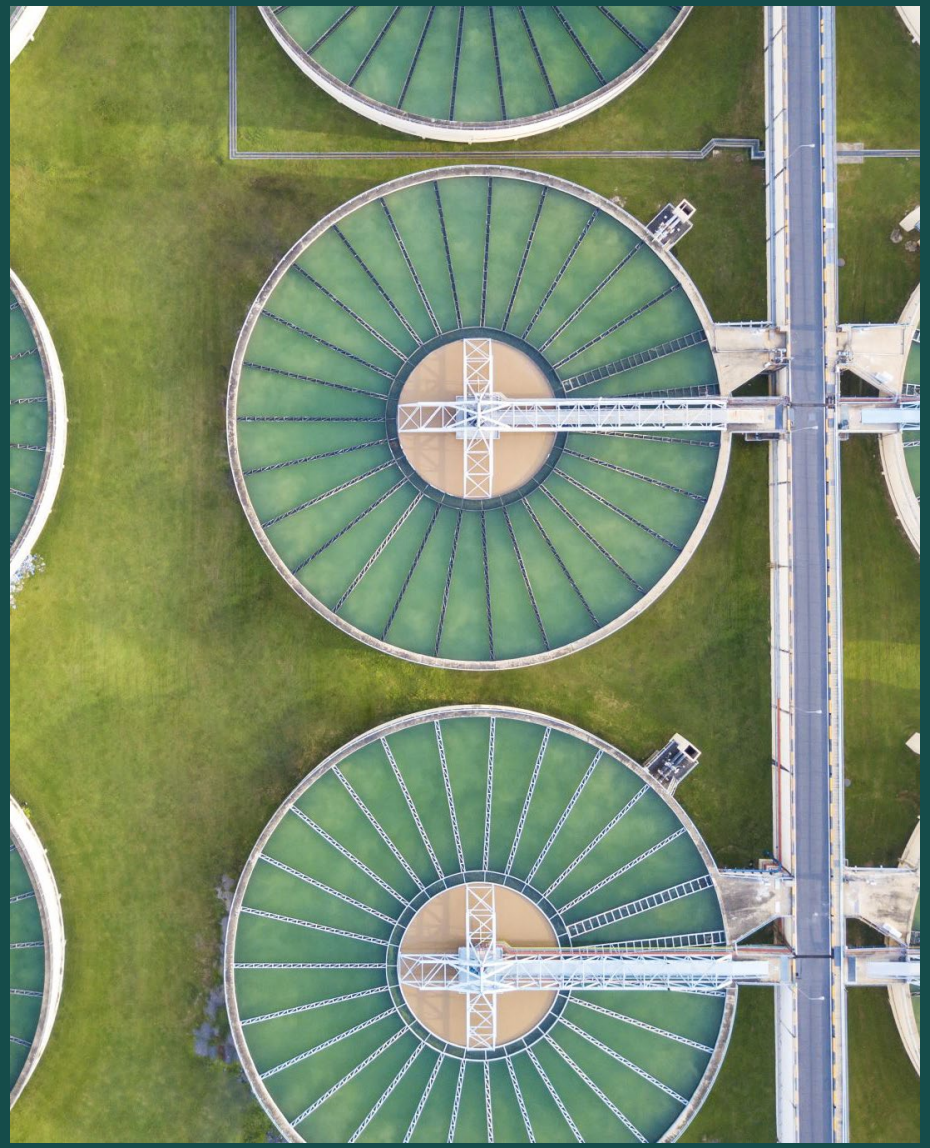
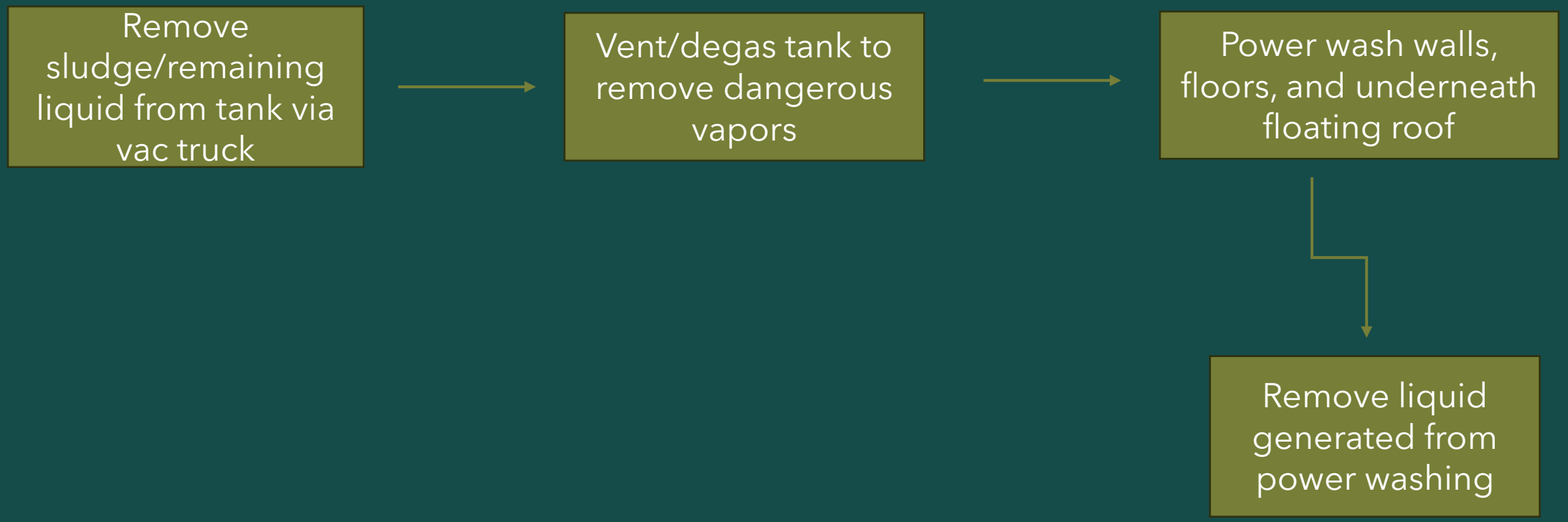
# Sustainable Tank Cleaning Solutions



# Overview

- Challenges in Traditional Tank Cleaning
- Growing need for sustainable practices in tank cleaning
- Optimizing resource efficiency
- Real-world examples of sustainable tank cleaning practices

# Standard Tank Cleaning Practice

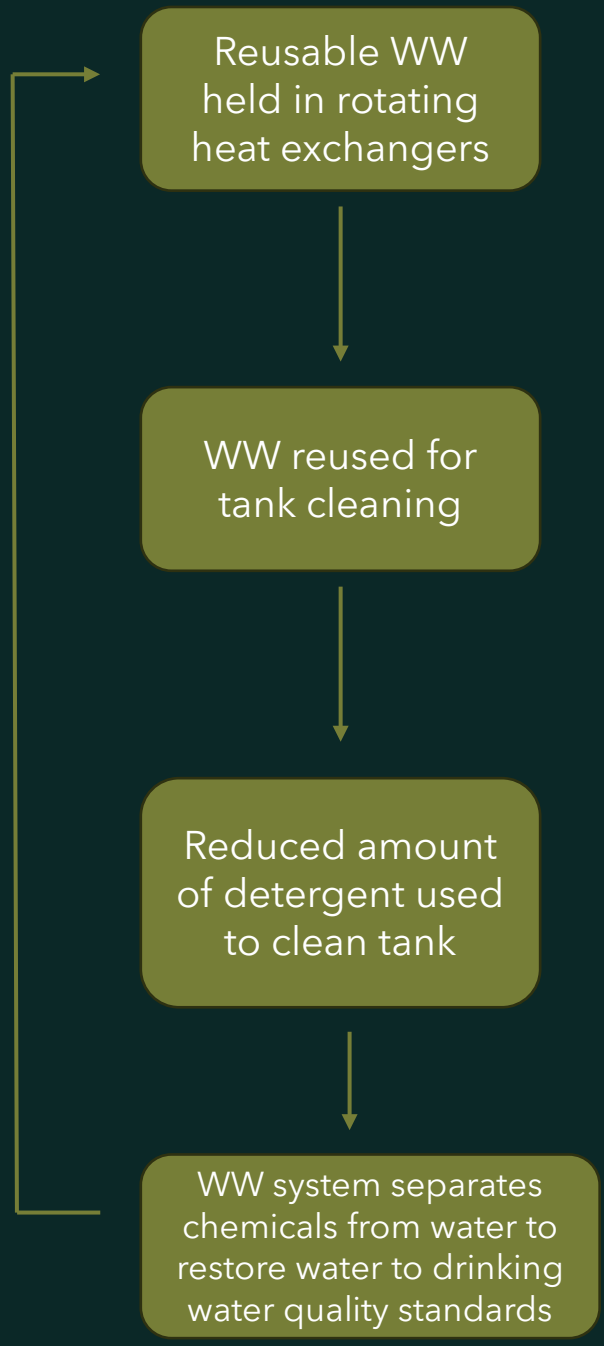


# Challenges in Traditional Tank Cleaning

- Environmental impacts of chemical cleaners and wastewater discharge such as:
  - Water pollution
  - Bioaccumulation
  - Eutrophication
  - Soil Contamination
  - Habitat Destruction
- Economic costs associated with water consumption and chemical usage
- Health and safety risks for workers

# Real-World Examples – Stolt Tank Containers (STC)

- STC Moerdijk Terminal in the Netherlands has installed a system that is expected to reduce wastewater (WW) discharge by 70%
  - WW system involves separation oils and fats, physical chemical treatment, biological treatment and enhanced effluent polishing to restore the water to drinking water quality standards
  - They plan to retain the WW for reuse at a temperature of about 73 °F so the WW doesn't require as much energy to reheat for cleaning
    - STC invested in special rotating heat exchangers to recover a large portion of thermal energy in the WW used for tank cleaning and reduce natural gas consumption to heat WW
    - Consumption of natural gas is expected to be reduced by 57,000 $m^3$ per year, saving 37,000 kg of carbon emissions
  - Re-usable water reduces amount of detergent needed for effective cleaning which in turn reduces chemical consumption
    - Chemical consumption is expected to be reduced by 2,000 kg a year



# Real-World Examples – Terminal on Houston Ship Channel

- USA DeBusk helped terminal on the Houston Ship Channel implement sustainable practices for residuals (water, solids, oil) found in terminal's customer bulk storage tank
  - Oil/water separation and processing aided facility to reclaim 140 bbl of oil for recycling and approximately 55,624 gallons of water that could be safely returned to the ecosystem
  - 397 tons of solid waste from tank was repurposed from the tank as a waste-derived fuel and the fuel was used to power a cement kiln
    - Waste-derived fuel had a lower carbon footprint, lower greenhouse emissions, benzene NESHAP compliant, and met all EPA air quality standards
  - Effective processing of material removed from tank prevented 64 tons of waste from entering a landfill and no residual ash was deposited into landfills

# Real-World Examples – Circon Environmental

- Blending approach for tank cleaning and waste disposal increases the efficiency of removal, transport and delivery of waste
  - Blending tank allows waste to be turned into waste-derived fuels and allows for sustainable practices to be met such as:
    - Landfill avoidance
    - Coal displacement
    - Net-carbon offset
    - Water Conservation
  - Direct-loaded Roberoller tankers eliminate the use of roll-off boxes and all associated costs, including delivery, rental, liners, and cleanout charges
  - Kilns provide "live" offload which keeps waste moving rather than taking up space and accumulating rental charges

# Ways to Reduce Waste Generation

- Reuse and repurpose materials within the facility (ex: empty drums and totes can be cleaned and reused for the same or different chemicals, or they can be sold to companies that recycle such containers)
- Work with vendors/suppliers to encourage eco-friendly packaging materials and take back packaging for recycling or reuse
- Provide training to employees to raise awareness about the importance of recycling and waste reduction
- Implementing waste reduction strategies such as identifying ways to recycle waste into a waste-derived fuel
    - Off-loading waste into tanker truck to avoid placing/storing waste in compatible containers

# Academic research shows move towards turning waste into waste-derived fuel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# Questions?

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