

It's been accepted that Electric Vehicles (EV) are the future of transportation. EV's are poised to make a serious dent in global Greenhouse Gas Emissions (GHG), but when paired with renewables - like solar or wind - the reductions can be enormous. More and more, municipalities and governments are not only taking the opportunity to replace outdated fleets with electrically driven options, but also doubling down - by powering them with green energy.

## Energy Storage

# Case Study

## GRANDE PRAIRIE ELECTRIC BUS CHARGING

Find out how TCE helped one of Alberta's largest cities transform their public transportation fleet into one of the cleanest in Western Canada.

## The Company

With combined experience of over **50 years in energy storage, large scale electrical system integration, project management, and industrial innovation** - TCE, a Tundra Process Solutions/Canadian Energy Joint Venture, is a leader in Battery Energy Storage Systems (BESS). Our full, turnkey systems are designed, engineered, constructed, and tested in Canada. Combined with our industry leading proprietary software control system, TCE provides robust application specific solutions.



### Target

Significantly reduce the GHG emissions of the city's urban transportation fleet with solar power and energy storage.



### Development

Design a compact, weatherproof system to contain 670KWH of power that could withstand the harshest Canadian winter.



### Integration

From design to build to site in less than 8 months, adhering to strict design, technical and regulatory specifications.



A Tundra Process Solutions/Canadian Energy Joint Venture

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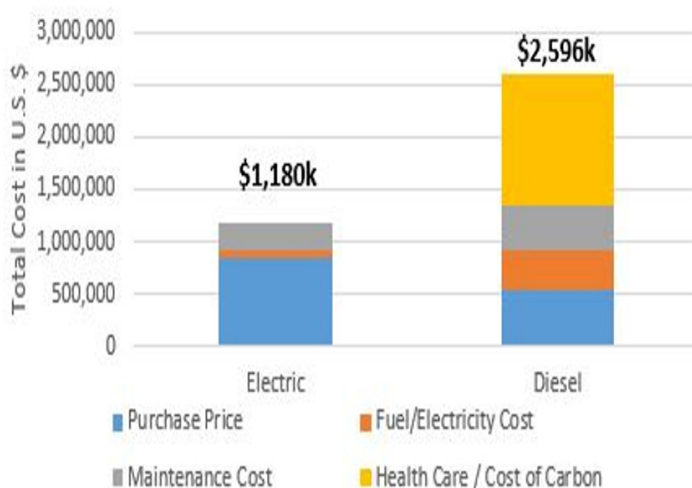
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## Overview

In 2016, a Northern Alberta city started looking at options to reduce their GHG footprint. It was decided to electrify their bus fleet.

**Along with the purchase of 10 new electric busses - replacing half of its current fleet - the city also wanted to power the busses with renewables. Enter a solar+storage capable system from TCE.**

### Lifetime Cost of Electric vs. Diesel Bus





## The Challenge

Offsetting GHG emissions by charging the batteries with solar, but also mitigating “peak demand” is a challenge for most systems. TCE’s proprietary control system was up to the challenge. Also, as with any municipal project, cost was a huge factor. A complete system needed to come within strict budget guidelines and be delivered on-time.

01

**Define Power Source**  
Based on the desire to reduce GHG’s, it was determined that solar would be the best energy source for this application.

02

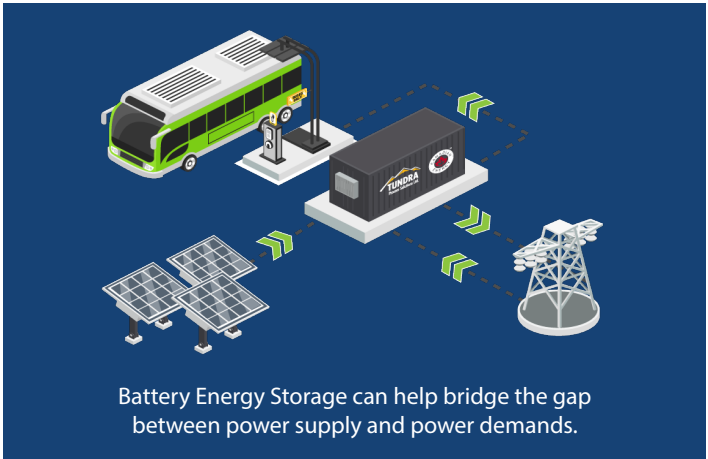
**Electrical Design**  
This system required the capacity to charge 4 new electric city busses with an individual load of 40kWh per charge.

03

**Control System Development**  
The control system must integrate renewables and avoid high grid demand charges while busses are charging.

04

**Integration and FAT**  
Must provide a Factory Acceptance Test (FAT) that shows system stability and an adherence to UL9450 certification.



## The Problem

Take multiple power sources (grid and solar) and design a robust, compact system that is able to withstand the harsh Northern winters. There was also a requirement from the city to use the system to “peak shave” spikes in electricity while buses were charging in order to avoid high electricity demand charges from the grid.



## The Results

This Northern Alberta city’s bus fleet is now one of the greenest in Western Canada. As well as making a significant impact on GHG emissions, the new busses are also expected to reduce overall costs by up to 50% from their diesel predecessors. As well as utilizing renewables to charge the busses, the city is also avoiding high peak demand electricity charges by avoiding added electricity demand to the grid.

GHG Reductions

30%

(average)



Solution

Battery energy storage is quickly becoming the go-to solution for getting the most out of any renewable project. Batteries allow the flexibility to store energy for when you need it, which is imperative for any EV charging situation. Energy flexibility at its finest.

Operational Cost

50%

Reduction



Solution

Battery Electric Buses (BEBs) are expected to cost half as much as their diesel predecessors to run and maintain. For the negligible difference in price the cost benefits make a lot of sense. When you are getting your power from the sun, everyone wins.