



How can fossil fuel based public bus transport systems become a sustainable solution for Swedish medium-sized cities?



Vehicles, infrastructure, fuel systems and other energy-driven systems that serve public transport are complex with many resource inputs and outputs, and involve many processes. Life Cycle Assessment (LCA) and Life Cycle Costing (LCC) helps analyzing those by quantifying environmental and economic effects, but will not in themselves provide a full systems perspective.

Swedish authorities have set ambitious national goals, and many regions targets a 100% increase in public transport by 2020. The medium sized city of Karlskrona (36,000 inhabitants), that is included in this study together with Sundsvall and Jönköping, embraces those goals too.

This study analyzes relevant differences between bus solutions, to investigate a change to more sustainable bus propulsion systems. The study zooms down to compare energy carriers (diesel, biodiesel, biogas, and electricity) in different powertrain combinations (combustion engines, electric hybrids, and pure electric).

The Framework for Strategic Sustainable Development (FSSD) where principles are defining a sustainable future is used to broaden from a cost and environmentally shortsighted perspective to a long-term sustainability perspective with systems thinking. The Strategic Life Cycle Assessment (SLCA) is first used to give a quick full scope of sustainability challenges in each bus life cycle stage from extraction to end of life. Then LCA and LCC approaches are used to "dig deeper" into prioritized identified challenges.

Initial study results suggest that electric drivetrains would be preferable in city buses within the coming decade - both from an economic and a sustainability perspective. It not only lowers emissions and energy usage, but also provides a platform for future promising energy carriers.

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