pretreatment Plant (WPP). The WPP treats 500,000 gallons of water and generates 500 gallons of wastewater sludge each day. The sludge currently contains 25 to 30 percent solids. The goal was to find opportunities to reduce the overall water content of the sludge produced, reducing hazardous waste generated by up to 10 percent.

Sludge drying options must continue to meet all waste management criteria defined under the Clean Water Act, the Resource Conservation and Recovery Act (RCRA), and the Clean Air Act. An alternative to the traditional heat dryers includes the ELODE unit, a new process that electrically charges the sludge to help dewater it. Using this new technology could result in an estimated annual 121-ton reduction of hazardous waste, reducing the annual total by 10 percent and creating a savings greater than or equal to \$45,000 annually.

Recommendations

Environmental heat map

The heat map is a useful tool that can provide an at-a-glance breakdown of current or proposed Auburn and Frederickson projects. The heat map could be used at any site, given the appropriate data. The map can also be used to provide a visual indication for areas that require more attention. Using the heat map, Boeing can prioritize projects that affect the buildings, as well as those projects that have the greatest environmental impact and projects that need funding through organizations like Global Enterprise Sustainability.

Sludge drying

After extensive research and fact checking, three possible opportunities for sludge drying aligned with all applicable requirements and objectives.

1. Adjust existing wastewater procedures to potentially improve the solid to water waste ratio.
2. Use existing heat from steam to dry the sludge. Boeing should continue researching the Enviro-Dri Sludge Dryer and the Paddle Dryer steam options to get better estimates on dewatering potential.
3. Use other innovative technologies (e.g. ELODE unit) to extract excess water from the sludge. The unit specifications appear to be a compatible fit for the WPP operations. The next step is to run a bench test on samples of the WPP sludge in the ELODE unit. The test results will determine more accurate estimates on reductions and cost savings. Early estimates indicate the sludge solids content can be increased to at least 40 percent and potentially up to 60 percent.

Estimated annual effects from implementing recommended P2 actions

Recommended P2 Action	Cost to Implement (\$)	Annual Savings (\$)	Hazardous Waste Reduction (lbs)
Install ELODE Dryer (40% dry solids scenario)	1,500,000	> 45,000	242,000

