



Estrogen Treatment by *Pseudomonas putida* In Dairy Farm Wastewater

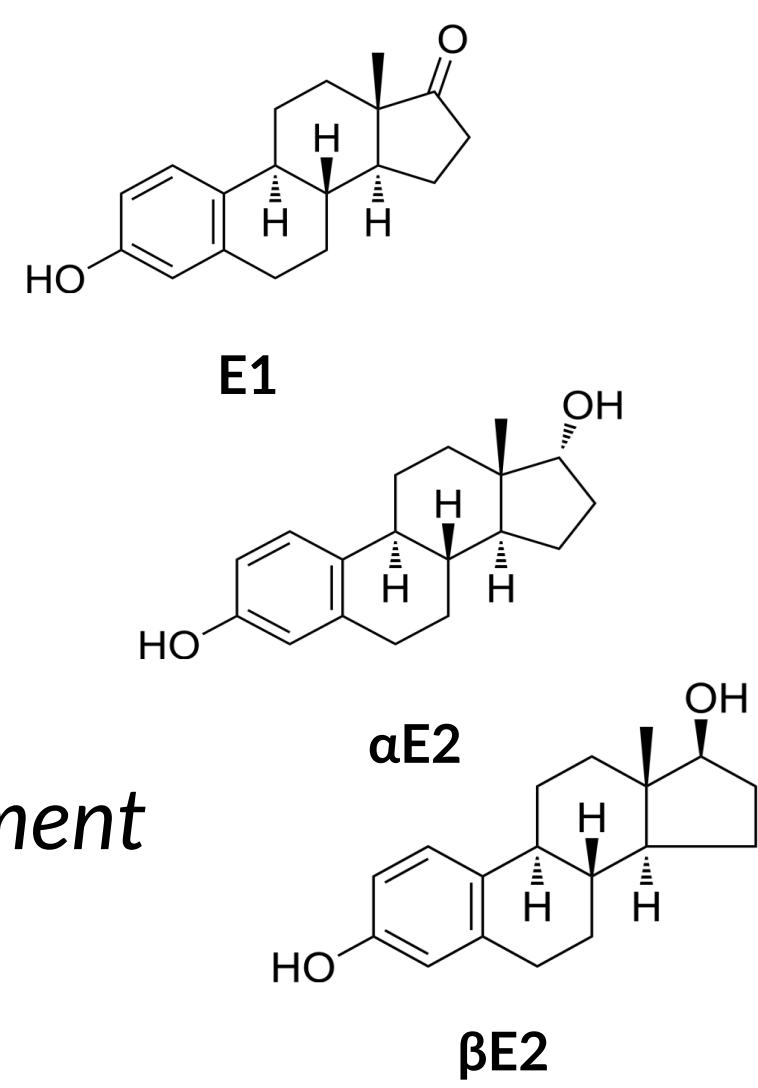


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Project Overview



- **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

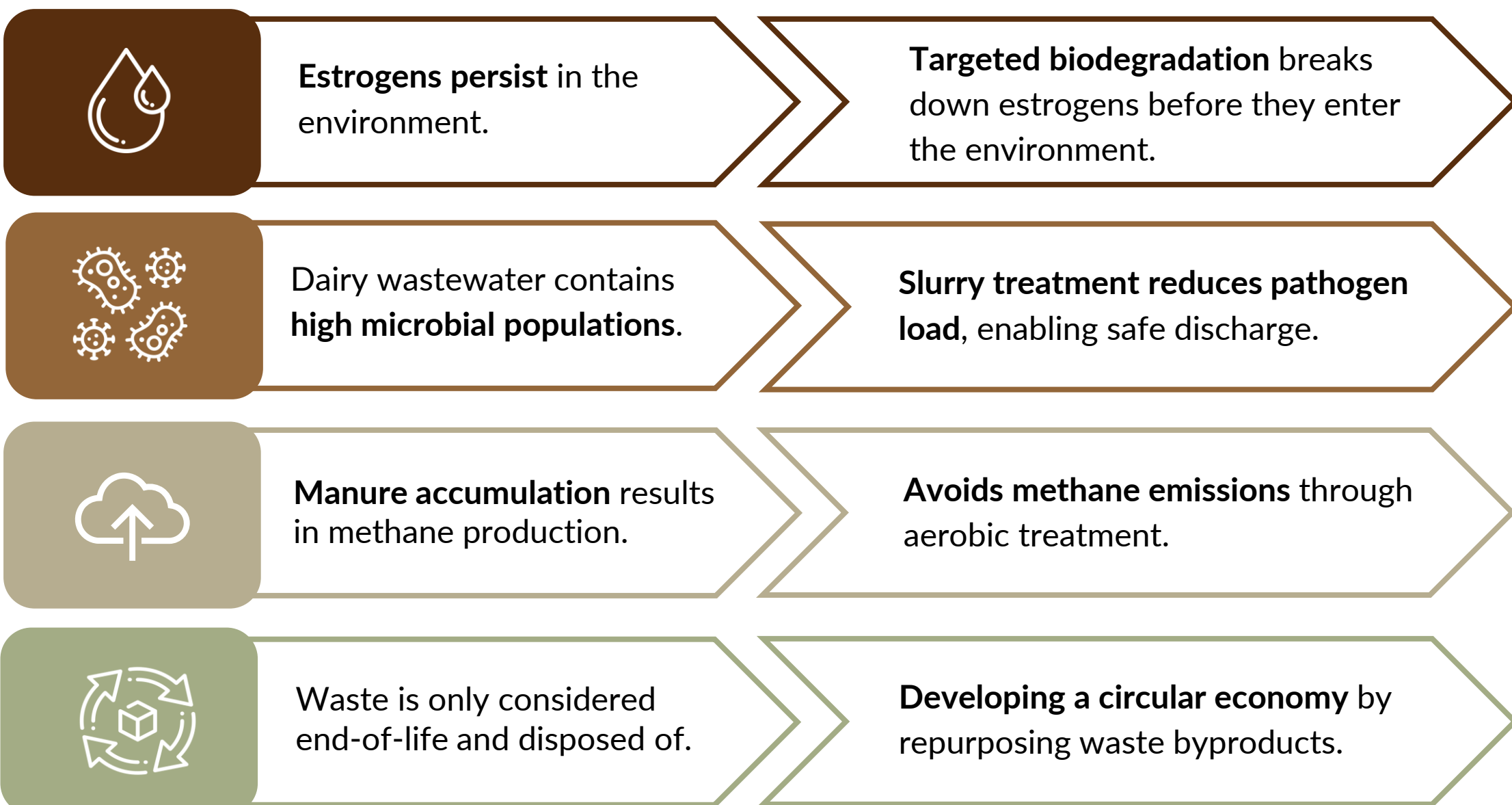


Currently, there is no targeted estrogen treatment in wastewater treatment processes.

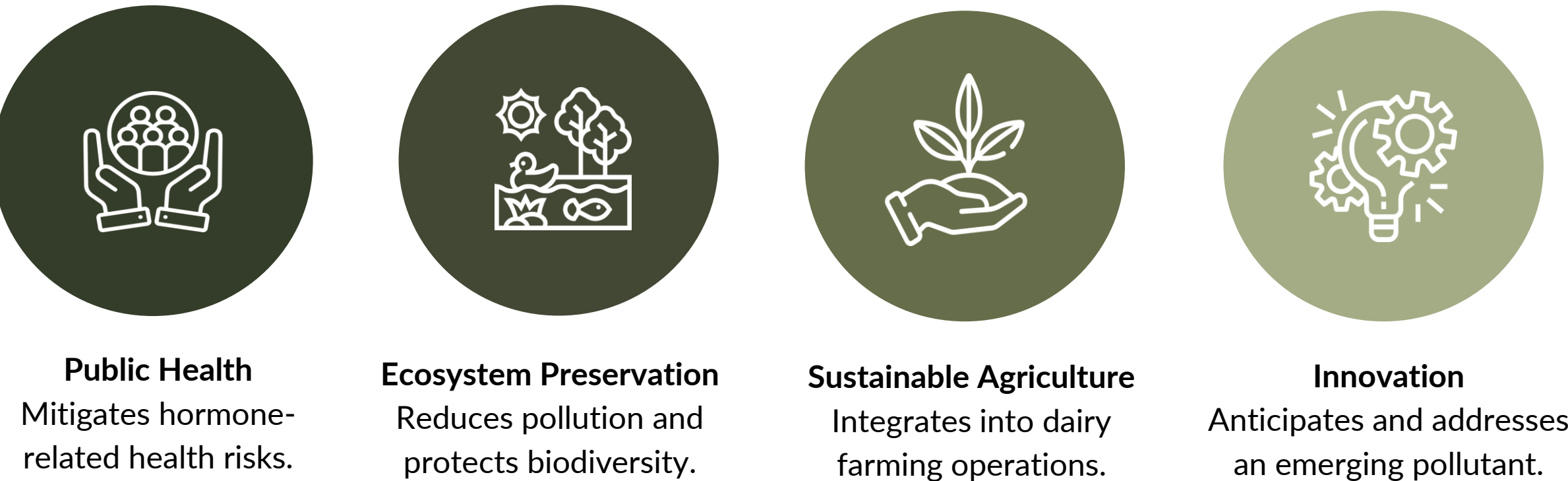
90% of estrogens in the environment

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

Environmental Analysis



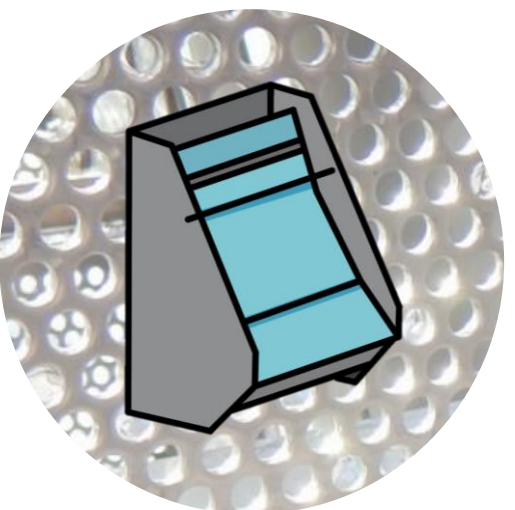
Relevance to Society



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.



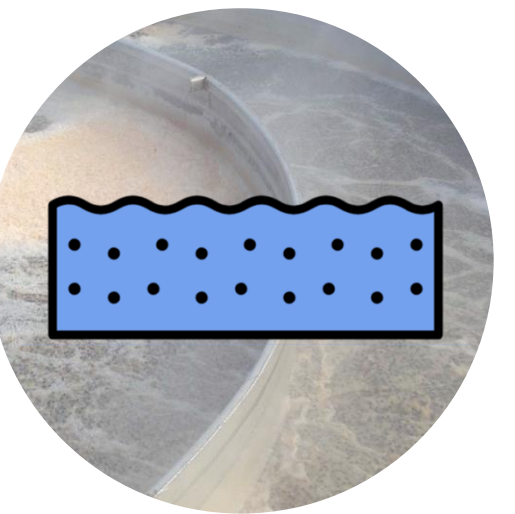
A **sophorolipid solution** desorbs estrogen from organic solids in the slurry. Large solids are removed by a **screen filter**.



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.

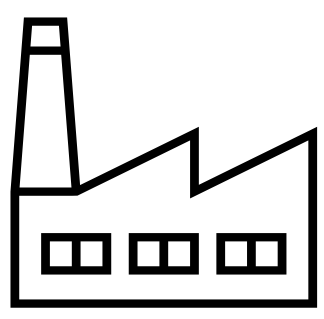


UV deactivates other microorganisms in the liquid before it enters a **moving-bed biofilm reactor**. *P. putida* metabolizes the estrogens.

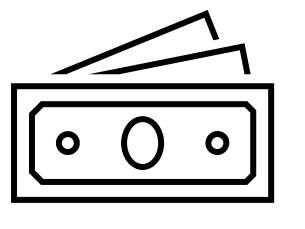


After 24 hours, treated effluent is **safely discharged** for farming uses.

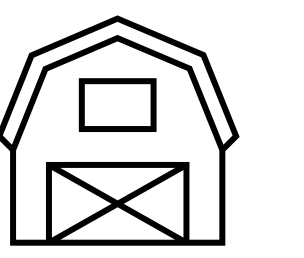
Economic Analysis



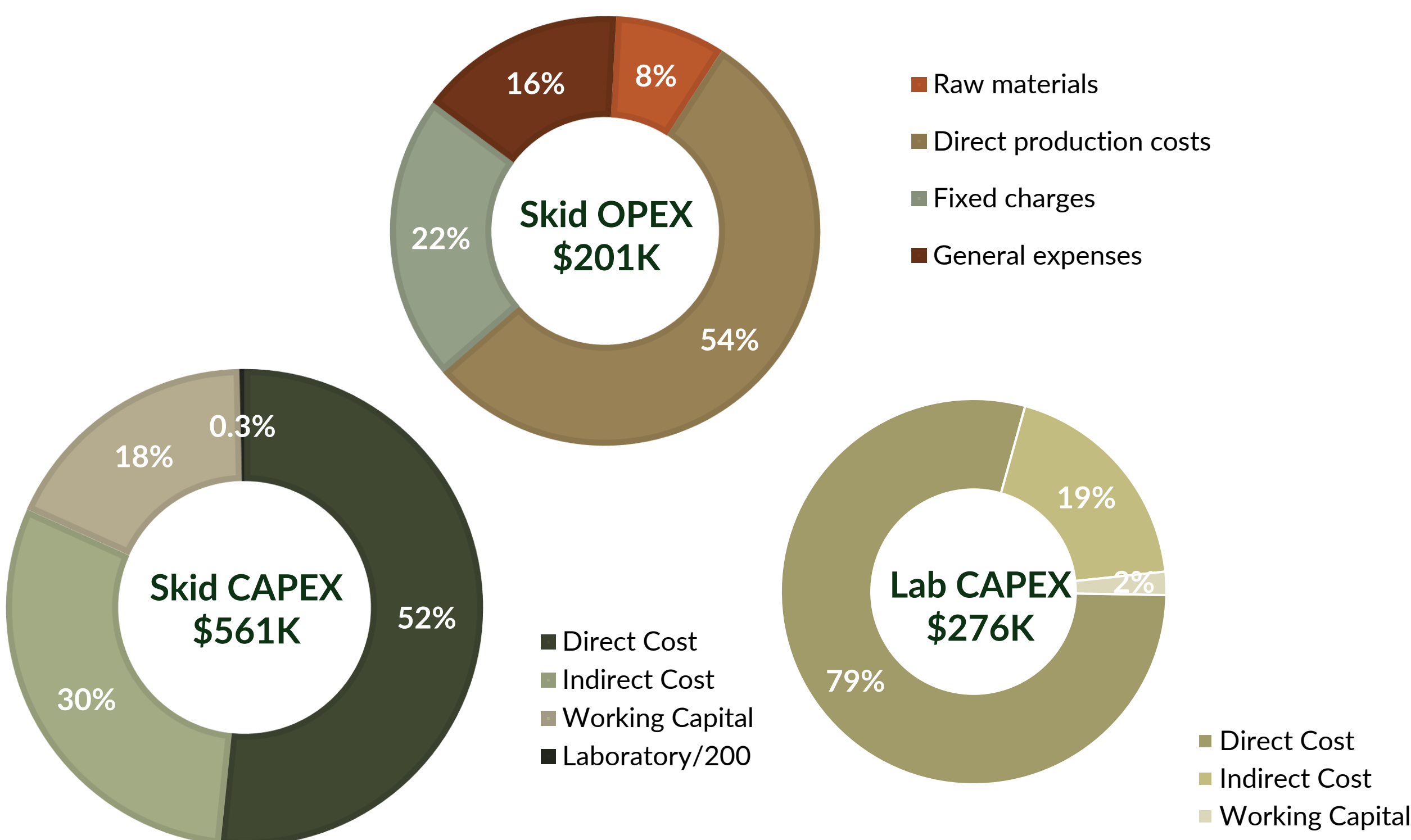
10 Years
Skid Unit
Lifetime



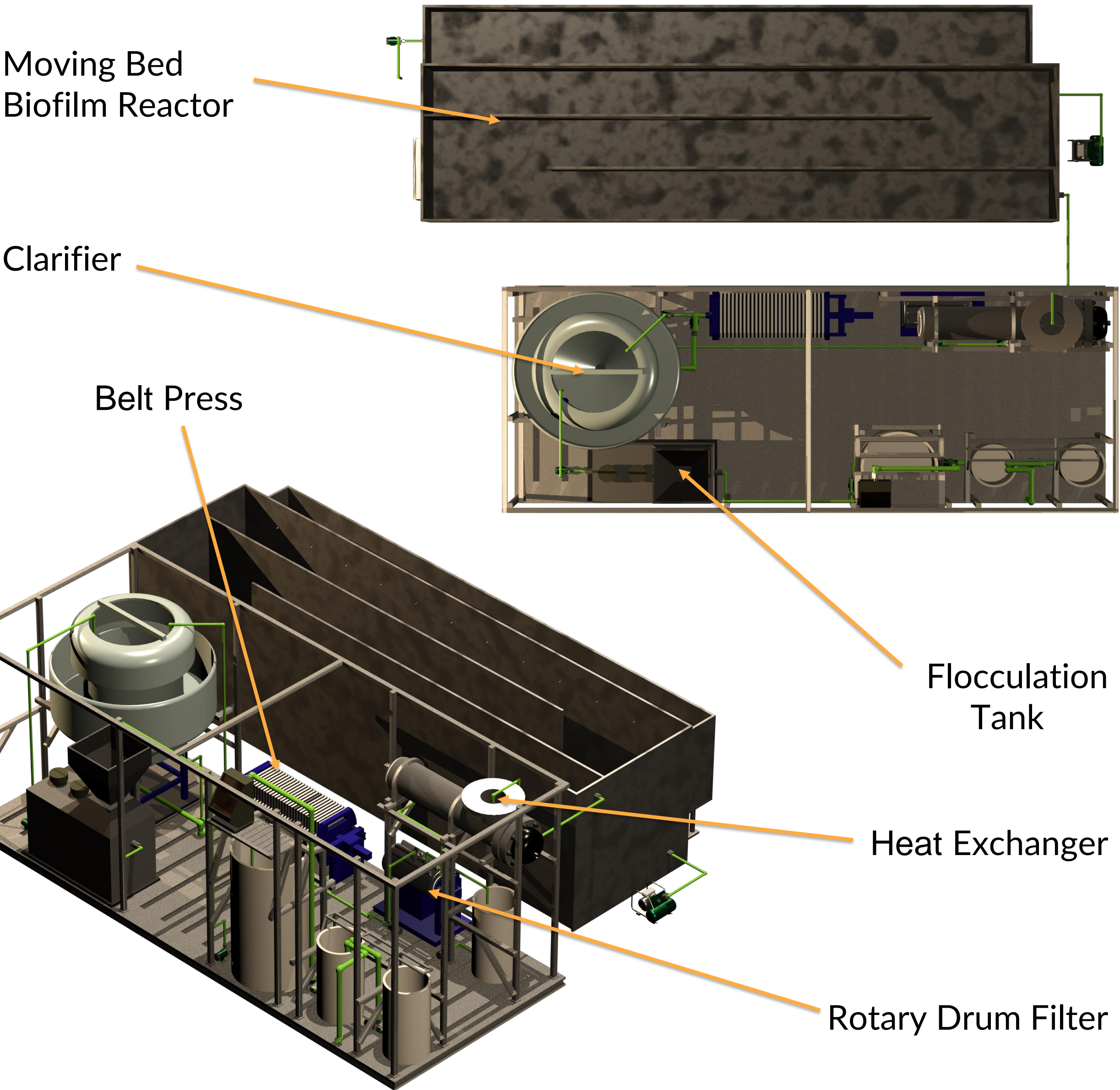
\$55 – 65/m³
of water treated



200 Farms
over 10 years



Plant Layout



Acknowledgements

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UBC SWIRL Team