

- Alternative Fuel for Transit Buses: Understanding Tradeoffs Using an Integrated Optimization and Life Cycle Assessment Approach (*Elaine Croft McKenzie, Ph.D. - Cambridge Systematics*)

Among the many challenges faced by transit operators, the tightening budgets and increasing environmental regulations that make up today's landscape require leaner, more efficient transit operations. Alternative fuel buses are one type of technology that may help reduce costs and environmental impacts of transit. However, purchasing new bus technology can be costly, and benefits may not be realized for many years. Additionally, it can be difficult to quantify and evaluate the complex tradeoffs between economic and environmental factors.

To address these issues, an optimization model with an integrated life cycle assessment component is used to determine the best mix of conventional and alternative fuel buses. Using this theoretical model, a fleet of vehicles can be chosen by optimizing over the life cycle costs, environmental impacts and service characteristics. Tradeoffs between environmental impacts and economic costs over the life cycle can also be quantified using sensitivity analysis techniques. Overall, this presentation will demonstrate a systematic way to model and understand the tradeoffs among conventional and alternative fuel bus technology using integrated optimization and life cycle assessment methods, providing insight into the very real tradeoffs faced by transit agencies.