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Fleet Modernization

Goals

1. **Replace** 75% of sedans with hybrid electric vehicles
2. **Update** most common vehicles with newer models
3. **Remove** underused vehicles from the fleet
4. **Reduce** idling during drop offs by 70%
5. **Identify** proper use for vehicles
6. **Establish** communication between missions and carpool
7. **Implement** a standard fleet replacement period

Results

6.1 million lbs CO2 saved annually

$950,000 saved annually

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Summary

Large fleets must plan their replacement cycles to ensure vehicles are being resold before their repair costs exceed their value. Without a coordinated fleet management system in place in the past, Catholic Relief Services has yet to realize significant cost and CO2 savings that are possible with a modern fleet. Our team has determined that a replacement cycle of 4.5 years will allow CRS to realize maximum resale gains and save money on operational costs. With an optimized global fleet, CRS can use more resources in its mission to help others. In coordination with the global fleet manager, we have developed 7 categories of recommendation for the CRS fleet.

Conservatively, these changes will allow CRS to save **6.1 million lbs of CO2** and **$950,000 annually**.

Motivation and Background

Global average surface temperatures on the Earth continue to rise in the industrial world as a direct result of carbon (CO2) emissions. As the world gradually changes to address this problem, vehicle fleets across the world will need to adapt. The sooner a fleet is modernized to minimize CO2 emissions, the more positive impact is made on the rising global CO2 levels. Since CRS is a charitable organization and works to better the lives of people around the world, switching to a lower carbon emission fleet is directly in-line with their mission as an organization. Not only is lowering carbon emissions itself a positive change, but it comes with several additional benefits, including the chance for increased donations and annual operations cost savings.

Carbon and Cost Savings Breakdown

To calculate CRS's current fuel prices, we looked at the seven operational regions and countries' average gas prices as of February 2020. After finding the average gas price for each country, we used the percentages of cars in each country to average the amount CRS is paying for gas for the entire fleet. We used this amount to calculate a $3.41 per gallon average fuel price.

Fleet Modernization

From 1,395 fleet vehicles, we narrowed our focus to just the vehicles we had fleet data for (mileage, model, year). From there, in discussion with the fleet manager we decided to look at the 11 models most used by CRS, and cut out any vehicle newer than a 2016 model, bringing our total to 871 vehicles to assess for fleet modernization. We found the government-confirmed fuel efficiency for every model in the fleet, some as old as 1985, and combined this data into a spreadsheet for management and formulas. Using the current

fleet's gas mileage and average annual mileage per vehicle, we calculated the current annual fuel use per vehicle model.

In discussion with the fleet manager, we determined about 75% of the sedan fleet could be upgraded to hybrid models while the other 25% would remain gas. CRS could save 7,958 gallons of gas and 35,800 lbs of CO2 per year by switching 75% of its sedans to hybrid models, which amounts to $27,200 in annual fuel savings. Over 4.5 years, this is $122,100 in cost savings and 161,100 lbs of CO2. The cost difference to purchase 75% hybrids over the Corolla gas model is about $106,000, which would be recovered in fuel savings after about 3.9 years.

All other vehicle models could be updated to the newest year of the same model, saving an additional 179,590 gallons annually, which amounts to 3.6 million lbs of CO2 and $612,400 in annual fuel savings, or $2.8 million and 16.2 million lbs of CO2 every 4.5 years.

Eliminate Underused Vehicles

In discussion with the fleet manager, we learned that there are some vehicles that aren't used regularly which could potentially be eliminated from the fleet. The miles these vehicles drive would shift to other vehicles, but there would still be CO2 and cost savings. We identified 31 vehicles driven less than 501 km per month (about 300 miles), which was the cutoff agreed upon by the global fleet manager. Eliminating these vehicles every replacement cycle (4.5 years) would save approximately $1.83 million in car purchase costs and about 1.27 million lbs of CO2 from the manufacturing of the new vehicles.

Cost Breakdown Related to Replacement Period

Currently, CRS replaces the 871 fleet vehicles on average once every 8.5 years, costing roughly $51.2 million based on invoice prices of current models. This is an average annual cost of $6.04 million. We calculated the potential financial savings possible with a replacement period of 4.5 years instead.

We added up the benefits and savings associated with replacing every 4.5 years instead of every 8.5 years.

- $3.25 million from better fuel efficiency (3.751 million lbs CO2)
- $15.9 million in resale value if vehicles are sold for 30% of purchase price
- $1.83 million from eliminating underused vehicles (1.271 million lbs CO2)
- $2.9 million maintenance costs of keeping vehicles 4 years too long
- $1.22 million from negotiated 3-year warranty

Together, these cost savings add up to $25.1 million over the 4.5 year replacement cycle. Subtracting this savings from the $51.2 million cost to modernize the fleet, we end up with $26.1 million in net cost. Divided over our recommended 4.5 year replacement cycle, this would be $5.8 million per year, compared to the current $6.04 million per year with the 8.5

year replacement period. This amounts to a savings of $240,000 annually from fleet modernization, removing underused vehicles, and savings on estimated maintenance costs. Additionally, modernizing the fleet and reducing underused vehicles would save approximately 4.069 million lbs of CO2 annually.

Reduce Idling

Given idling data from Vtron idle monitoring devices installed on 65% of vehicles in four sample countries that are representative of the CRS fleet as a whole, we looked at idling periods in excess of 10 minutes. The fleet manager indicated that most idling occurs while drivers wait in vehicles for long periods of time outside meetings, and estimated that realistically 70% of this idling could be eliminated with a directive from the fleet manager and a change in policy. Compliance could be monitored using the devices that are already installed and expanding their use throughout the fleet.

Out of 150 vehicles in the four sample countries, 97 had idle monitors installed, which recorded 5,775 hours of idling in excess of 10 minutes. Expanding this data to cover the entire fleet of 1,395 vehicles (assuming a 65% rate of monitoring and only looking at those miles), that amounts to 53,700 idle hours. If 70% of these idle hours are eliminated, assuming 0.51 gallons of fuel burned per hour of idling [1], that amounts to 28,376 gallons, $96,800, and 567,500 lbs of CO2 saved annually, or 2.55 million lbs CO2 and $435,600 every 4.5 years.

Match the Vehicle to the Mission

Identifying the proper vehicle for each trip has substantial savings potential. An example would be identifying SUVs that drive in cities or do long distance road travel and transferring that mileage to compact vehicles with better gas mileage. By switching 30% of miles currently driven by SUVs (Land Cruisers) to being driven by sedans (Corollas, averaging between hybrid and regular models), CRS could save an additional 121,968 gallons of gas, $415,900, and 2.439 million lbs CO2 annually. This would be $1.9 million and 10.98 million lbs CO2 every 4.5 years.

Establish Communication for Carpool

Another significant cost savings can be realized by eliminating unnecessary mileage that happens as a result of multiple vehicles making the same drive when carpooling is possible. If just 10% of Land Cruiser miles could be consolidated through carpooling, CRS could save an additional 57,274 gallons of gas, $195,300, and 1.15 million lbs CO2 annually. This would be $878,900 and 5.15 million lbs CO2 every 4.5 years.

Total Savings

Combining the savings of fleet modernization every 4.5 years and elimination of underused vehicles ($25.1 million), idle time savings ($435,600), proper use savings ($1.9 million), and savings from carpool ($878,900), the potential gross savings is $28.32 million.

After the cost to replace the 871 vehicles ($51.2 million), the final cost per 4.5 year period is $22.89 million, or an average of $5.09 million per year. Compared to the $6.04 million per year currently spent on replacing the fleet every 8.5 years, the annual savings is approximately $950,000 per year or $4.275 million every 4.5 years by implementing the full proposed fleet plan.

Additionally, by implementing this fleet plan, CRS can reduce carbon emissions by approximately 6.1 million lbs per year or 27.23 million lbs every 4.5 years.

Co-benefits

As CRS is a non-profit charitable organization, every dollar saved on the fleet can go directly toward the CRS mission of supporting people in need in the developing world. Other co-benefits of this proposal include reducing particulate matter emissions that worsen air quality, allowing fleet vehicles to be resold in safe working condition to benefit local car buyers, and demonstrating CRS's commitment to the environment and efficiency, which will attract future donors. Overall, fleet modernization will put CRS on a modern footing to increase its charitable work in a lower-carbon world.

Anticipated Obstacles and Best Practices

This proposal for fleet modernization involves a large upfront investment, but our calculations demonstrate significant savings over a 4.5 year period. This is a large fleet with previously little coordinated oversight or data collection. The fleet management team will need to expand to realistically implement a coordinated fleet strategy, and mileage/idling monitoring will have to be expanded across the fleet. This proposal is simply the first step in a long-term fleet management strategy to be executed by the CRS team.

In terms of best practices for fleet replacement, it is key to replace strategically. While we recommend CRS to carry out all the above mechanisms for fleet improvement, the 75% replacement of sedans with hybrid electrics could be used as a first or "pilot" step. We recommend CRS strategically begin this round of replacement with those cars that drive mainly in city centers where gas is more than $3.60 per gallon on average, in the countries Senegal, Malawi, Gaza, Congo, Central African Republic, and Burundi.

Additionally, continual monitoring of fleet mileage must be implemented to ensure vehicles aren't being underused. In the event vehicles drive less than this, they should be flagged for non-replacement and their vehicle miles should be transferred to a different vehicle.

In order to reduce idling, the fleet manager should implement an awareness campaign among drivers, using incentives and/or disincentives to achieve a 70% idling reduction.

References

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[6] All raw data from CRS Global Fleet Manager