CASE STUDY

DENVER WATER

Sawatch Labs helps Denver Water reduce fleet emissions

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Case Study

DENVER WATER

Client overview

Denver Water proudly serves high-quality water and promotes efficient use to 1.5 million people in Denver, Colo., and many surrounding suburbs. Established in 1918, Denver Water is Colorado's oldest and largest water utility.

Long recognized as a leader in sustainability with a dedication to environmental stewardship, the organization has a strong focus on energy and water conservation. Recently, Denver Water established an initiative to reduce fleet emissions.

The challenge

To determine which of 490 on-road vehicles are candidates for electrification

Transportation accounts for a large portion of Denver Water's emissions. Its fleet consists of approximately 750 assets operating in a large geographic area spanning 335 square miles. Recognizing a potentially significant opportunity to drastically slash greenhouse gas (GHG) and particulate emissions through vehicle electrification, Denver Water undertook a study of its 490 on-road vehicles, enlisting Xcel Energy to assist.

Xcel Energy Inc., is a regulated electric utility and natural gas delivery company based in Minneapolis, Minn., serving more than 3.7 million electric customers and 2.1 million natural gas customers across parts of eight states in the US. Xcel Energy funded Denver Water's analysis through its Fleet Electrification Advisory Program (FEAP). The FEAP program began by engaging Sawatch Labs to determine the best course of action for electrification.

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How Sawatch Labs helped

Sawatch Labs conducted a comprehensive analysis of vehicle operations for Denver Water

Denver Water fleet operations are unique and integral to ensuring Colorado residents have access to clean, reliable water. So, it is no surprise that their top priority when considering a mixed-energy fleet is understanding if an EV can meet the daily driving needs of its operations. Sawatch Labs analyzed the minute-by-minute operations of each Denver Water vehicle using existing telematics data to identify instances where EVs would be able to meet Denver Water's driving requirements.

Denver Water conducted the analysis using Sawatch Labs' EV software suite, which includes:

- ezEV
- ezIO
- EMIT

By determining the daily energy use and total cost of ownership of each vehicle, ezEV identifies which vehicles are well-suited to be replaced by an EV.

Planning how to maximize efficiency in charging commercial EVs can be complicated. However, this planning can be simplified by using ezIO, which projects when, where, and for how long each vehicle will need to sit and charge at each parking facility.

The EMIT software monitors vehicle activity and reports on observed/calculated emissions. Using EMIT, Denver Water established an emissions baseline, identified specific vehicles or whole fleet segments that would offer the greatest emission reduction opportunities, and then tracked those emission reductions over time.

Sawatch Labs' innovative analytics platform uses vehicle operational data collected through vehicle telematics. Because of the quality and quantity of data available through telematics, Sawatch Labs' analyses provide a high degree of accuracy and confidence, allowing organizations to set a baseline for current emissions, identify vehicles whose daily use patterns are well suited to electrification, and fine-tune EV charging infrastructure siting and development.

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Performing the study and analyzing the findings

The vehicles in the Denver Water analysis included a mix of SUVs, sedans, 1⁄2-ton pickups, 3⁄4-ton pickups, and class 3-8 vehicles. Many of the class 3-8 vehicles are up-fitted with specialized equipment. To account for seasonal fluctuations in fleet operations and ambient temperatures, 14 months of vehicle data was used in the analysis.

Accurate vehicle pricing is a critical component of all Sawatch Labs analyses. Vehicle prices can be variable, and factors like MSRP, contract pricing, vehicle trim, and even lease parameters, must be considered. Like many organizations with a fleet of commercial vehicles, Denver Water partially funds new vehicle purchases with auction proceeds from the sale of retired vehicles.

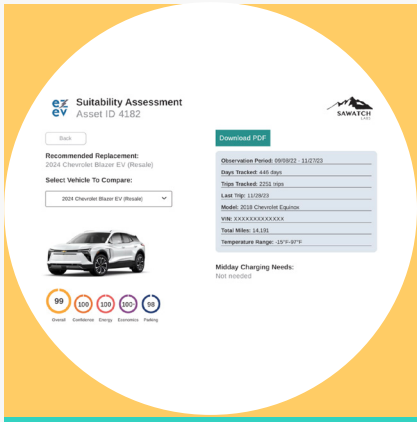
Sawatch Labs' analysis reflected auction sale data, increasing the accuracy of TCO projections. Vehicle pricing scenarios, vehicle service life, observed maintenance costs per mile, and fuel prices, including specific seasonal and time of use kWh rates, were adjusted throughout the study to reflect the most up-to-date conditions.

Results

Significant projected emissions reduction and reduced fleet spending

At the end of the data collection phase of the study, ezEV identified 63 vehicles as good candidates for electrification. Each of the 490 internal combustion engine (ICE) vehicles analyzed were scored against available in-class electric alternatives. Scores reflected the projected performance of an EV if it were to replace an existing fleet vehicle, including daily energy use, parking and charging accessibility, and total cost of ownership. Scores are aggregated, weighted, and then used to assign each vehicle a comprehensive rating, allowing fleet operators to make significantly more informed procurement decisions.

Most of the 63 vehicles identified as good candidates for electrification were light-duty vehicles. They included a mix of 1⁄2-ton pickup trucks and SUVs. A battery electric vehicle (BEV) was identified as the best fit for 61 of those vehicles, and a plug-in hybrid electric vehicle (PHEV) was determined to be the best fit for the remaining two vehicles. If Denver Water transitions the 63 vehicles to its recommended EV replacement, Denver Water is projected to reduce TCO fleet spending by $360,000 and lifetime GHG emissions by 1,000 tons.



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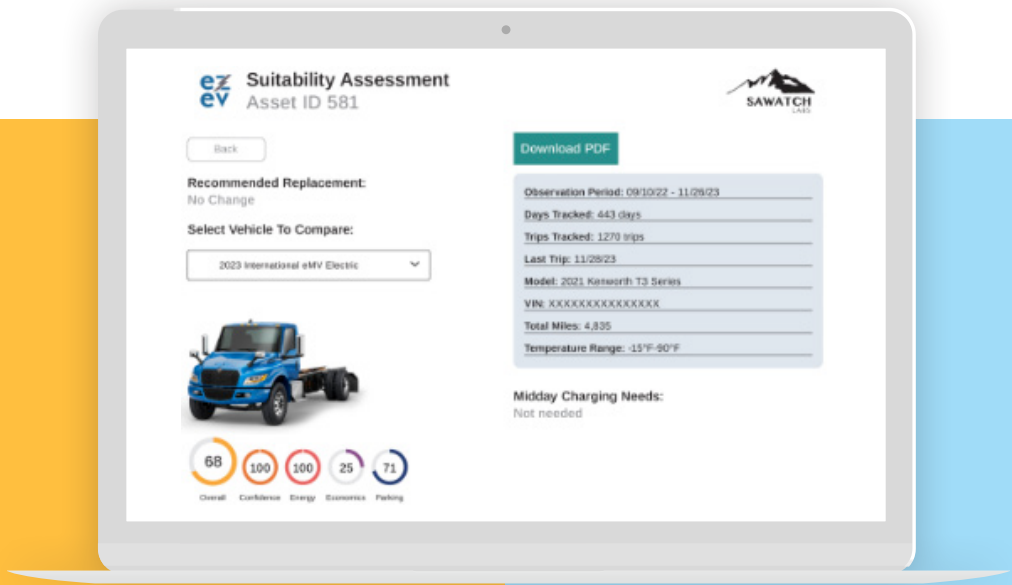
Interpreting the results

The analysis did not recommend replacing any medium- or heavy-duty vehicles with an electric option. Interestingly, Sawatch Labs identified many Class 5 and larger vehicles in the study for which an EV would meet daily operational needs. Class 5 trucks have a GVWR of 15,001 to 19,500 lbs, placing them in the middle of the medium-duty category.

What impacted the analysis was the higher purchase price for medium- and heavy-duty (MD/HD) electric vehicles, such that the total cost of MD/HD EV ownership for Denver Water was higher. This finding is important because even with the added energy required of the up-fits, there are EVs available that are suitable for Denver Water's daily operations. These findings will be used to inform future MD/HD vehicle procurements and help support potential grant applications. By accounting for the energy needed to fuel an entirely electric vehicle fleet, Denver Water can also use the analysis results to plan for immediate and future infrastructure build-outs.

Sawatch Labs' analysis identified each facility and location where Denver Water's vehicles are projected to charge. Additionally, for each site, the ezIO software provided the number of ports needed, projected the peak energy demand, and provided a 15-minute demand curve at various levels of fleet electrification. The organization has used these findings to target specific facilities for initial charging infrastructure deployment. These findings have also informed the development of long-term infrastructure plans, contributing to significant time and budgetary savings for Denver Water.



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Implementing a strategy to reduce fleet emissions

With the help of Sawatch Labs, Denver Water is developing a long-term strategy to reduce overall fleet emissions. Operational data will inform vehicle procurement and charging station infrastructure installations. The insights gained from Sawatch Labs' analysis will save time and money while minimizing impacts on daily operations. The Denver Water fleet has already used findings from the study to begin purchasing EVs and installing additional charging stations. Since completing the analysis, Denver Water has taken delivery of seven Ford F-150 Lightning EV pick-ups. The fleet also placed orders for four Chevy Blazer EVs, citing the results of the analysis as the primary factor in the decision to purchase. The ezIO analysis supported the decision to install four dual port Level 2 chargers and one single port Level 2 charger on-site. As Denver Water continues to expand the number of EVs in its fleet, the ezEV, ezIO, and EMIT results will continue to inform its purchasing and infrastructure decisions impacting the entirety of the organization – fleet, facilities, sustainability, finance, and drivers.

"Wanted to express our gratitude... for all of your support! We have certainly gotten a lot of this service, and we have really enjoyed working with you all to start developing our strategy for the electrification of our fleet."

Katie Fletcher,
Sustainability Program
Analyst, Denver Water

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