



Estrogen Treatment by *Pseudomonas putida* In Dairy Farm Wastewater

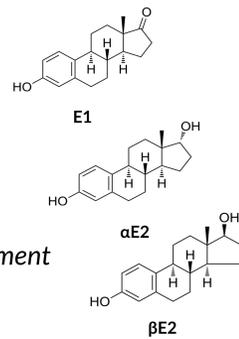


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Project Overview



- Estrogens are increasingly recognized as a micropollutant of concern
- Classified as endocrine disrupting compounds (EDCs), which can bioaccumulate or biomagnify in organisms
- Health effects include:
 - Feminization of fish, disrupting population cycles
 - Cancer in humans

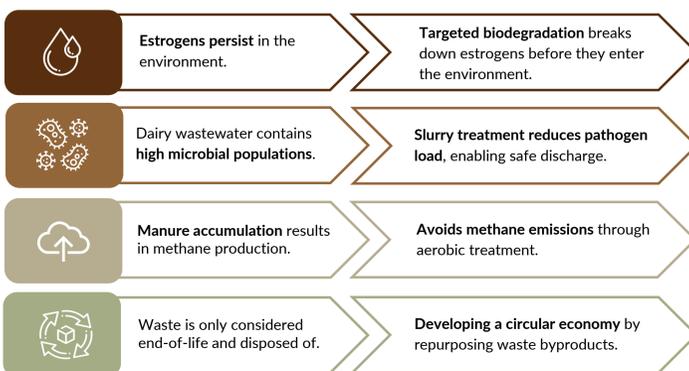


Currently, there is no targeted estrogen treatment in wastewater treatment processes.

90% of estrogens in the environment

are leached or discharged by feedstock farms, including dairy farms.

Environmental Analysis



Relevance to Society



Process Description



P. putida is batch-cultured at an off-site lab. The cells are lyophilized for long-term storage and shipping to farm sites.



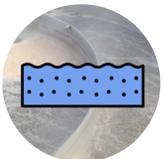
A **sophorolipid solution** desorbs estrogen from organic solids in the slurry. Large solids are removed by a **screen filter**.



Small solid particles settle out in a **clarifier** after flocculation. Wastewater is recovered by a **belt press**.



Liquid effluent from the clarifier is processed by a **rotary drum filter** to remove remaining fine solids.

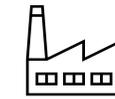


UV deactivates other microorganisms in the liquid before it enters a **moving-bed biofilm reactor**. *P. putida* metabolizes the estrogens.



After 24 hours, treated effluent is **safely discharged** for farming uses.

Economic Analysis



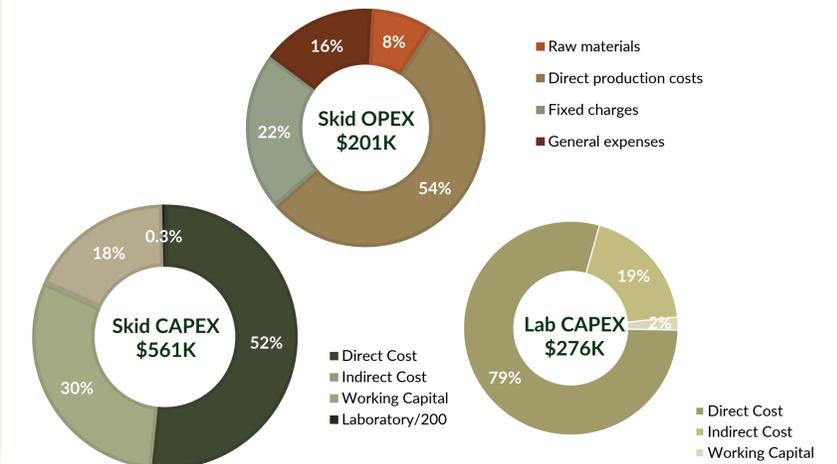
10 Years Skid Unit Lifetime



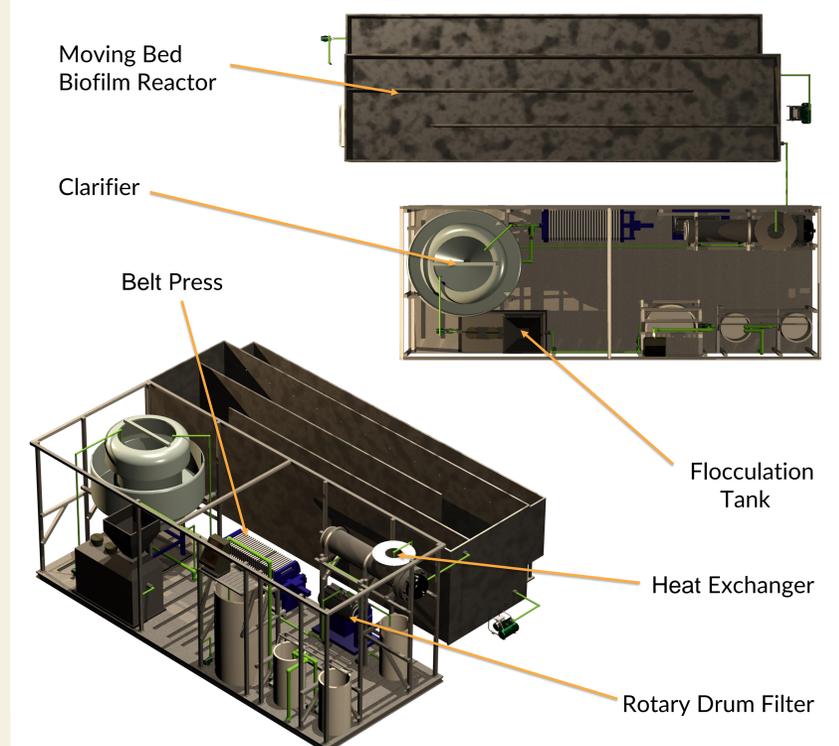
\$55 - 65/m³ of water treated



200 Farms over 10 years



Plant Layout



Acknowledgements

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