E-Bus Simulation

alectra
GRE&T Centre

Getting ready for electrification of public transportation

The rapid growth in bus electrification presents challenges for local distribution systems, which need to balance the energy needs of an electric bus fleet with those of other energy users while ensuring the grid continues to deliver stable, reliable, efficient and affordable service to customers.

Alectra has collaborated with York University and the Canadian Urban Transit Research & Innovation Consortium to study the impact of bus fleet electrification on the electricity distribution system. The project will develop models and simulations to analyze the performance of full battery-based electric bus (e-bus) fleets, including electric city buses, electric school buses, and their associated charging stations.

Innovating & collaborating together to:

- ✓ Quantify the impact of e-buses on local distribution networks
- ✓ Identify and evaluate technical best practices for efficient electrification of transit bus fleets in Ontario

The Challenge

Factors such as high gas and diesel prices, the pollution caused by diesel vehicle fleets, new regulations and targets for greenhouse gas emissions, and declining battery prices help make electric low-emission public transportation an increasingly viable option. Understanding the potential impacts of e-buses on local distribution grids is critical.

The Solution

Alectra is working with York University and industry partners to develop advanced engineering tools to collect data on e-bus performance and to analyze and assess the effects of adopting full battery-based e-buses on the utility grid. The project will help understand the daily load profiles of e-bus fleets and the best way to integrate them with existing infrastructure. This project will lay the foundation for safe and efficient electrification of electric bus systems across Canada.

THE RESEARCH APPROACH FOR THIS PROJECT INCLUDES

1. Development of a generalized energy consumption model to simulate the operation of different e-bus fleet concepts.
2. Analysis of load characteristics for different e-bus fleets including average demand, maximum demand and load factor.
3. Analysis of how aggregated demand profiles affect the bulk electricity system.
4. Development of an integrated transit-utility optimization toolbox, with a view to ensuring a constant, low-cost and low-greenhouse gas (GHG) energy supply to power electric buses without overwhelming the electricity infrastructure.

The Benefits

Significantly reduced GHG emissions and air pollution

Improved environmental sustainability

Insights to drive distribution planning and integration

In collaboration with

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