**Chayse Lavallais**
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## SUMMARY

Technology strategy and sustainability professional with expertise in techno-economic analysis (TEA), life cycle assessment (LCA), energy systems evaluation, and commercialization of emerging clean technologies. Experience developing business cases, evaluating market opportunities, conducting carbon and sustainability assessments, and translating complex technical analyses into strategic recommendations for industrial and energy-sector stakeholders. Proven ability to support technology development, commercialization, and decarbonization initiatives through data-driven decision making.

## EDUCATION

**Northwestern University | Evanston, IL**
August 2025
*Ph.D. in Chemical and Biological Engineering*
**Northwestern University-Kellogg School of Management | Evanston, IL**
August 2023
*Management for Scientists and Engineers Certificate*
**Prairie View A&M University | Prairie View, TX**
June 2019
Bachelor of Science in Chemical Engineering*, Honors Program, Summa Cum Laude*

## RELEVANT EXPERIENCE

**Dow Chemical | Midland, MI**
*Senior Research Specialist, Life Cycle Center of Expertise* December 2025-Present

- Developed enterprise methodology for bio-based product carbon footprints used to support commercialization decisions, customer sustainability claims, and product positioning strategies across multiple product lines.
- Led cross-functional external validation program across internal teams and third-party reviewers, supporting a $10M commercial agreement
- Identified and implemented proxy datasets for 1,000+ purchased materials, improving Scope 3 greenhouse gas inventory and product sustainability assessment
- Translated complex LCA and carbon accounting methodologies into actionable insights for non-technical stakeholders and business leaders

**Northwestern University | Evanston, IL**
*Graduate Research Assistant, Professor Jennifer Dunn Group* January 2021-August 2025

- Led techno-economic analysis (TEA) and life cycle assessment (LCA) of emerging circular economy and resource recovery technologies to evaluate commercialization potential, environmental performance, and deployment pathways.
- Assessed market-mediated impacts and technology deployment scenarios using consequential LCA methods to evaluate system-wide effects of alternative clean technology pathways.
- Developed a decision-support framework comparing ten emerging technologies across 18 environmental, economic, and circularity metrics to support technology prioritization and investment decisions.
- Led cross-functional assessments of emerging decarbonization technologies including $CO_2$ utilization and low-pressure ammonia production, providing technical and economic insights for technology development efforts.

**Dow Chemical | Midland, MI**

*Life Cycle Center of Expertise Intern* June 2024-September 2024

- Developed enterprise guidance for allocation methodologies across 100+ multifunctional systems involving bio-based and circular feedstocks, supporting consistent environmental accounting and sustainability claims.
- Created an optimization tool to identify operating conditions for biomass gasification to minimize carbon footprint and operational cost

***ExxonMobil Research and Engineering* | Spring, TX**

*Hydroprocessing Engineer* June 2019-August 2020

- Developed hydroprocessing kinetic models for a $500M study analyzing future refinery configurations and feed compositions that provided the largest economic benefit
- Completed economic analysis and kinetic modeling for catalyst selection based on pilot plant data from four vendors, which led to a $3M/yr uplift
- Organized 4 workshops and seminars for 20+ engineers to discuss opportunities within the organization to incorporate advanced data analytics and machine learning into their workflow

***ExxonMobil* | Baytown, TX**

*Process Engineering Co-op (3 rotations)* January 2017-August 2018

- Developed stage 1 project plans related to process optimization and sustainability, resulting in and economic uplift of $5M/yr and energy savings of 20 GBTU/Mo
- Created computational tools that operational efficiency of process equipment, resulting in a $3.65M/yr economic uplift and 15 GBTU/Mo energy savings

## SELECTED PUBLICATIONS (OF 6 PUBLICATIONS AND 8 CONFERENCE PRESENTATIONS)

- **Chayse Lavallais** and Jennifer B. Dunn. "Developing Product Level Indicators to Advance the Nitrogen Circular Economy." *Resources, Conservation and Recycling* 198 (November): 107167. 2023.
- **Chayse Lavallais,** George Wells, Keith Tyo, Jennifer B Dunn. "Life Cycle Assessment and Techno-Economic Analysis of Utilizing Waste Nitrogen to Develop Microbial Protein from Cyanophycin Accumulating Organisms." *ES&T Water* 2025, 5, 12, 7207–7218
- **Chayse Lavallais**, George Wells, Justin Notestein, Jennifer Dunn. "N2O as reactant rather than pollutant at wastewater treatment plants: Life Cycle Assessment and Techno-Economic Analysis of N2O-to-phenol." *ACS Sustainable Chemistry and Engineering*

## TECHNICAL SKILLS

**Technology & Business Assessment:** Techno-Economic Analysis (TEA), Technology Commercialization, Business Case Development, Total Cost of Ownership (TCO), Market Assessment, Scenario & Sensitivity Analysis, Emerging Technology Evaluation, Strategic Decision Analysis
**Sustainability & Carbon Accounting:** Attributional LCA, Consequential LCA, Product Carbon Footprinting (PCF), Scope 1–3 GHG Accounting, Environmental Impact Assessment, Circular Economy Assessment, Allocation & Multifunctionality Analysis
**Standards & Methodologies:** ISO 14040/14044, GHG Protocol, Product Carbon Footprint Standards, Mass Balance & Chain-of-Custody Accounting, Embodied Carbon, Circular Economy Indicators
**Data Analytics & Decision Support:** Python, R, SQL, Power BI, Statistical Analysis, Multi-Criteria Decision Analysis (MCDA), Data Visualization, Risk & Sensitivity Analysis
**Process Modeling & Engineering:** Aspen Plus, Aspen HYSYS, GPS-X, Process Simulation, Energy Systems Analysis, Process Optimization
**LCA & Sustainability Tools:** SimaPro, Ecoinvent, GREET