

**2016 OReGO FAST Act STSFA Grant**

**June 2019**

New Technologies evaluation

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# Executive Summary

The Oregon Department of Transportation (ODOT) Road Usage Charge (RUC) program uses Mileage Reporting Devices (MRD) that plug into participating vehicles’ onboard diagnostics (OBD) ports to track and report mileage and fuel consumption data. The devices currently in use are only compatible with the OBD-II port.

As of now, certain vehicles do not meet the criteria to use a MRD for one of the following reasons:

* Vehicles manufactured before 1996 may not have OBD ports;
* Diesel vehicles manufactured before 2006 may not have standardized OBD ports; or
* Electric vehicles are not required to follow OBD standards, therefore some electric vehicles are not compatible with the MRD.

As the RUC program continues to move forward, additional mileage reporting technologies must be implemented to better prepare for a mandatory program and to provide the participants with options.

The purpose of this project is to partner with current commercial account managers (CAM) to analyze the feasibility of additional mileage reporting technologies. This will allow more vehicles to be eligible to participate in the program and provide more choices to the public. Because an additional opportunity was presented to explore development of a connected vehicle ecosystem, which would potentially allow for greater access to data directly from vehicles that could be used in the OReGO program, the scope was amended.

## Project Objectives

Partner with current commercial account managers (CAM) to analyze the feasibility of additional mileage reporting technologies to:

* Better prepare the current OReGO program for a mandatory system;
* Increase program participation and satisfaction;
* Revise program procedures and systems to accommodate different technologies while ensuring compliance with program requirements; and
* Enhance the RUC market by providing more choices to program participants.

The project met its objectives. A number of different technologies were tested, and the one that showed the most promise was in-vehicle telematics because it does not require access to a diagnostic port nor does a participant have to install a device. Requirements were rewritten in anticipation of other technologies being offered.

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|  |  | BackgroundODOT Road Usage Charging and OReGO In 2001, the legislature formed the Road User Fee Task Force (RUFTF). Its mission was to find an alternative source of transportation funding outside of fuel taxes. From this legislative body, the concept of road usage charge -- where volunteers pay for every mile they drive, rather than for every gallon their vehicles consume—came into existence. With the passage of SB 810 in 2013, the Oregon Department of Transportation (ODOT) was mandated to create and maintain a road usage charge (RUC) program. The resulting OReGO program became operational on July 1, 2015. 2016 FHWA FAST Act STSFA Grant In 2016, ODOT was awarded a federal grant from the Federal Highway Administration (FHWA) under the Fixing America’s Surface Transportation (FAST) Act Surface Transportation System Funding Alternatives (STSFA) program. ODOT has defined eight projects to meet the objectives in the grant and enhance the OReGO program.  The primary project objectives are to:  1: Expand the market   * Expand technology options for reporting mileage * Manage the open market * Develop requirements for a manual reporting option * Streamline reporting and data sharing   2: Increase public awareness  3: Evaluate compliance mechanisms   * Account manager * RUC payer   4: Explore interoperability Evaluation Report This document is broken into three Sections with each addressing a grant initiative:   1. New Technologies Project 2. Panasonic Research 3. RUC for Fleets Report |
|  |  | New Technologies Project The Oregon Department of Transportation (ODOT) Road Usage Charge (RUC) program uses Mileage Reporting Devices (MRD) to report mileage and fuel consumption data from participating vehicles. The program’s current device plugs into the vehicle’s Onboard Diagnostics (OBD) port, captures the mileage and fuel consumption data, and reports it to an account manager (AM) that calculates road usage charges and fuel tax credits. Two types of devices are available to OReGO Program participants:   * Basic: Plugs in to the OBD port; Captures miles driven and fuel consumption (when available). This device does not use vehicle location technology. * Advanced: Plugs in to the OBD port; Captures miles driven and fuel consumption (when available) as well as Global Positioning System (GPS) location data. GPS allows CAMs to differentiate between in-state and out-of-state miles driven and also provide a number of value-added services.   As of now, certain vehicles do not meet the criteria to use a MRD for one of the following reasons:   * Vehicles manufactured before 1996 may not have an OBD port * Diesel vehicles manufactured before 2006 may not have standardized OBD-II ports * Electric vehicles are not required to follow OBD standards, therefore some electric vehicles are not compatible with the MRD * Up to 2014 not all vehicles even report VIN   As the RUC program continues to grow, the program must research new technologies to ensure all target vehicles can participate and to introduce more options in the RUC market.  The OReGO Program will solicit current CAMs to analyze the feasibility of additional mileage reporting technologies, which could allow more vehicles in the program and provide more choice to the public. |
|  |  | Evaluation The “New Technologies” subproject took place between November 2016 and January 2019. The Account Manager’s final task of “Evaluation and Report,” was completed in April 2019.  Architecture and Analysis (A&A) began December 2016, with ODOT staff evaluating and updating existing requirements documents to align with the goals of the New Technologies subproject. The draft of new requirements were provided for the Request for Proposal (RFP) in April 2017. As part of the A&A, ODOT realized the need for a separate application environment for system administration. The team scheduled development cycles (called sprints) for the purpose of cloning the current administrative system into “RUCAS OpsTrial”. This secondary system will, in perpetuity, serve as the platform for all future operational trials.  Current Account Managers for the OReGO Program were invited to submit responses to the RFP submitted in May 2017. After careful evaluation of all submissions, both Azuga and emovis were given an Intent to Award, and negotiations began. A Work Order Contract (WOC) was approved (by DOJ and Oregon’s Procurement Office) for Azuga in October 2017, with emovis’ taking place in November 2017. The project requirements were then finalized and provided for account manager review in December 2017.  The Design and Construct phase began for both account managers in February 2018, with certification beginning in April 2018. Due to the newness of the proposed technologies, ODOT and the account managers held joint consultations, to work through unforeseen issues. Applying the solutions found during these consultations, ODOT concluded the final sprint for the RUCAS OpsTrial in May 2018.  Implementation of the operational trial started for emovis in June 2018, while Azuga implemented its trial technologies in August 2018. The trials illuminated opportunities for improvement. ODOT, under the guidance of leadership, took a continuous improvement approach and assessed opportunities proactively throughout the project. |
|  |  | The pilot demonstrated that emerging technologies have their inadequacies. The technologies tested included a cell phone/beacon pairing and cell phone imagery of the odometer as well as telematics. For two of the three technologies, these deficiencies resulted in poor user experiences and inconsistency in the data captured.  Telematics did demonstrate promise. The advantage of telematics is the reliability and simplicity. The disadvantage is the lack of ubiquity in automobiles. The technology will need more time to mature, the access through third parties is limited and engagement from the automotive industry could move the technology further. |
|  |  | Lessons Learned The outline below summarizes the OReGO team’s lessons learned including challenges that were encountered, findings and recommendations for future implementations.  **Certification Requirements**  The certification process was time consuming for Account Managers and OReGO staff alike. The process needs to be more iterative with regular OReGO check points so the AM can ask questions and validate assumptions. This will provide OReGO improved insight to determine whether the AM is veering off track.  **Self-Certification**  Initially the AMs were unclear of the purpose of the self-certification process and the intended outcomes. The AMs rushed through the process often considering it a “paper exercise” without doing the actual development and/or the proper testing. In the future OReGO will need to have clearer communication about the process and hold AMs accountable to the process.  **Clear and Concise**  It is critical to write details in the service level agreements, contracts, requirements, and the system specifications in an unambiguous way so that OReGO’s intentions are not left open to interpretation. Consistent and accurate interpretation among the account managers is paramount for honoring the original objective of the requirement or agreement so that the project outcomes are as intended.  **End to End Testing At Each Phase**  OReGO testing was conducted incrementally however changes were being made by the AM throughout the product development. OReGO’s experience was that a function would behave as intended but at some point a change made resulted in it not functioning the same or breaking. In a couple instances this was not be discovered until the participant enrolled.  **Inconsistencies in Terminology**  AMs had their own conventions for terms and they were inconsistent with OReGO’s terminology and contract language. This led to confusion and a consistent need to cross map and translate terms. In future partnerships there needs to be a common set of terms that are consistently used.  **Ambiguity in Product Design and Back-office Workflow**  There were several misunderstandings between OReGO and the AM’s experience relating to the technical functionality. This made it difficult to trouble-shoot problems or provide guidance to our participants. In future projects OReGO should hold AMs accountable to provide more details and documentation that explains their processes end-to-end, including those of their business partners. Panasonic Research A delegation of ODOT, Portland Bureau of Transportation, and Metro representatives traveled to Denver in December 2018, to meet with Panasonic on a potential partnership for a connected vehicle (CV) ecosystem. Panasonic has already partnered with the Colorado Department of Transportation (CDOT) to deploy the system, and is seeking to partner with several other states to expand the scope and coverage of the project.  As ODOT strives to fulfill its mission of providing a safe and reliable multimodal transportation system, it will need to be able adopt new systems and technologies that improve how it operates the transportation system as well as how it funds it. This means keeping abreast of evolving technologies, such as those in connected vehicles, and proactively partnering with private industry rather than reacting to changing standards.  Connected vehicles are capable of communicating with each other and with infrastructure, which allows them to transmit vast quantities of data about the transportation system and vehicle operations. This could enable public agencies to gather real-time data that will allow them to enhance their operations of the transportation system, creating opportunities for next generation intelligent transportation systems to reduce crashes, improve travel time, and lower emissions. Some of this data may be used for revenue collection, whether that is for road usage charging, tolling or congestion pricing.  Public agencies currently have no way of connecting to this data to better operate the system, and current federal policy leaves it to industry to make technology choices and determine the adoption rate. In spite of this uncertainty, recent advances in the private sector indicate that opportunities to access this data may be on the horizon. A technology-agnostic connected vehicle ecosystem would provide a platform for CV data gathering and distribution, creating a link to communicate information from vehicles to the highway system and share safety and mobility information with drivers.  A partnership with Panasonic could help to break through that impasse by leveraging Panasonic’s connections to automobile manufacturers as a Tier 1 auto supplier, providing a link to communicate information to and from vehicles on the highway system and display safety-related information to drivers.  A major focus of the meeting with Panasonic was evaluating in greater detail the potential for the proposed system to support implementation of transportation funding applications. In the meeting, we discussed what role Panasonic could potentially play in the Open Architecture for Transportation Systems, concluding that Panasonic could serve the role of a data collector and transaction processor. Panasonic’s system could potentially receive information from vehicles related to time and location, and use this information to calculate taxable miles traveled under different payment schedules (e.g., tolling, RUC), as inputs to calculation of fees. As Panasonic does not wish to act as an account manager, a separate organization would be necessary to actually calculate dollar amounts and handle individual accounts.  Panasonic emphasized its close relationship with automakers, as a Tier 1 supplier of in-vehicle infotainment systems. Through these partnerships, Panasonic has already put an agreement in place to directly receive telematics information from one manufacturer’s vehicles, and is seeking to implement agreements with other auto manufacturers. If Panasonic was able to secure additional data sharing agreements, and develop the technical infrastructure to handle transportation funding applications, it potentially offers a path forward towards broader implementation of RUC and tolling, without having to use a device that occupies the OBD-II port.  ODOT and its regional partners will continue to pursue a connected vehicle ecosystem that would move towards a production system that enables RUC and other transportation funding mechanisms to get necessary data directly from the vehicle. An integrated vehicle option would increase the ease of participating in the program, and potentially provide increased satisfaction to users by providing easily accessible, real-time account information. RUC for Fleets Report - Azuga Report Synopsis With the grant ODOT commissioned a RUC for Fleets Report from Azuga. The report is intended to assess the potential opportunity and use cases for RUC in the fleet marketplace.  Fleets in the US comprise about 10% of the total light duty vehicle pool. This means that currently about 25 million fleet vehicles exist in the US with about 300,000 of those are in Oregon. Granted, not all of those vehicles will be required to participate in a RUC system (due to weight limitations), but most of them will. Azuga’s proposal outlines the features and processes within the Azuga CAM system that need to be enhanced and modified in order to better support companies that use fleets in conducting their business. RUC Fleet Examples Listed are some examples of how the RUC for Fleets service will work **Rental Car Fleet** The Fleet Maintenance System (FMS) for the Rental Car company would handle all of the core functions that are required by a rental car company – booking, tracking of the rental activities as well as the management of the vehicles (i.e. onboarding new vehicles, off-boarding old vehicles, servicing). FMS functionality needed for RUC would be within the rental car return process. During this process an odometer reading is captured either manually or electronically. An odometer reading at the initial time of rental provides a start and the reading at the rental car return is already part of the normal rental procedures and can be used by the Azuga RUC for Fleets solution. Azuga would use these two odometer values along with some other basic factors to determine the RUC owed for the time that the vehicle was rented. **Transportation Network Company (TNC) (i.e. Uber or Lyft)** The FMS for the TNC would work similar to any other fleet and would handle all of the core functions that are required to manage their business – booking, tracking of the usage activities as well as the management of the vehicles (i.e. onboarding new drivers, off-boarding drivers, servicing). The TNC management service functionality that would be necessary for RUC would be within the end event process. During this process a mileage reading is captured electronically as part of the usage event. Capturing mileage is already part of the normal TNC customer event procedures and can be used by the Azuga RUC for Fleets solution. Azuga would use the mileage values along with some other basic factors provided by the state to determine the RUC owed for the time that the vehicle was rented. **Fleet Functions** The underlying technology in Azuga’s RUC for Fleets solution can be broken down to its major functions:   * Track miles * Track fuel usage (or EPA MPG) * Maintain State mileage rate * Calculate RUC (per vehicle, per day) * Payment collection (from owner or user) * Payment disbursement (to State) * End customer user interface (portal, invoicing, communications) * CWFV user interface (portal, invoicing, onboarding new vehicles, off-boarding sold vehicles, link to DMV)  Fleet Use Cases & Enhancements This section identifies two use cases and the changes to the Azuga platform to support each: **Use Case 1: Fleet companies that do not already have a fleet management system in place and are not looking for one** This use case is primarily targeted at companies that do not have a fleet management system. For this use case, the existing Azuga RUC platform would need to be “fleet friendly”. The following are the key areas of the Azuga RUC platform that need to be optimized for fleet use.  **Changes for Enrollment**   * A new question will be asked during step one to determine if this account will be a personal account or a commercial account. If commercial account is selected, the rest of the enrollment steps will change to reflect the specific needs of a commercial customer. * When adding vehicles, there will be an option to enter all vehicle information into a worksheet. There will also be an alternative for customers to upload their information in bulk (from a spreadsheet or CSV file for example). During the upload process, the Azuga CAM system will parse the data to ensure it meets ODOT data requirements. This change will also require a change on the ODOT side to allow for a bulk upload of vehicle information. * Entry of payment information will be enhanced to support company specific payment methods that are tied to the corporation.   **Changes for Dashboard**   * Company name will be used as opposed to an individual. * All vehicles will have a nickname (if uploaded during enrollment). * Profile information will pertain to the company rather than an individual. * Dashboard tiles will provide an aggregate view of vehicles instead of just one. * A vehicle information tile will be added that expands into a vehicle information page to show high-level details of all vehicles. * In order to not overlap with Azuga’s fleet product   + badges will be removed   + trip logging will be removed   + scoring will be removed   + SafeZones will be removed   + battery health and engine health will be moved to the vehicle information page * Emissions support will remain the same.  **Use Case 2 - Fleet companies that already have a fleet management system in place**  The second use case is to provide interfaces to fleet management companies as a means of integrating RUC functionality into their own systems. This is primarily for fleet management companies that need to participate in a RUC program without having to become a fully certified RUC service provider.  For this use case, the core Azuga RUC as a Service functions will be modularized into a set of API’s for FMS companies to leverage to update their FMS to include RUC capabilities.  Enhancements Proposal Summary The Azuga RUC for Fleets solution would provide modules that include an RUC calculation engine, which will integrate directly with the fleet management company’s core fleet management system. Azuga would supply ongoing mileage rate and fuel tax credit rule updates to help ensure accurate, compliant RUC calculation and collection. Azuga’s CAM offering could easily be integrated with a fleet management system through Azuga’s open APIs offered to partners. |