



Techno-Economic Analysis of First-of-a-Kind and Nth-of-a-Kind CO₂ Shipping Systems

Daniel Atuegwu, Odessa College, Texas

Mentor: Caspar Donnison, Lawrence Livermore National Laboratory

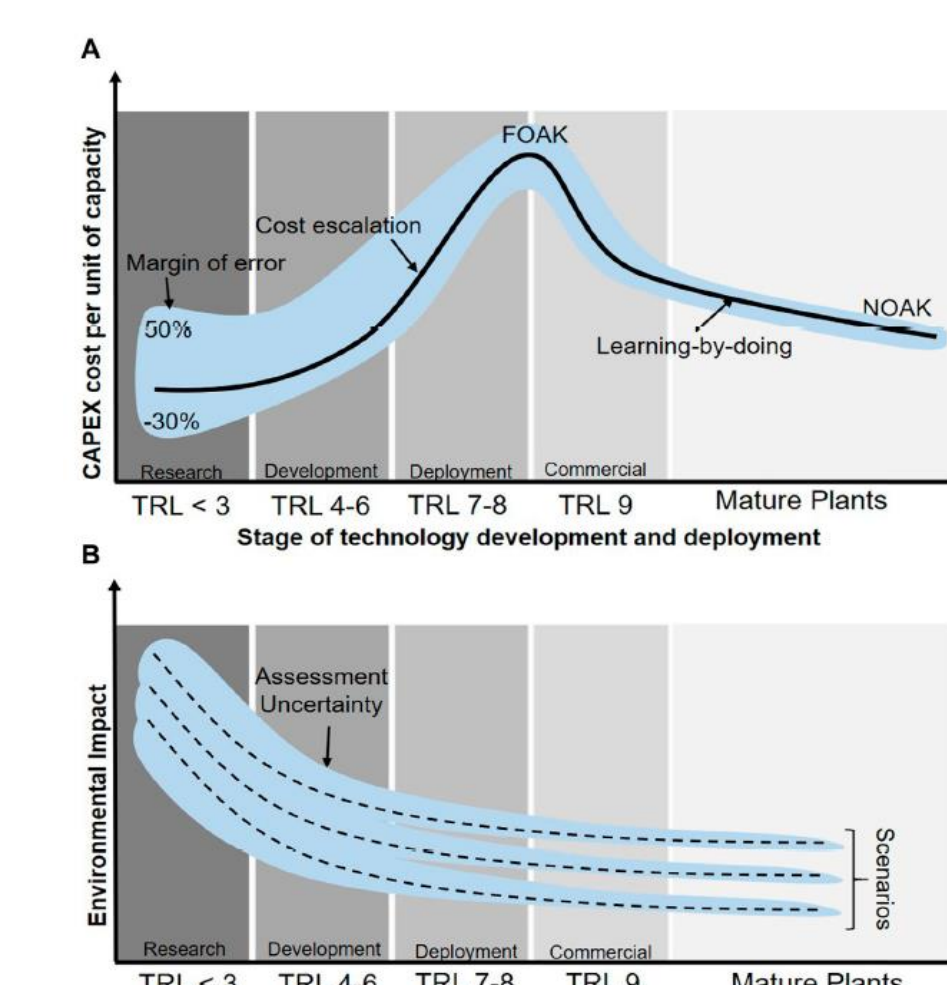
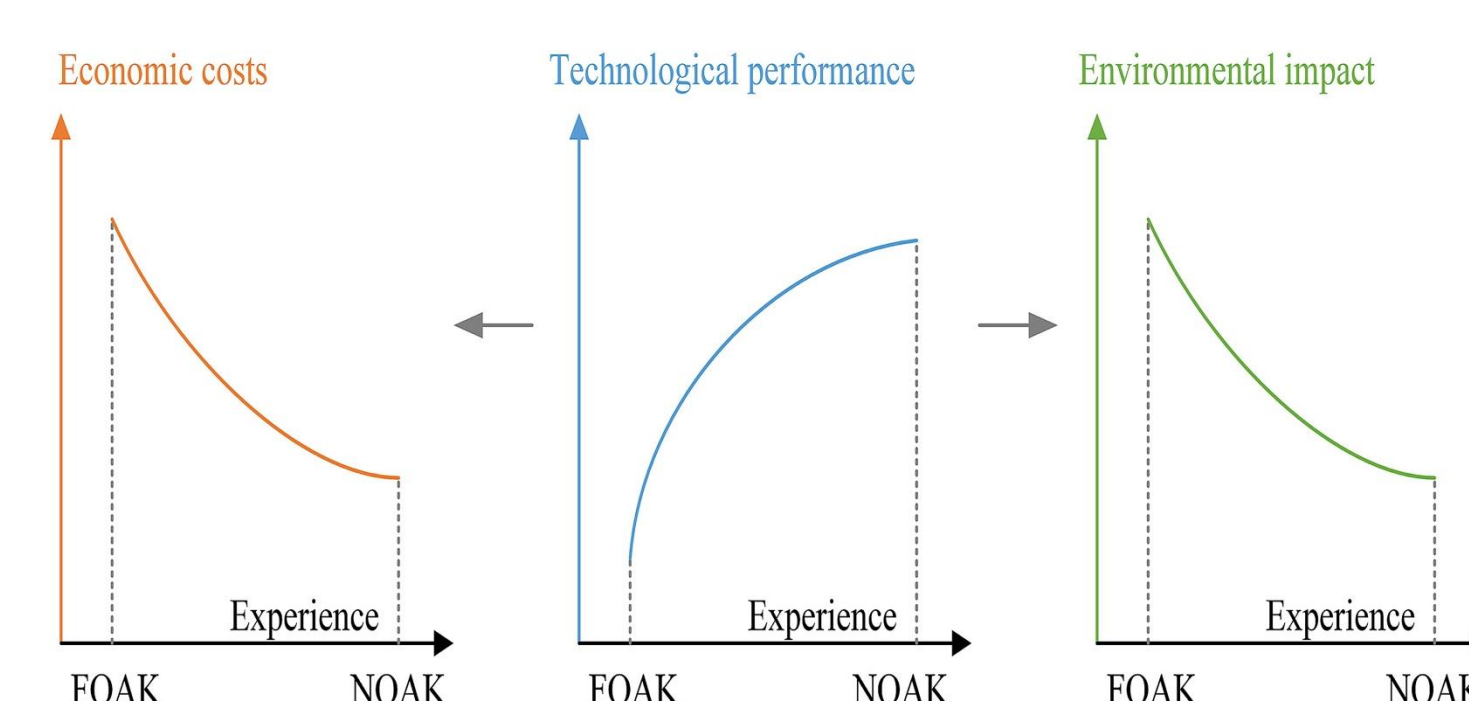
ABOUT ME

- Mechanical Engineering student at Odessa College.
- **Career Goal:** Aspire to become a nuclear engineer, pursuing graduate studies and conducting research that advances sustainable energy technologies and resilient energy infrastructure.
- I chose LLNL because of its commitment to mission-driven research and engineering solutions that address complex global challenges. Through the RECONNECT Carbon Fellowship, I am contributing to sustainability-focused solutions while gaining experience in mission-driven research.
- **Interests:** I will always be available to play football (soccer), ping pong, and listen to music.



SUMMER RESEARCH

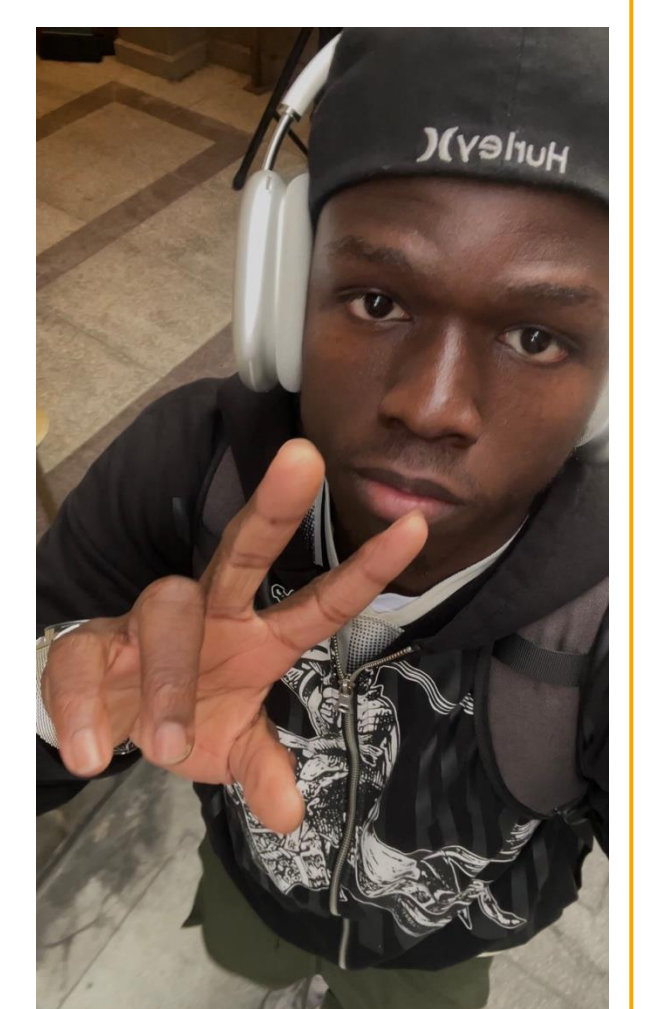
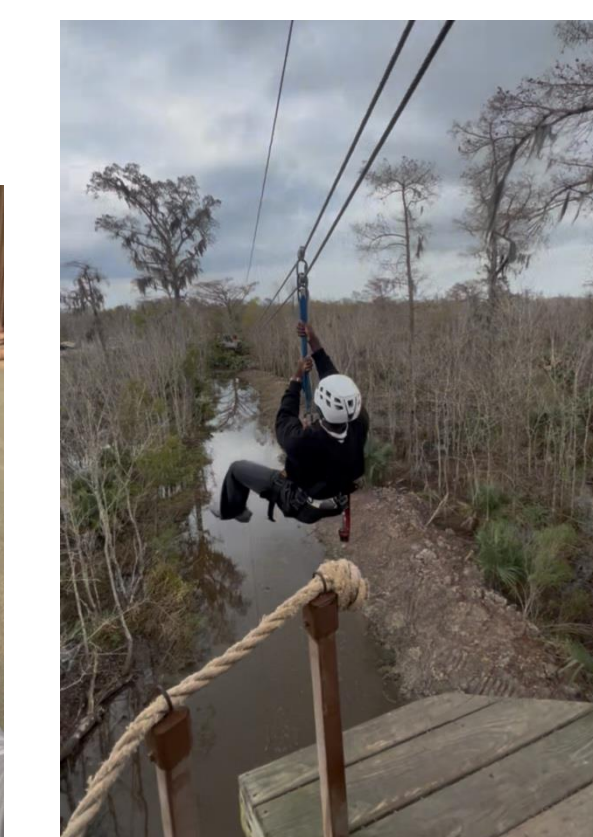
- **Abstract:** Carbon management requires reliable and cost-effective methods for transporting carbon dioxide (CO₂) from capture sites to utilization or storage locations. This project explores the techno-economic differences between First-of-a-Kind (FOAK) and Nth-of-a-Kind (NOAK) CO₂ shipping systems by examining factors that influence cost differences between early stage and developed technologies.
- **Methods:**
 - Apply a techno-economic analysis (TEA) framework for evaluating CO₂ shipping systems.
 - Compare First-of-a-Kind (FOAK) and Nth-of-a-Kind (NOAK) systems to assess how technology development affects cost.
 - Analyze major cost components, including capital costs (CAPEX), operating costs (OPEX), and other factors influencing overall system economics.
 - Evaluate how learning effects, technological improvements, and increased deployment may contribute to future cost reductions.



Source (left to right): Thomassen et al. 2020, U.S. DOE (2025), Wang et al. 2024

LLF AWARD

- LLF Funds are being used to cover essential expenses, including housing, transportation, and personal well being.
- The LLF Fellowship has exposed me to new research areas, engineering challenges, and potential solutions that I would not have encountered otherwise. From the beginning, I have experienced a welcoming and supportive environment from the LLNL and fellowship community, including mentors, staff, and professionals across different areas. Beyond research, I have enjoyed building connections with fellow interns and exploring new places together, making this experience both professionally and personally rewarding.



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