CAMBRIDGE SYSTEMATICS

# Colorado Road Usage Charge Pilot Program

## Independent Evaluation

Road Usage Charge Pilot Program

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# 1.0 Overview of Pilot Program and Evaluation

The Colorado Department of Transportation (CDOT) relies on motor vehicle fuel taxes as the primary revenue mechanism to fund multimodal transportation improvements. The revenue generated from fuel taxes is declining over time as vehicle fuel efficiency improves and the share of alternative fuel vehicles on the road grows. Alternative transportation revenue models are being explored and tested in a number of states across the country. Some of these models levy charges on users based on total mileage driven, rather than a flat tax based on gallons of fuel purchased. This mechanism is commonly referred to as road usage charging (RUC).

In 2016, CDOT initiated the first research pilot study of a road usage based system in Colorado. This Road Usage Charge Pilot Program (RUCPP) was conducted by a consultant team led by CH2M Hill with Azuga, Pacific Rim Resources, and WSP|Parsons Brinkerhoff. Consistent with national best practices, CDOT also commissioned a third party evaluation of the RUCPP program. Cambridge Systematics (CS) was contracted in 2017 to perform this independent evaluation.

This independent evaluation is intended to provide accountability and transparency in reporting data and results generated by the RUCPP. The evaluation focuses on a series of six key objectives established for the pilot program, including education and communication, attitudes and acceptance, technical and administrative feasibility, privacy, and cost-effectiveness. Technical, participant, and administrative data were examined by the CS evaluation team to independently assess results and RUCPP outcomes. All participant data provided to the evaluation team was anonymous and did not include identifying participant information. This summary report provides a discussion of key findings, data, and outcomes for each objective of the research pilot. The opinions and information within this evaluation represent the sole assessment of the independent evaluation team and were not coordinated with members of the project team or CDOT.

## Colorado Road Usage Charge Pilot Program

This RUCPP pilot program began with a soft launch in November 2016. This soft launch included testing by the pilot project team and CDOT staff. Open enrollment in the pilot program occurred in December 2016. Pilot participants were selected to achieve appropriate representation among geographic regions of the state and among different types of vehicles. In total, 100 participants completed the pilot program, including key stakeholders and members of the travelling public. Including participants in a preceding soft launch, more than 147 participant vehicles were involved in this research pilot. Stakeholders included staff from CDOT, state and regional agencies, and local government as well as key representatives from industry associations, businesses, and civic organizations. The pilot program included 70 public participants with no or limited connections to CDOT and participating agencies. The full pilot ran from December 2016 through April 2017.

Participants were able to select one of three types of mileage reporting options, including:

- *Odometer reporting* – the participant provides a monthly odometer reading via Azuga's website or mobile app. Before and after odometer readings are verified through odometer pictures at the beginning and end of the pilot.
- *Non-GPS enabled mileage reporting device (MRD)* – the participant utilizes an electronic device connected to their vehicle's on-board diagnostics (OBD-II) port. This device reports distance traveled and fuel consumed, but does not gather or report location data.

- *GPS-enabled mileage reporting* device – the participant utilizes an electronic device connected to a vehicle's OBD-II port that records distance travelled and fuel consumed. These devices are also GPS-enabled, allowing vehicle location information to determine chargeable and non-chargeable miles driven.

Pilot participants were selected based on different types of passenger vehicles, including traditional gas-powered with various fuel economies, electric, and hybrid models. No commercial trucks, motorcycles or passenger vehicles using diesel were included. The RUCPP was designed to simulate payment mechanisms and mock "invoices" were issued to participants representing road usage charges and fuel tax credits. No money changed hands, and there was no refund of participant expenses on fuel taxes. The pilot design was intended to illustrate in practice how a road usage charge system could work in Colorado, to test technology and administrative systems, and to sample participants' impressions and opinions on road usage charges. This pilot was not intended to test change in driver behavior or travel patterns resulting from road usage charge mechanisms.

# 2.0 Independent Evaluation Design

## Pilot Program Goals and Objectives

This evaluation focused on assessing outcomes of the Colorado RUCPP relative to established objectives of education and communication, attitudes and acceptance; technical feasibility; administrative feasibility, privacy; and, cost effectiveness. The conclusions noted in this report represent the professional opinions of the independent evaluator.

For each of these areas, evaluation measures and approaches were identified. Data used in this evaluation was provided by the pilot project team directly to the evaluation team and did not pass through CDOT. Evaluation criteria are measured using two primary sources: qualitative information drawn from stakeholder interviews and available outcome, participant surveys; and, reporting data available through the pilot program.

### Stakeholder Interviews

The evaluation team conducted four in-person group interview sessions with stakeholders in June of 2017. These discussions were used to solicit information and input on technical and administrative feasibility issues, communications and public acceptance, cost effectiveness, and overall pilot program oversight and effectiveness.

In total, eighteen individuals participated in these sessions representing pilot program participants, key stakeholders and technical advisory committee members, as well as staff from the pilot project team. Discussions focused primarily on identified topics, though stakeholders were invited to share feedback on any aspect of the RUCPP, including experiences as participants. In addition to interviews, the evaluation team exchanged e-mail communications and conducted phone calls and meetings with the RUCPP project team to gather background information about the pilot and to request documentation and data from all aspects of the RUC pilot program.

## Data Analysis

This independent evaluation rests on the quality and availability of data resulting from the pilot program. Colorado's RUCPP was limited in scope, but provided comprehensive data to evaluate the program against established objectives. Data collected for analysis and synthesis included: social media metrics and comments, media summaries, helpdesk logs and common issues, mileage reporting data, invoicing data, labor data from the pilot project team, and the surveys of participants and the public.

Online surveys of RUCPP participants were conducted before, during, and after the pilot program. These surveys represent a significant source of data used in this independent evaluation. Online public and participant surveys included:

- Baseline survey of statewide public (500 respondents)
- Pre-pilot survey of selected participants (82 respondents)
- Mid-pilot survey of participants (63 respondents)
- Closing survey of participants (84 respondents)

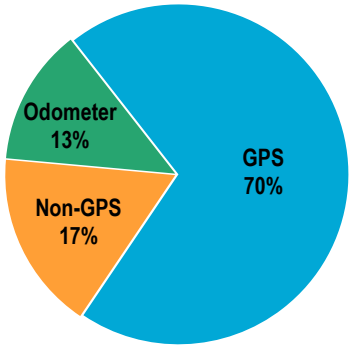
These surveys are referenced throughout this evaluation. Response rates for surveys remained high throughout the pilot with 60 to more than 80 of 100 participants providing input and feedback via surveys.

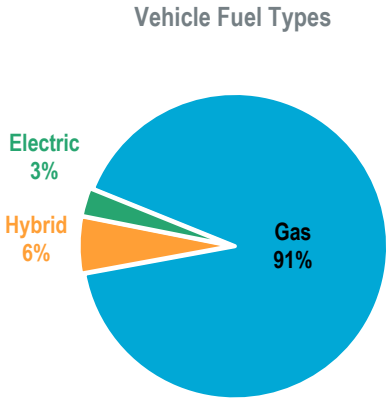
## RUCPP Participant Characteristics

Excluding soft launch and pilot project team members, 104 participants were enrolled in the pilot program, including key stakeholders and members of the travelling public. However, 4 participants dropped out of the program after enrollment and prior to the start of the pilot, leaving 70 public participants and 30 stakeholders from state agency staff, other state and local agencies, media members, and representatives from statewide organizations, associations, and advocacy groups.

Participants chose from one of three mileage reporting device options. Seventy percent of participants utilized a GPS enabled MRD while a smaller number used non-GPS electronic MRDs or chose to record and report odometer readings manually.

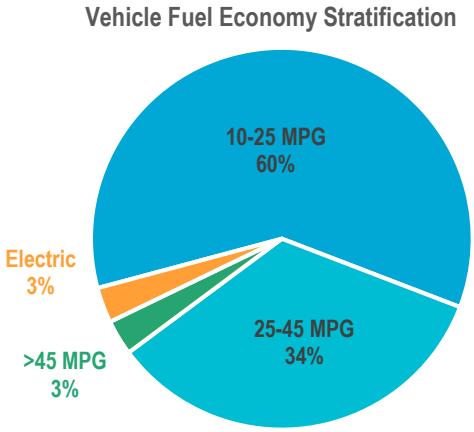
Selected Mileage Reporting Devices (MRD)



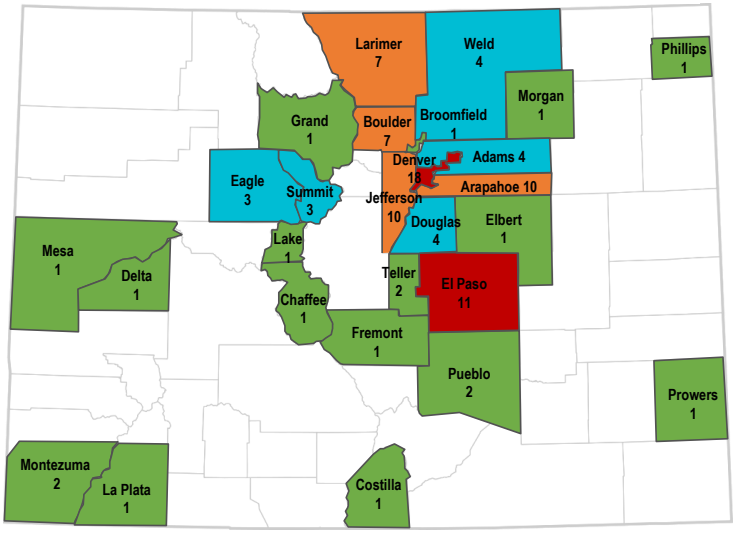



Pilot participants were selected based on different types of passenger vehicles, including traditional gas-powered (91 participants), electric (3), and hybrid (6) models. No commercial trucks or motorcycles were included, nor passenger vehicles using diesel or other alternative fuels. A 2015 report by the Colorado Energy Office found that alternative fuel vehicles made up less than 3 percent of registered vehicles in the state. Electric vehicles make up less than one percent of registered automobiles in Colorado.

Pilot participants were selected based on different fuel economy stratifications as well. Sixty percent of participants drove vehicles with a fuel economy between 10-25 miles per gallon (MPG), thirty four percent drove vehicles between 25-45 MPG, three percent drove vehicles over 45 MPG, and three percent used electric vehicles during the pilot. According to the U.S. Department of Energy, average fuel efficiency of all motor vehicles nationally equaled 17.5 MPG in 2010.




## Geographic Distribution of RUCPP Participants by County




Geographic distribution was also considered in participant selection to achieve representation in diverse parts of the state. A key requirement for the RUCPP was geographic stratification between urban and rural participants, with an emphasis on rural and resort communities. The project team recruited participants from all CDOT regions, major urban areas, as well as resort and small metropolitan areas. Rural communities were represented by at least one participant in most parts of the state. The map at left shows the distribution of RUCPP participants by county.

# 3.0 Evaluation Results

## Evaluation Objective: Education and Communication

### Media Exposure

The RUCPP kicked off with a press release to local and statewide media outlets and a website launch on Wednesday, November 9, 2016. The press release, picked up in a lead story by the Denver Post, summarized the program and invited volunteers to sign up as participants in the pilot study. The pilot program utilized traditional print and social media channels but did not place paid advertisements. The project team catalogued all media mentions, including television, radio, and text – primarily through their online links and associated comment sections. At least 13 stories were run by media outlets online with geographic representation in most regions of the state and national websites.

### Pilot Program Website Visitation

The RUCPP website was used to educate and inform the general public and potential participants. The website included an online calculator that enabled site visitors to estimate how much they might pay in road usage charges compared to estimated fuel tax expenditures. This simple calculator used average fuel economy data and driving characteristics to estimate monthly fuel taxes and monthly road usage charges under a RUC program. The calculator was among the top most frequently visited web page. Other commonly visited web pages include FAQ and fact sheet information, as well as enrollment information pages.

There was significant activity on the RUCPP website. Between November 2016 and May 2017, approximately 2,216 unique site visitors accessed the website generating 3,856 total page views. Monthly average visitation registered 394 users and 551 page views. Users viewed an average of 1.9 pages per session. The following table provides detailed monthly visitor statistics for the RUCPP website. The most visited page on the website featured an interactive road usage charge calculator.

| RUCPP Website Analytics | | | |
|---|---|---|---|
| **Month** | **Total Number of Sessions** | **Number of New Users** | **Average Pages/Session** |
| November 2016 | 3,018 | 2,216 | 1.9 |
| December 2016 | 194 | 103 | 1.9 |
| January 2017 | 121 | 81 | 2.2 |
| February 2017 | 165 | 94 | 2.6 |
| March 2017 | 91 | 61 | 1.6 |
| April 2017 | 102 | 78 | 1.8 |
| May 2017 | 165 | 123 | 1.9 |
| ***Sum Total*** | ***3,856*** | ***2,756*** | ***1.9*** |
| ***Average Monthly*** | ***551*** | ***394*** | ***1.9*** |

## Pilot Program Social Media Exposure

Use of social media platforms was limited for the RUCPP. Two posts were published to CDOT's Facebook page providing information on the pilot program. The first post was made in November to raise awareness of the program and solicit interest in participation in the pilot. A second post was published in February providing information on fuel taxes and trends in prices of average household expenditures.

Analysis of comments and reactions to posts about the RUCPP pilot on CDOT's Facebook page indicate that informational posts were viewed by broad audiences and generated a significant level of engagement. The table below displays statistics on social media exposure for the two posts made regarding RUCPP. Compared to average posts on travel conditions, weather, or public information on CDOT's primary Facebook page, social media engagement was relatively low for the RUCPP posts. CDOT posts regarding construction activity, traffic incidents, or other events generate significantly more exposure with sometimes hundreds of shares and comments. Informational CDOT posts about the agency, planning efforts, or communications topics tend to generate exposure statistics more similar to RUCPP posts with tens of shares and fewer comments.

| Social Media Exposure Statistics | | | | |
|---|---|---|---|---|
| **Facebook Post** | | November 2016   | | February 2017   |
| **Total People Reached** | | **6,319** | | **18,358** |
| **Reactions** | | **52** | | **162** |
| Positive (Likes) | | 9 | | 44 |
| Negative (Sad/Angry | | 2 | | 5 |
| Comments | | 29 | | 90 |
| Shares | | 10 | | 9 |
| **Post Clicks** | | **331** | | **1,383** |

## Participant Communications and Surveys

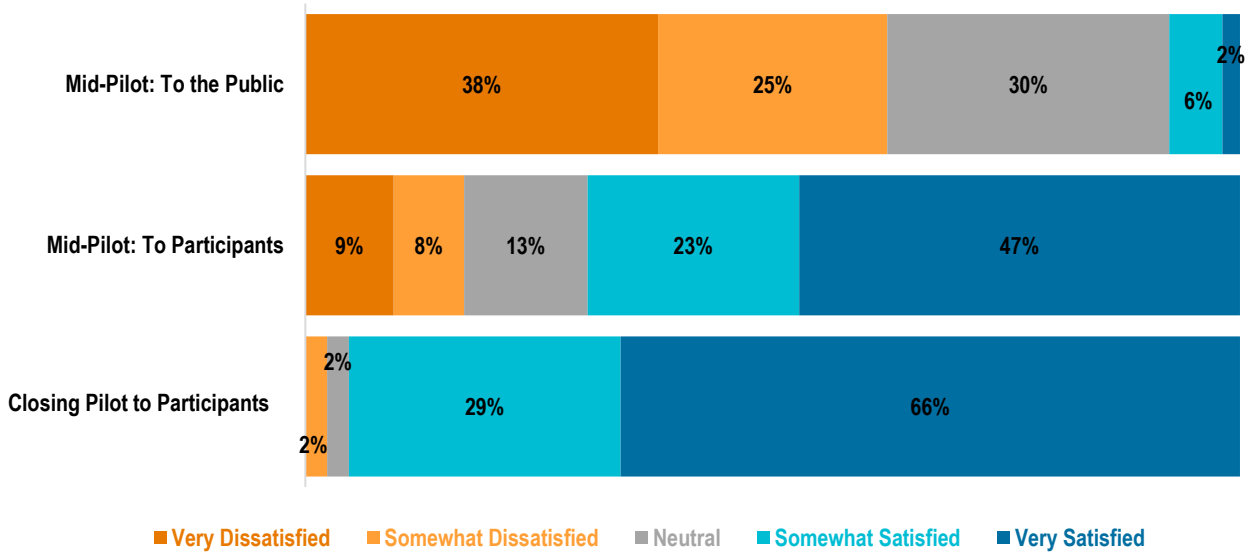
Throughout the RUCPP, newsletters were distributed via email by the project team. These newsletters were sent to approximately 500 people including pilot participants. Newsletters provided information on general topics such as RUC, as well as operational specifics about the pilot program, including invoicing, mileage reporting options, and enrollment and closing procedures.

The project team also communicated with participants through a series of online surveys. Surveys were conducted pre-pilot, mid-pilot, and at closing and were used to evaluate the RUCPP and to gather information from participants and general public audiences. Each of the surveys administered included

questions addressing participant satisfaction with the clarity of communications sent by the pilot project team, as well as perceptions of communications to public audiences.

The following figure shows survey responses indicating satisfaction levels with the clarity of communications on pilot program topics. Satisfaction of participants increased from 70 percent during the mid-pilot survey to 95 percent in the closing pilot survey. This represents a significant improvement in communications perceptions over a short period. Regarding the overall clarity of communication to the public, satisfaction was relatively low at eight percent.

**Clarity of Communications in the RUCPP**

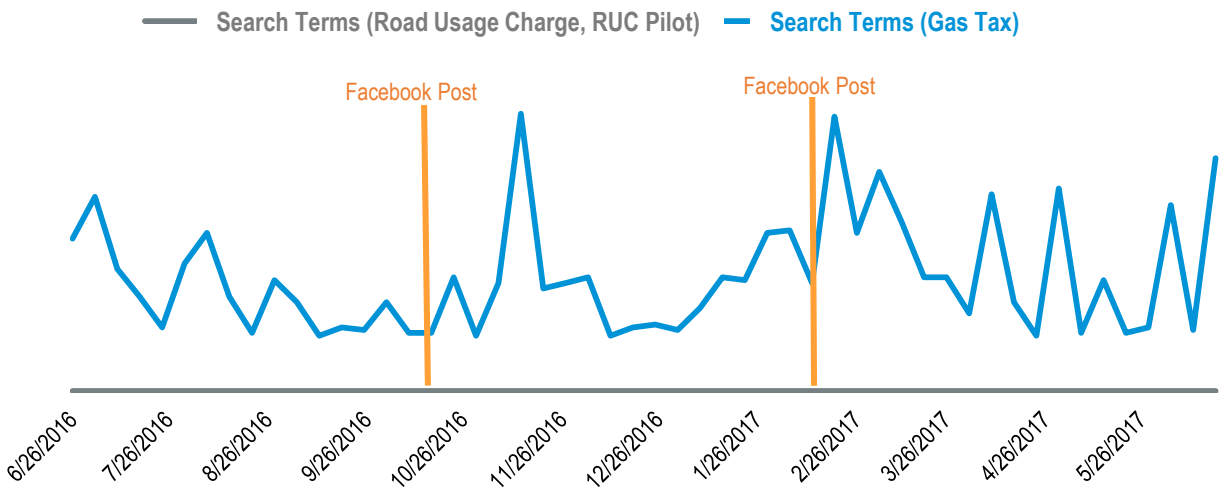



## Education and Communications Outcomes

The RUCPP engaged in outreach and educational efforts to broad audiences early in the pilot program. Communications about the program and outreach to media and stakeholders was scaled back after the pilot launch in consideration of transportation funding initiatives under discussion by the state legislature.

To evaluate the potential media reach and audience engagement resulting from the pilot program, a google trends analysis of search phrases, such as “Road Usage Charge”, “RUC”, “Vehicle Miles Traveled”, and “Gas Tax” was conducted for the June 2016 to June 2017 period. According to data from Google Trends, the search term “gas tax” was mentioned on average 41 times per week, during this period. There were significant trends of search terms related to road usage charge or vehicle miles travelled in Colorado in the same time period. The figure below highlights average weekly trends of this keywords analysis. The spikes in search mentions of “gas tax” in November 2016 and February 2017 correspond with posts regarding RUCPP to CDOT’s primary Facebook account. This suggests that social media encouraged members of the public to conduct additional research and information gathering on fuel taxes in Colorado.

**Google Search Trends Analysis in Colorado**




Pilot participants graded the clarity of communications significantly higher than did the general public. Communications to participants were made regularly through newsletters, the pilot website and information included in monthly invoices.

# Evaluation Objective: Attitudes and Acceptance

A key objective of the RUCPP was to test and understand current attitudes toward road usage charge fees and public acceptance of the necessity, mechanisms, and implementation issues involved in a RUC program. The RUCPP relied on communications materials and surveys to educate participants and the public and to test broad acceptance.

## Participant and Public Understanding

RUCPP participants included a mix of individuals from the general public and those considered stakeholders in the program. Baseline understanding and attitudes among this group varied widely and included participants with in-depth knowledge of the needs and issues to those who were previously unaware of transportation funding issues or road usage charge concepts.

A common perception among public audiences, social media comments, and from some participants was that the road usage charge was in addition to fuel taxes, rather than a replacement for the current system. This viewpoint is evident in comments on news stories, comments on the CDOT Facebook page, in remarks made by elected officials, and in the initial surveys administered to interested parties before pilot participant selection.

These discussions, and other negative opinions of road usage charges, changed for most audiences once presented with further information or through the experience as a pilot participant. Generally, greater acceptance of the concept and need was demonstrated over the course of the pilot program. Among stakeholder participants interviewed, all agreed on the need for additional transportation funding. Regarding

acceptance and understanding of the mechanics and issues involved in road usage charge programs, personal experience as a participant in the pilot appeared to have a more significant impact on acceptance than general education efforts.

## Privacy Concerns

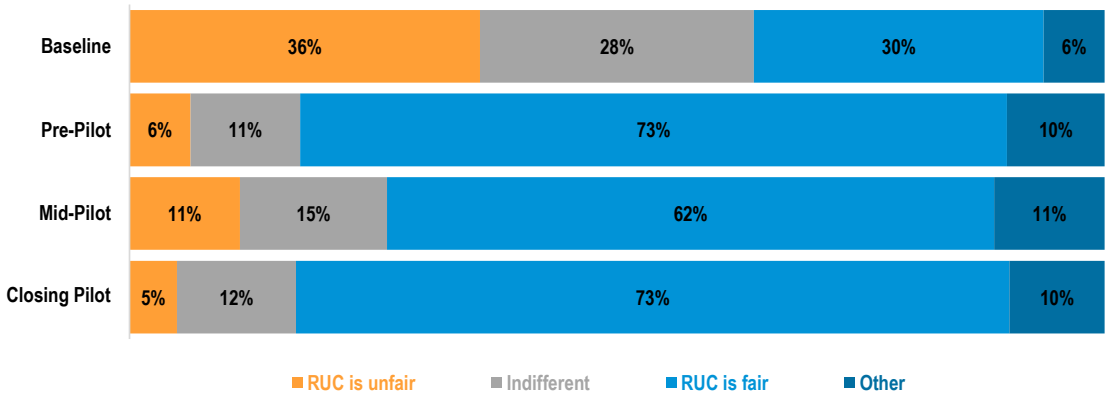
Common attitude and acceptance issues raised through media comments, interviews, and surveys included regional equity, impact of out-of-state visitors, technology, privacy, fairness, and trust issues. Privacy is often considered a top challenge to implementation of road usage charge programs. A manual mileage reporting option was provided for those participants with privacy concerns about using electronic mileage reporting devices (MRD). Among all RUCPP participants, privacy concerns tended to be resolved or accepted over the course of the program.

Potential privacy perception issues with electronic MRDs may have been outweighed by the value-added feature provided by these devices. According to some stakeholder participants interviewed, the additional information provided by these devices, including vehicle and driving diagnostics, push notifications on low batteries or check engine codes, and reports on hard braking and other driving characteristics helped overcome concerns with using these devices. Participant compliance with reporting odometer readings was about 55 percent by the end of the pilot. Some participants interviewed considered manual odometer reporting to be time consuming. The convenience and time savings of automated electronic MRDs might factor into increased public acceptance of these devices.

## Equity Concerns

Equity and fairness are fundamental issues with any taxation mechanism. For road usage charge programs, these concerns can be more complicated. The RUCPP engaged participants with information on equity and fairness issues and tested perceptions through surveys. Among participants and public audiences responding to the initial baseline survey, 30 percent considered RUC concepts to be a fair funding mechanism. Among pilot participants, agreement that RUC programs are fair was substantially higher – ranging between 60 and 70 percent throughout the pilot program.

**RUC Concept Fairness as a Funding Mechanism in Colorado**

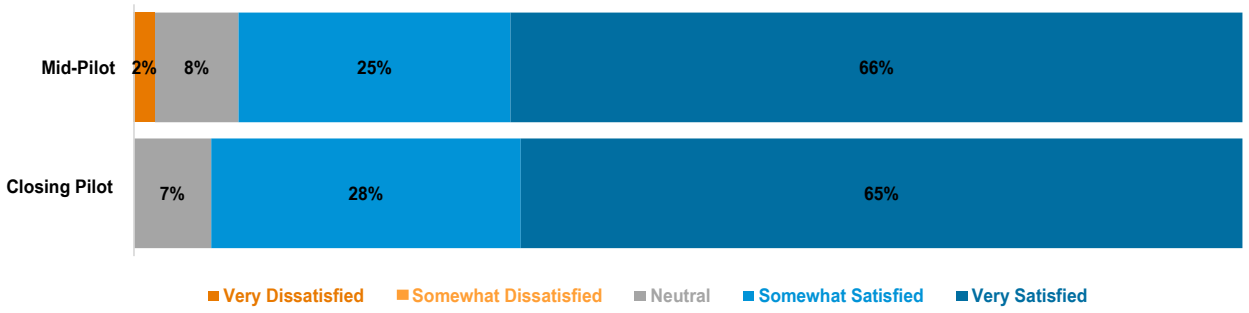


While understanding of program fairness remained high among participants, closing surveys suggest that nearly 1 in 5 respondents disagreed or were indifferent with the fairness of RUC funding. This suggests the opportunity exists for further education and informational efforts on this issue.

## Support for RUC Program

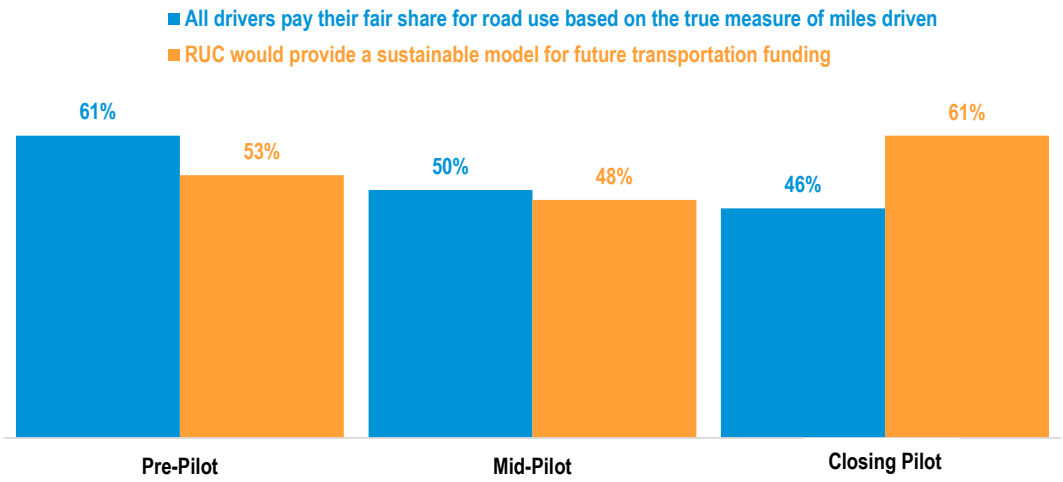
Overall support and satisfaction of the RUCPP among participants, was initially high in the mid-pilot and remained steady through the closing-pilot surveys. At the conclusions of the pilot program, over 90 percent of responding participants supported the RUC program with no significant dissatisfaction reported. These results suggest small, but important improvements in satisfaction at the conclusion of the pilot program.

### Overall Support for the RUCPP




Participants were also asked to describe benefits and drawbacks to the RUCPP effort. Survey respondents chose among various responses they most agreed with to identify the top two benefits of the program. Responses remained largely similar through all surveys with respondents agreeing that under the RUC model all drivers pay their fair share and that this provides a sustainable model for future transportation funding. Between the top two benefits, the percent of respondents agreeing that under a RUC model all drivers pay their fair share based on miles driven declined from the pre-pilot survey through the closing-pilot survey – falling from 61 percent support to 46 percent support for that statement. This trend raises questions of participants' understanding of fairness, what other program benefits were surveyed, and how this statement was interpreted by those in disagreement.

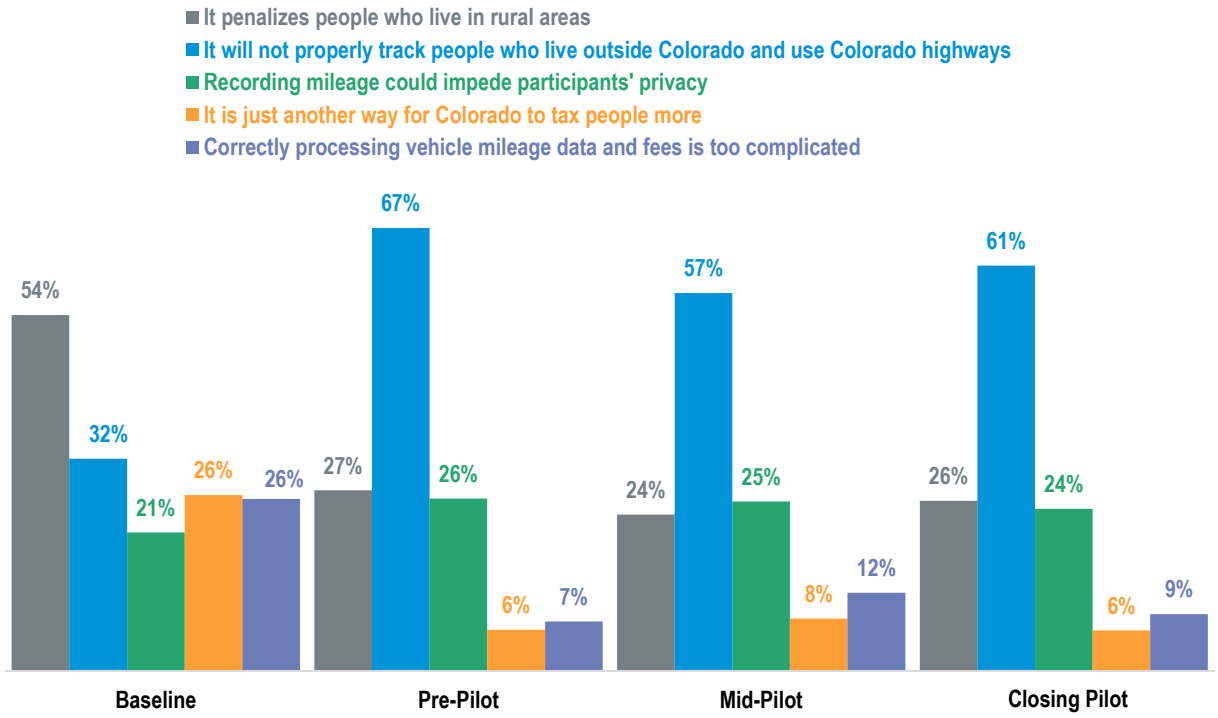
### Perceived Benefits of a RUC Program



The top two drawbacks of a RUC model were identified by respondents as penalizing people who live in rural areas and that this model would not properly report mileage for people living outside of Colorado and using Colorado highways. These identified drawbacks may relate to the declining support for the perceived fairness of the RUC model. As participants learned more about how RUCPP affects different road users and what it could and could not accomplish, it is possible that concerns over fairness to specific populations could have increased.

Three other statements were also ranked relatively high among top RUC drawbacks in participant surveys. These statements including ideas that recording mileage could impede participants' privacy, that RUC was just another way for Colorado to tax more, and that correctly processing vehicle mileage data and fees is too complicated. Among pilot participants in the pre, mid, and closing-pilot surveys, the percent of respondents agreeing with these drawbacks remained relatively stable. Overall, there was little change in responses to these statements among participants. The baseline survey shows higher levels of concern with potential drawbacks when compared to survey responses from those that actually participated in the pilot.

**Drawbacks of a RUC Program**




## Attitudes and Acceptance Outcomes

In terms of acceptance and understanding of concerns, drawbacks, and benefits of the program there are notable differences in survey responses from the baseline survey compared to responses from pilot program participates. This suggests that the RUCPP was successful in providing information and shifting attitudes on privacy and equity concerns. Direct experience with the pilot program appears to have reduced concerns over privacy and technology, while increasing concerns with fairness – particularly the potential issue of out-of-state drivers. Further pilot programs are likely the best education tool to continue to build public understanding, awareness, and acceptance.

# Evaluation Objective: Technical Feasibility

## OBD-II Port Utilization

Most vehicles manufactured after 1996 include an OBD-II diagnostic port. This port enable a vehicle's self-diagnostic and reporting capabilities and are essential to the operation of MRDs. Some RUCPP participants reported issues or trouble finding and locating OBD-II ports on their vehicles. Instructions were included in mailings sent to the participants along with the MRD. Help desk staff were able to respond to these participants and enable set up.

OBD-II ports in most vehicles are not commonly in constant use. The ports are typically accessed only during repair or service. However, some vehicles in the pilot program were utilizing ports continuously to provide data for insurance purposes or other uses. For participants with a single OBD-II port currently in use, that device must be discontinued in order to use the RUCPP MRD. Other issues related to ports reported by participants included mechanics unfamiliar with the devices and issues restarting reporting and diagnostics once unplugged. Resolutions to OBD-II port competition and utilization are being developed by private industry.

## Unrecognized VINs

Several help desk issues reported after the full pilot launch included some Vehicle Identification Numbers (VINs) not being recognized when participants attempted to first register their vehicle with the system. The Azuga system relies upon the national Edmonds vehicle database. The Edmonds database is the best available national source for vehicle information, but may not be accurate for all vehicles, particularly those originating or first registered in other countries. The RUCPP experienced issues with unrecognized VINs that prevented three or four participants from completing online enrollment without assistance from the project team. This issue was experienced with less than one percent of all RUCPP participants.

## Electric Vehicle MRD Issues

The RUCPP included three electric vehicles using a MRD device. Electric vehicles are required to select the GPS MRD option versus the non-GPS because mileage data for electric vehicles are based on GPS data, rather than data collected from the OBD-II port. The onboard computer systems of electric vehicles differ from other modern vehicles and may remain active while charging or may automatically shut down accessory devices when not charging and in sleep mode. When charging, a MRD may consider an electric vehicle active.

Anecdotes from Azuga representatives suggest that in other operational tests, continuous attempts by devices to connect and identify a vehicle's location may result in a trip being recorded with only several tenths of a mile – resulting not from movement but GPS drift. This can result in phantom trips being logged and charged to the user. Azuga reports that some makes of electric vehicles may power on or off the MRD device when not charging which can also result in recording phantom trips. Algorithms can be developed to address this issue and remove trips that are clearly anomalies. While these issues did not arise in the Colorado RUCPP, they should be considered in future efforts.

## Manual Odometer Reporting

The pilot participant group using manual odometer readings experienced low reporting compliance. Participants were required to submit monthly odometer readings through either the website portal or the smartphone application. A picture verification was required for the initial and final odometer readings.

Compliance with manual reporting dropped significantly over the course of the pilot. Of the 22 manual odometer reading participants, 18 percent were non-compliant in December and over 55 percent were non-compliant in reporting by April at the close of the program. This group also experienced occasional data entry errors. Participants manually entering an odometer reading rather than taking a picture of it, can mistakenly type incorrect values. During the RUCPP, mileage data was verified by staff from the pilot project team and inaccurate values were identified and corrected before invoices were sent out.

### *GPS Accuracy*

For participants in the group using GPS MRDs, the total mileage used for calculating road usage charges is not dependent on the accuracy of GPS. GPS traces are illustrated on maps for the convenience and information of the driver but are not reported or retained by CDOT. This initially led to some confusion among participants.

GPS signals are used to determine on earth locations and software algorithms then assign that location to a street on the roadway network. The software uses certain assumptions based on proximity, speed, direction, and other known characteristics of the road network. In cases where streets run parallel in close proximity (e.g. a highway and frontage road) the software can place a driver on a different street than actually driven. This can result in inaccurate mapping of a trip or a trip that shows additional routes driven. Pilot participants who raised questions about the accuracy of trips were provided with information to reinforce that road usage charges were not derived from mapped trips, but from total miles driven collected from the OBD-II port.

The only GPS derived data retained by CDOT during the RUCPP was anonymized extractions of miles driven in state and out of state. No significant issues were reported during interviews with the evaluation team or from participants to the project team help desk regarding miles driven in and out of state. One participant experienced inaccurate GPS trip mapping in a remote area of Utah, but no issues were reported with GPS positioning in more remote regions of Colorado.

## Mileage and Fuel Use

RUCPP participants collectively drove 541,013 miles during the duration of the pilot. Of this total, 165,471 miles were driven by participants using the non-GPS MRD or the odometer reporting option, and so the geographic location of these miles driven (within Colorado or not) is not available. Of the 375,542 miles driven by the participants using the GPS-enabled MRD, 93 percent of miles were driven within Colorado. Approximately 8,895 miles (2.4 percent) were driven in nine other states. The following tables present summary statistics of participant mileage and fuel usage by MRD option throughout the pilot.

### Participant Mileage and Fuel Usage by Geography by Mileage Reporting Device

| Participant Device | N/A | CO | AZ | IA | KS | MN | MO | NE | NM | UT | WY | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **GPS MRD** | | | | | | | | | | | | |
| Mileage | 17,008 | 349,638 | 1,610 | 542 | 1,097 | 493 | 15 | 944 | 1,898 | 1,589 | 707 | 375,542 |
| Fuel Usage | 761 | 15,151 | 172 | 26 | 47 | 23 | 1 | 50 | 100 | 72 | 34 | 16,437 |
| **Non-GPS MRD** | | | | | | | | | | | | |
| Mileage | 102,346 | - | - | - | - | - | - | - | - | - | - | 102,346 |
| Fuel Usage | 4,533 | - | - | - | - | - | - | - | - | - | - | 4,533 |
| **Manual Odometer Reading** | | | | | | | | | | | | |
| Mileage | 63,125 | | - | - | - | - | - | - | - | - | - | 63,125 |
| Fuel Usage | 3,066 | | - | - | - | - | - | - | - | - | - | 3,066 |
| **Total Participants** | | | | | | | | | | | | |
| **Mileage** | **182,479** | **349,638** | **1,610** | **542** | **1,097** | **493** | **15** | **944** | **1,898** | **1,589** | **707** | **541,016** |
| **Fuel Usage** | **8,380** | **15,151** | **172** | **26** | **47** | **23** | **1** | **50** | **100** | **72** | **34** | **24,037** |

Note: N/A location is used when the vehicle location cannot be determined.

### Participant Mileage and Fuel Usage by Month by Mileage Reporting Device

| Participant Device | December | January | February | March | April | Total |
|---|---|---|---|---|---|---|
| **Non-GPS MRD** | | | | | | |
| Mileage | 11,722 | 23,664 | 23,189 | 23,329 | 20,443 | 102,346 |
| Fuel Usage | 533 | 1,042 | 1,041 | 981 | 936 | 4,533 |
| **GPS MRD** | | | | | | |
| Mileage | 39,122 | 89,981 | 82,583 | 90,863 | 72,992 | 375,542 |
| Fuel Usage | 1,844 | 4,035 | 3,486 | 3,933 | 3,140 | 16,437 |
| **Odometer** | | | | | | |
| Mileage | 9,542 | 9,637 | 13,160 | 14,191 | 16,595 | 63,125 |
| Fuel Usage | 476 | 478 | 681 | 712 | 718 | 3,066 |
| **Total Participants** | | | | | | |
| **Mileage Total** | **60,386** | **123,282** | **118,932** | **128,383** | **110,030** | **541,016** |
| **Fuel Usage Total** | **2,853** | **5,555** | **5,209** | **5,626** | **4,794** | **24,037** |

## Reporting Systems Errors

An important aspect of technical feasibility is the extent and significance of errors related to MRDs that occurred throughout the pilot program. Overall, 131 incidents were reported in error logs collected and maintained by the MRD software. Of total errors, the majority (129 errors), were related to system disconnects. Disconnects occur when the MRD is reset, powered off, or removed from the vehicle for any reason. This can occur when a battery dies or when the device is unplugged from the OBD-II port. Another

less common error occurred when devices were transferred to a new vehicle. Vehicles equipped with GPS MRD option experienced 83 percent of total error incidents. This rate is slightly over representative when compared to the proportion of GPS MRDs in the pilot program (approximately 70 percent).

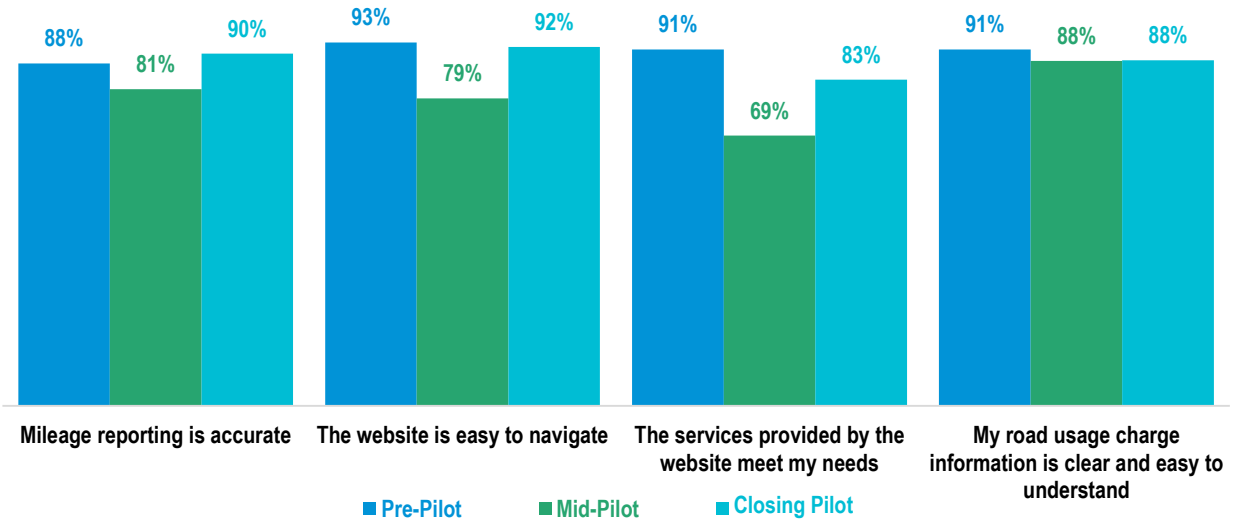
### Recorded MRD System Errors by Month and Issues

| Participant Device | Monthly Totals | | | | | Total |
|---|---|---|---|---|---|---|
| | December | January | February | March | April | |
| Non-GPS Mileage Reporting | 2 | 2 | 5 | 8 | 5 | **22** |
| GPS Mileage Reporting | 15 | 29 | 38 | 16 | 11 | **109** |
| Odometer Reading | 0 | 0 | 0 | 0 | 0 | **0** |
| **Total Errors** | **17** | **31** | **43** | **24** | **16** | **131** |

## Mobile App and Web Platform Services

The Azuga mobile app and web platform are two important components of the RUC technical framework. Over 70 percent of participants visited or utilized the web platform during the pilot program. Participant satisfaction with the Azuga mobile app grew from 70 percent to 82 percent from the mid-pilot survey to the closing-pilot survey. Participant survey responses show satisfaction with the services provided by the website, the ease of navigation, and the clear and easily understood road usage charge information presented online.

### Participant Survey Responses, Azuga Web Platform Satisfaction




Pre, mid, and closing pilot surveys are not directly comparable as the pool of participants responding changed from survey to survey. Reported satisfaction with the web platform information and accessibility generally remained stable and consistently show high satisfaction.

### Technical Feasibility Outcomes

Key feasibility aspects of the RUCPP include reliability and accuracy of mileage devices, rate of issues and errors experienced, and customer satisfaction with reporting systems. The pilot program did not experience fatal reporting errors, significant technological issues, or customer service issue greater than would be reasonably expected. Azuga devices and the study design of the RUCPP provide a solid example of how RUC technology might be implemented.

Of reported issues with device connectivity and installation, most were readily resolved by providing additional information to participants through help desk support or communications. In the closing pilot survey, 15 respondents reported that they sought help with a technical issue related to mileage reporting devices. All questions were resolved. GPS related inconsistencies were either identified early or readily explained to participants. These technical issues could be resolved in the future with backend software algorithms. Logistical and hardware issues, such as competing use of vehicle OBD-II ports and compatibility with some newer vehicles can be overcome through collaboration with private vendors and manufacturers.

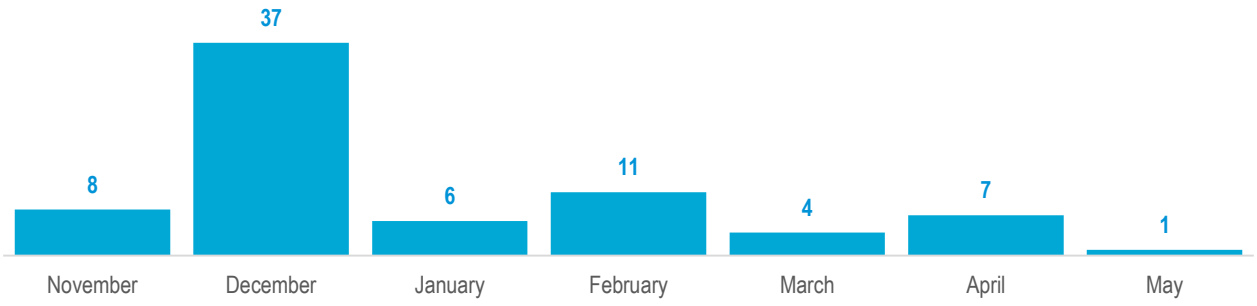
## Evaluation Objective: Administrative Feasibility

### Customer Support Needs

A key component of technical feasibility for the RUCPP is the ability to cost-effectively support participant questions and informational needs. The pilot project team staffed a help desk throughout the RUCPP. This help desk was available to participants by email and phone and was operational both before and following the official pilot program duration from December 2016 through May 2017.

The RUCPP help desk received 74 requests from participants through the six-month operation. An average of ten help desk requests were received each month of the pilot program. Excluding enrollment related inquiries in December, customer support requests represented 1 percent or less of the total participant group in any given month. Nearly two out of every three requests could not be immediately addressed and required additional research into solutions and or coordination with vendor staff from Azuga.

**Help Desk Requests by Month**




The majority of staff hours devoted to help desk support occurred during initiation of the pilot in December 2016 as participants registered and installed their devices. Additional peaks in customer support inquiries occurred in February and at the conclusion of the pilot in April. February requests coincided with mailings of

the first invoices for the month of January and addressed invoice related questions. April requests were related to questions about returning mileage devices or final reporting of odometer readings.

On average, pilot team staff spent 30 to 40 minutes per help desk request. This time includes fielding the call or email from a participant, researching the issue and potential fixes, and communicating back to the participant and other pilot team members. All help desk request were resolved in a timely manner and there were no outstanding requests at the close of the pilot program. If the RUCPP were scaled up, average help desk request resolution time would represent a significant amount of time and labor resources. Technological advances and economies of scale are likely to reduce costs of customer service in the future.

The pilot project team estimated labor hours required to field, address, and resolve help desk issues on a monthly basis. A total of 11 hours were expended by all members of the pilot project team on customer support requests, or an average of 18 hours per month. This represents roughly one hour per participant over the span of the RUCPP. In addition, telecommunications service fees were incurred for phone-based help desk requests. Phone requests represented roughly 40 percent of all support inquiries. Monthly costs for this service covered 30 minutes of customer call center services per month at a fee of $88, or $0.80 per participant per month.

Labor hours can be extrapolated to labor costs using the 2016 mean wage for customer service representatives in Colorado as the low end of a cost range and the mean wage for state government employees as the high end. These assumptions result in a total customer service labor cost of $1,900 to $2,800 or approximately $300 to $500 per month of the pilot program. These estimates are only useful for illustrating the potential direct labor costs of providing customer service during the pilot program. Under full implementation of a RUC program, economies of scale and lower cost customer service response methods would likely be achieved.

| Estimated Customer Service Resource Requirements | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | November | December | January | February | March | April | Average | Total |
| | | | | | | | | |
| **Customer Support Labor Hours Required** | | | | | | | | |
| Labor Hours | 10 | 49 | 11 | 15 | 8 | 18 | **18.5** | **111** |
| | | | | | | | | |
| **Customer Service Labor Rate Ranges** | | | | | | | | |
| $17.40 | $174 | $853 | $191 | $261 | $139 | $313 | **$322** | **$1,931** |
| $25.57 | $256 | $1,253 | $281 | $384 | $205 | $460 | **$473** | **$2,838** |
| | | | | | | | | |
| **Telecommunications Services** | | | | | | | | |
| Total Charges | $0 | $128 | $88 | $88 | $88 | $88 | **$80** | **$480** |
| | | | | | | | | |

## Invoicing Accuracy and User Satisfaction

The RUCPP prepared and sent monthly invoices informing participants of miles driven and estimated road usage charges levied. Participant survey responses show that satisfaction with invoice information increased over the duration of the pilot program. Over 90 percent of responding participants in the closing-

pilot survey indicated that invoice charges were transparent and accurate. Interviews of several participants suggested that the first month and last month invoices were examined more carefully and of more interest to participants than mid-pilot invoices.

### Sample RUCPP Invoice

azuga INSIGHT

NOT A BILL - SIMULATED PAYMENT COMPLETE

**MONTHLY STATEMENT ROAD USAGE CHARGE**

**Statement Period:** Apr 1 2017 - Apr 30 2017

**Statement At a Glance**

| | |
|---|---|
| Account Holder | |
| Number of Vehicles | 2 |
| Account Type | GPS Mileage Reporting Device |
| Azuga Customer Number | Azuga-1 |

**Road Usage Charge Details For April**

| | |
|---|---|
| Mileage Fees for April | $12.59 |
| Fuel Tax Credit for April | -$10.65 |
| Net April Road Usage Charge ( Mileage Fees - State Fuel tax) | $1.94 |

## Administrative Feasibility Outcomes

Customer service issues were addressed with labor-intensive help desk systems and one-on-one handling of questions and requests. This level of support was manageable in this pilot program, but would not be feasible or cost effective under broader implementation. Similarly, manual verification of manual mileage reporting and or invoicing would not be feasible at a larger scale. Should RUC implementation efforts grow in the future, innovations in reporting options or technological solutions to mileage verification are likely to be developed.

Issues with user compliance, particularly non-reporting of manual odometer readings, highlighted significant issues with manual systems. Enforcement options were not included in the RUCPP design though mechanisms could be developed to enforce reporting. The RUCPP simulated road usage charges only and was not designed to test issues with available invoicing and payment systems.

# Evaluation Objective: Privacy

Public polling and previous pilot implementation efforts around the country have shown significant public concern with privacy issues under road usage charge programs. Unlike current fuel tax systems, road usage charge programs necessarily collect individual information. The RUCPP tested several systems for protecting personally identifiable information of registered participants and anonymizing participant data stored and managed by state agencies.

## Privacy Protections

The RUCPP established privacy firewalls between Azuga's account management system, which included personally identifiable information, and any data transmitted to the Colorado Department of Transportation. Personally identifiable information in the pilot program included vehicle location data, participant personal information, and vehicle information collected by MRD, and other information required of participants at time of enrollment.

Personal information was required to enroll all participants into the pilot program, including vehicle and personal contact information. Invoices and payments were simulated and no banking or financial information was collected or required. GPS MRDs record, transmit, and store location specific data to the account management system, which is processed and accessible only by the participant and Azuga. GPS location data was not transmitted to or accessible by state agencies.

Data privacy concerns are likely most significant with GPS enabled MRDs. GPS data was only used for the purposes of the pilot program to distinguish total miles driven in-state and out-of-state . This data is anonymized and reported to state agencies only as total mileage and in-state versus out-of-state mileage, and is. Actual GPS location trace or route information is not provided to state agencies. Invoice statements do not include identifying trip or location information and only list total miles traveled and chargeable (in-state) mileage (see invoice snapshot below). Private vendors providing account management services would be required to develop data security and retention policies, though that aspect of data privacy was not evaluated in the RUCPP.

### Sample RUCPP Invoice with Mileage Reporting Detail

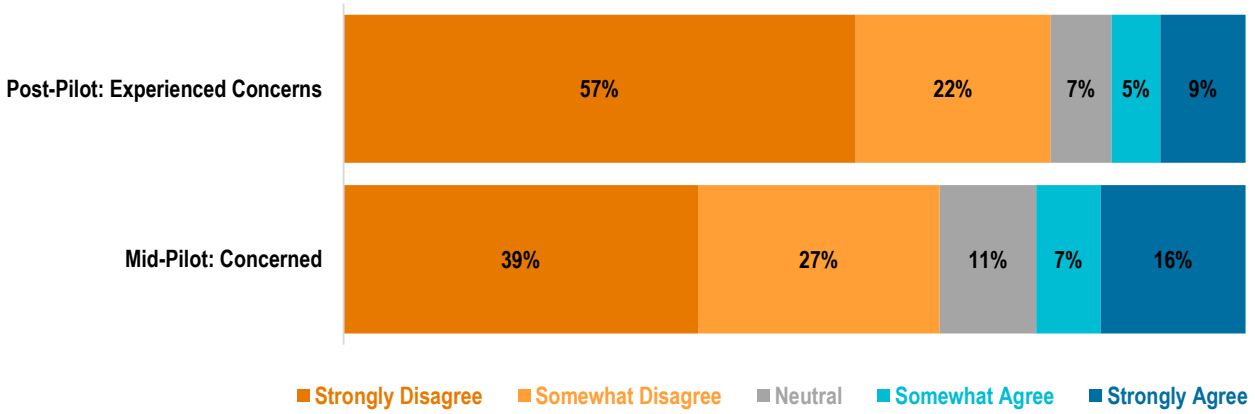
**Daily Log - GMC Acadia 2014** [redacted]

| Date | Chargeable Miles | Out of State Miles | Total Miles | Mileage Fees on Chargeable Miles($) | Fuel Consumed (Gallons) | Fuel Tax Credit ($) | Daily Net Road Usage Charge ($) |
|---|---|---|---|---|---|---|---|
| 03-01-2017 | 29.3 | 0.0 | 29.3 | $0.35 | 1.66 | -$0.37 | -$0.01 |
| 03-02-2017 | 17.6 | 0.0 | 17.6 | $0.21 | 1.03 | -$0.23 | -$0.02 |
| 03-03-2017 | 0.0 | 0.0 | 0.0 | $0.00 | 0.00 | $0.00 | $0.00 |
| 03-04-2017 | 0.0 | 0.0 | 0.0 | $0.00 | 0.00 | $0.00 | $0.00 |
| 03-05-2017 | 0.0 | 0.0 | 0.0 | $0.00 | 0.00 | $0.00 | $0.00 |
| 03-06-2017 | 28.1 | 0.0 | 28.1 | $0.34 | 2.04 | -$0.45 | -$0.11 |
| 03-07-2017 | 17.4 | 0.0 | 17.4 | $0.21 | 1.00 | -$0.22 | -$0.01 |
| 03-08-2017 | 17.5 | 0.0 | 17.5 | $0.21 | 1.85 | -$0.41 | -$0.20 |

Concerns with privacy and privacy protections were evaluated through surveys of participants. Generally, privacy concerns decreased over the course of the pilot program, as participants learned more about system options and experienced the convenience and additional driver services offered by MRD based reporting.

Among baseline survey respondents, 90 percent were concerned regarding their collection of personal data as part of a pilot program. Participant responses to the mid and closing-pilot surveys show that fewer experienced privacy concerns, particularly by the close of the pilot program. Just 14 percent of respondents to the closing-pilot survey agreed that they experienced privacy concerns, while 79 percent disagreed.

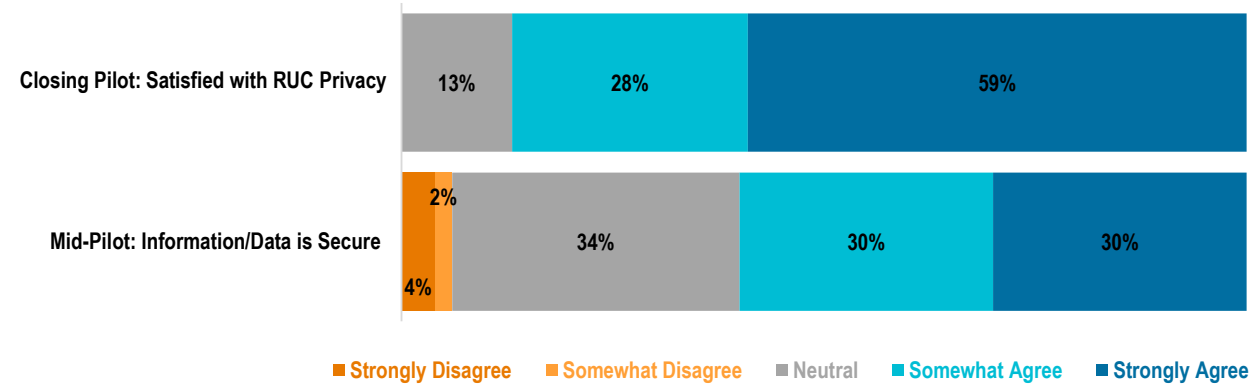
### Survey Respondent Privacy Concerns




Participants were also asked to assess satisfaction with privacy of the RUCPP. Among participants responding to the closing-pilot survey, 87 percent agreed that they were satisfied and no respondents disagreed.

Information and data security agreement was less clear. Among mid-pilot survey respondents, 6 percent of participants indicated potential concerns with data security, while 60 percent agreed that data was secure. Over a third of respondents were neutral or undecided on this issue.

### Survey Respondent Privacy Concerns



Participants highlighted two primary data security and privacy issues with the RUCPP including concerns over the GPS capabilities of reporting devices and network safety and potential hacking of the account management databases.

### Privacy Outcomes

Interview findings and discussions with the pilot project team suggest that participant privacy concerns were less significant than initially anticipated. Survey responses show that with experience and education, privacy concerns were alleviated over the course of the pilot. Interview responses indicate that the convenience and benefits offered by MRDs may have outweighed privacy concerns. At least one participant who had initially chosen the odometer reading option expressed a preference for an automated MRD if given the choice again. Outcomes of the RUCPP are broadly consistent with other implementation and pilot efforts in other states and mirror national trends in data privacy concerns.

## Evaluation Objective: Cost-Effectiveness

Colorado's current state gasoline tax of 22 cents per gallon provides about $560 million in annual revenue to the state. The RUCPP fee value was set to simulate a revenue neutral program. The pilot team established a road usage charge rate of 1.2 cents per mile based on historical data on vehicle miles traveled and average miles per gallon of the current registered vehicle fleet. If implemented statewide at this rate, it is estimated that the program would generate revenue of $573 million annually. If RUC were to be implemented in Colorado in the future, further rate refinement is needed to maintain a revenue neutral funding mechanism. Direct comparisons of the cost-effectiveness of current fuel tax collection systems and the system tested under the RUCPP are challenging and were not fully evaluated under this pilot program.

### Recovery of Administrative Costs

Both the current fuel tax collection system and any road usage charge model require administration support. Fuel taxes are currently collected from 400 to 500 fuel distributors rather than directly from individual gas stations or drivers. The Department of Revenue administers current fuel tax collections systems. According to interviews with staff from this department, approximately 3.5 full time equivalent (FTE) positions are needed to support statewide fuel tax collections, between 2 and 3 FTEs are dedicated to compliance and auditing, and 2.5 FTEs manage the state's multi-state and international fuel tax program, which is primarily related to commercial motor vehicles. Funds from the Highway Users Tax Fund (HUTF) are directed to the Department of Revenue to cover the cost of fuel tax collection software. The software used by the Department is estimated to cost approximately $35,000 per month, or over $400,000 per year.

Recovery of administrative costs could be built into a road usage charge per mile rate or funded in part through HUTF diversions to the Department of Revenue. Estimates of administrative costs associated with individual driver reporting and payment systems are not available and cannot be extrapolated based on the RUCPP. For comparison, Colorado's electronic toll administration costs are estimated at $0.50 cents per transaction. MRD technology and account management systems once developed and tested can be scaled relatively easily. If implemented statewide, it is assumed that account management vendor fees would include costs related to physical MRD hardware and software and data storage related to mileage collection,

processing, and reporting. Vendor costs could be implemented on a per user basis, flat annual fee, or as a percent of revenues.

## Revenue Generation of Road Usage Charge

RUCPP participants traveled 532,117 chargeable miles inside Colorado borders and consumed a total of 3,512 gallons of taxable fuel. Total road usage charge revenue accumulated during the RUCPP was $6,385 while fuel tax credits over the same period were $5,172, resulting in net revenue of $1,212. This positive balance on RUC usage charges resulted from the difference between statewide average fuel economy and the fuel economy of vehicles participating in the pilot program. The initial RUC rate per mile was set using assumptions about statewide average fuel economy, while the actual fuel economy of participant vehicles was slightly higher than the statewide average. This resulted in positive net revenues. In any future or broader implementation the per mile charge will be adjusted to remain revenue neutral.

Generally, participants driving fuel efficient or alternative fuel vehicles were likely to see no change or an increase in charges under the RUCPP model compared to what they pay in fuel taxes. Participants driving relatively fuel inefficient vehicles were likely to see a decrease in total charges, even if total miles driven exceeded other participant groups. The following shows the average monthly RUC charge balance, net of any fuel tax credits applied, and average monthly mileage based on vehicle fuel efficiency type. The average monthly balance demonstrates charges below, or above, what would otherwise be paid in fuel taxes.

### RUCPP Usage Charge Balances by Vehicle Type

| Average Road Usage Charges | | |
|---|---|---|
| **Vehicle Type** | **Average Monthly Balance** | **Average Monthly Mileage** |
| **Low Fuel Efficiency** *(5 – 15 mpg)* | **($3.20)** | **4,169** |
| **Average Efficiency** *(15 to 25 mpg)* | **$1.54** | **4,305** |
| **High Efficiency** *(25 to 45 mpg)* | **$4.25** | **4,026** |
| **Over 45 mpg and Electric** | **$5.70** | **3,046** |

On average, for every $1 of fuel tax credits the RUCPP generated revenue of $1.23. The net benefits of the RUCPP illustrate the advantages of capturing miles travelled in fuel-efficient or alternative fuel vehicles. On average, each pilot participant drove approximately 3,058 miles and consumed 135 gallons of gas. Over the four months of the pilot program, the average RUC revenue and fuel tax per participant was $36 and $29, respectively. The average miles per gallon for participants was 22.6. The following tables summarizes available data on monthly mileage, fuel usage, and simulated payment or credit balances.

### RUCPP Monthly Mileage, Fuel Usage, and Payment/Credit Balance

| Values | December | January | February | March | April | Total |
|---|---|---|---|---|---|---|
| Total Chargeable Mileage | 58,322 | 122,116 | 117,924 | 126,110 | 110,031 | **541,016** |
| Total Fuel Usage (gallons) | 2,853 | 5,555 | 5,209 | 5,626 | 4,794 | **24,037** |
| Total Chargeable Fuel Usage (gallons) | 2,756 | 5,490 | 5,163 | 5,428 | 4,675 | **23,512** |
| Total Revenues | $699.86 | $1,465.39 | $1,415.09 | $1,513.32 | $1,291.74 | **$6,385.40** |
| Total Fuel Tax Credit | $(606.40) | $(1,207.74) | $(1,135.76) | $(1,194.24) | $(1,028.49) | **$(5,172.62)** |
| Balance | $93.46 | $257.65 | $279.33 | $319.08 | $263.26 | **$1,212.79** |
| Average RUC Fee to Fuel Tax Ratio | 1.15 | 1.21 | 1.25 | 1.27 | 1.26 | **1.23** |

### Average All RUCPP Participants Monthly Mileage, Fuel Usage, and Payment/Credit Balance

| Values | December | January | February | March | April | Total |
|---|---|---|---|---|---|---|
| Average Mileage | 604 | 1,233 | 1,189 | 1,284 | 1,100 | **5,410** |
| Average Chargeable Mileage | 583 | 1,221 | 1,179 | 1,261 | 1,076 | **5,321** |
| Average Fuel Usage (gallons) | 28.5 | 55.6 | 52.1 | 56.3 | 47.9 | **240** |
| Average Chargeable Fuel Usage (gallons) | 27.6 | 54.9 | 51.6 | 54.3 | 46.8 | **235** |
| Average Revenues | $7.00 | $14.65 | $14.15 | $15.13 | $12.92 | **$63.85** |
| Average Fuel Tax Credit | $(6.06) | $(12.08) | $(11.36) | $(11.94) | $(10.28) | **$(51.73)** |
| Average Miles Per Gallon | 21.2 | 22.2 | 22.8 | 23.2 | 23.0 | **22.6** |

## Cost-Effectiveness Outcomes

Colorado's RUCPP was a limited, early research study of a road usage charge model. The pilot was primarily intended to demonstrate technical feasibility. However, revenue generation potential and appropriate road usage charge rates can be assessed.

At the established 1.2 cents per mile rate, the RUCPP showed revenue generation potential over current fuel tax collections among the participant groups. The participants pool of this pilot was designed to be balanced across regions of the state, driving levels, and vehicle mile per gallon efficiency. However, care should be taken when using these results to extrapolate to statewide implementation. Under full implementation and in order to remain revenue neutral, the per mile rate may need to be revised. Revenues would need to be directed to cover costs of vendor provided MRD hardware and account management services as well as public agency personnel responsible for administration, enforcement, and management of a road usage charge system. Reliable cost estimates for private vendor provided support services are not available. Public agency staff administrative labor support could increase or decrease under a road usage charge model compared to the fuel tax system. There is precedent for applying revenues generated from fuel tax collections to cover software and administrative expenses.

Fuel tax collections from out of state or foreign visitors are currently collected by the State of Colorado and are not remitted to home states. The exception is multi-state and international fuel tax programs for commercial vehicles. It is unknown how much fuel is consumed by visitors. Under a single-state, driver-based road usage charge system, Colorado would not capture revenue from miles driven by visitors. If a

road usage charge system was implemented to cover rental vehicles or to enable tax collections from individual drivers this revenue may be captured. The question of how great of a fiscal impact visitor fuel tax collections have on overall fuel tax revenues will determine the cost effectiveness of any road usage charge model implemented statewide.

# 4.0 Evaluation Summary

Colorado's initial RUCPP illustrated the potential of road usage charging as an alternative transportation revenue model. This pilot, while limited in scale, provides valuable lessons learned and additional questions for broader implementation.

**Mileage devices performed as expected.** Overall, the RUCPP demonstrates the technology and technical feasibility of a road usage charge program. The mileage reporting devices and accompanying software worked as intended with a relatively low error rate. When errors did occur they did not impact total mileage reported used to calculate road usage charges. Azuga and other private vendors are likely to continue to test and improve hardware and software systems. Manual mileage recording systems showed significant non-compliance rates and were subject to human error in reporting.

**Administrative feasibility and costs require additional research.** This pilot program relied on manual processes that were labor intensive to provide customer service, to verify mileage reports, and to prepare invoices. However, these systems may be readily scaled up and automated in an expanded program or demonstration. The costs associated with vendor support to provide mileage reporting devices, customer support, and system administration must be accounted for in future per-mile charges. The impact of a RUC model to state agency staff needs and administrative costs depends on how a program is ultimately implemented. However, because the RUC model assess individual drivers, rather than fuel distributors - the data collected, record and registration requirements, and payment and invoice systems under RUC will expand significantly compared to current fuel tax collection systems.

**Participant satisfaction and perception of the program was positive.** Based on interviews with limited participants and survey findings from responding participants, satisfaction with the RUCPP as implemented was high and improved over the duration. This reflects the quality of customer support offered and the additional services and information provided by GPS enabled mileage devices and applications. Perceptions of the RUC model as a responsive, fair, and equitable revenue generating mechanism show that education and direct experience matter. RUC in theory may present drivers with significant questions of fairness and equity, while in practice those concerns diminish with exposure to how the model works. Some participants benefitted from lower charges under a RUC model and others saw increases in estimated charges paid.

**Privacy and data concerns remain key issues.** This RUCPP demonstrated that effective data and personal information privacy firewalls could be established between state agencies and private system management providers. Information on individual participants, including location data, was protected at all times during this pilot and not transferred to a state agency. Participants did express notable concerns over data security and potential privacy issues resulting from collection and storage of data by private vendors. As location based devices and services become more commonplace, consumer privacy issues may be alleviated for some stakeholders, but will remain significant for others.

**RUC provides effective revenue generation.** The participants included in this pilot were selected to represent a mix of vehicle types, fuel efficiency, driving patterns, and geography. However, with a limited sample size the participant pilot group was not exactly similar to Colorado's driving population. Under the estimated per mile charge and the characteristics of the pilot participants, the program showed revenue generation capabilities greater than the current fuel tax system. Surplus revenue balances were generated under the RUCPP when compared to estimated fuel tax collections. The per mile rate can be adjusted under an expanded RUC program to remain revenue neutral or to collect additional revenues. Expanded pilot programs with increased sample sizes are likely needed to confirm this finding.


CDOT
CO
Road Usage Charge
Pilot Program


CAMBRIDGE
SYSTEMATICS