The Wheels on the E-Bus Go Round and Round — And Reduce Carbon

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Battery-run buses are finding their way into state and municipal fleets, but their deployment lags far behind that of other countries, particularly China. Our e-bus fleet — estimated at 650 units by *BloombergNEF* — is dwarfed by China's over 400,000. But, in a 2018 report, the Public Interest Research Group Education Fund and its co-authors project that at least a third of the nation's 70,000 public buses will be electric by 2045.

E-bus acquisitions are driven by several factors. Replacing commonly used diesel buses improves air quality by reducing pollution, such as particulates and ozone precursors — and decreases associated health care costs. For example, Chicago estimates that each of its two e-buses saves the city close to $55,000 annually in health costs.

In addition, e-bus acquisitions are instrumental in helping cities achieve their carbon mitigation goals. If the United States replaced all its diesel transit buses with e-buses, PIRG estimates, it would reduce annual greenhouse gas emissions by over two million tons per year.

They cost more to purchase but save on fuel and maintenance

E-buses also require less maintenance. Bluebird, a manufacturer of electric school buses, asserts that buying its e-buses "makes cents," because they have fewer moving parts than diesels and do not require maintenance like oil filter changes or spark plug replacements. PIRG reports that Chicago's two e-buses reduced the city's maintenance costs by $30,000 and fuel costs by $24,000 per year.

But the environmental and financial benefits of e-buses are contingent, in part, on the type and cost of the energy used to charge them. PIRG highlights that it is essential for utilities and public officials to "restructure electric rates to provide discounted off peak charging and limit excessive demand charges." PIRG's case studies indicate that high demand pricing from utilities in King County, Washington, for example, resulted in higher per-mile fuel costs for its e-buses than its diesel buses. Some cities, however, are working out agreements with energy providers to reduce demand charges, and it is likely that other utilities may be interested as well, because electrification increases consumption of their electricity.

Furthermore, although the footprint of e-buses varies depending on the carbon intensity of the regional grid, according to the Union of Concerned Scientists, the "life cycle global warming emissions" from e-buses is nevertheless lower than for diesel buses throughout the country. Specifically, UCC estimates that diesel buses have between 1.5 to 8 times the global warming emissions of electric buses.

A key roadblock is the high initial e-bus price tag. Although costs have declined considerably, an e-bus costs about $750,000 as compared to $500,000 for a diesel bus, according to PIRG. As a result, federal grant programs and other forms of subsidies are instrumental in supporting acquisitions. In particular, the Federal Transit Administration's Low or No Emission Program has awarded $279 million to 61 projects since it was authorized in 2016. In 2019, FTA distributed $85 million in almost 40 states and recently announced the availability of $130 million in FY 2020.

Some states, including Florida, Maryland, New Jersey, and Colorado, have relied on funds from the Volkswagen settlement, which required a $2 billion investment in the promotion of zero-emission vehicles and infrastructure. Other options include state and local programs, such as California's cap-and-trade program, which raises money that can be used to purchase e-buses.

Another way to defray upfront costs, according to PIRG, is to encourage programs in which utilities pay for the initial investment. Private-sector approaches also are available, including battery leasing programs.

Concerns about limited range, performance in severe temperatures, and power to perform on certain terrains also has deterred acquisitions. Technological improvements have increasingly addressed these problems, but PIRG recommends that governments assess "the capabilities of electric buses for particular routes and conditions."

An additional challenge is how to sustainably produce (and later recycle) e-bus batteries, including mining of lithium and other rare metals. And, provisions in the National Defense Authorization Act of 2020 will ban the purchase of e-buses from China with federal funds starting in two years, which could impact acquisitions.

Despite these obstacles, PIRG encourages governments to commit to a full transition to e-buses to build the market, promote technological innovation, and achieve economies of scale. Several cities, including Los Angeles, Seattle, and New York, are well on their way and have pledged to have only e-buses in their fleets. In addition, a National Conference of State Legislatures database indicates that bills that promote e-buses in various ways are pending in Maine, Maryland, Massachusetts, Minnesota, and New Jersey.