











Utilities and Fleet Electrification

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Topics for Discussion

- City Utilities Fleet Status
- Our Experience
- Things to Consider Before Implementing

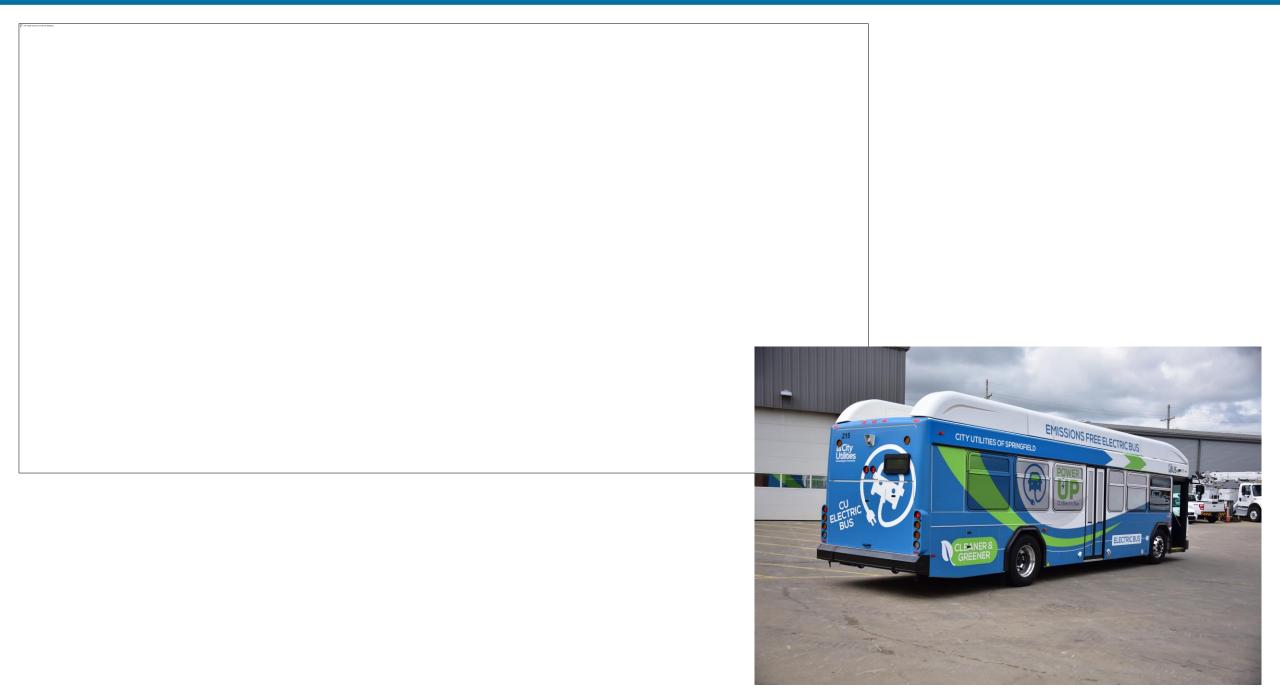


City Utilities Fleet Status

- Combined commodity utility
 - Electric, Gas, Water, Fiber Internet, Transit
- 25 Fixed Route
 - 23 Diesel, 2 Electric
- Charging Equipment
 - 2 ABB Chargers







Our Experience

- Grant application
 - Infrastructure provided by CU's Electric Division
- Battery life
 - Driver habits, weather
 - Routes designed for diesel
 - No on-route charging
- NTD Reporting
- Software Options
 - On bus, with chargers, etc.



Data/Reporting Available

Performance

- Avg. Speed
- # of charging sessions
- Regeneration rate

Energy

- Energy consumed driving
- Energy used in service
- Energy regenerated driving

State of Charge

- SOC used driving
- SOC used idling
- SOC



Time

- Time charging (fast vs slow)
- Time driving
- Time idling

Charger Data

- Charger status
- Charging session start/stop time
- Charging duration
- Energy delivered
- Stop charge reason
- Initial SOC vs Ending SOC

Things to Consider

- 1.) Engage with your electric provider early in the process
 - a. Electric fleets = revenue
 - b. Key Accounts, Economic Development Staff
- 2.) What is the current electrical capacity of your charging location?
- 3.) Understand charging cost & rates
 - a. Off-Peak, On-Peak, Special Rates
- 4.) Will it be beneficial to have chargers on separate meter?
 - a. NTD Reporting



Things to Consider

- 5.) Is there a need for duplicate charging capabilities/secondary site?
 - a. Do you need a standby generator?
 - b. What percentage of your fleet is (will be) electric?
 - c. How long are you comfortable not being able to charge a bus, in case of reporting a charger/no power issue?
- 6.) What does your "big picture" fleet look like?
- 7.) Can your team accommodate off-peak charging, or will you require on-peak?



Things to Consider

- 8.) Electric buses could require new/additional safety measures.
 - a. Additional training
 - b. PPE requirements
 - c. Lockout/tagout process
- 9.) Will there be an insurance impact?
 - a. Will rates be impacted?
 - b. Will insurance have an opinion on whether buses are stored inside/outside?

