NATIONAL ACADEMIES Sciences Engineering Medicine

TRB TRANSPORTATION RESEARCH BOARD

TRB Webinar: The RUC Guide—Your Pathway to Road Usage Charging

March 7, 2024

1:00 – 2:30 PM

PDH Certification Information

1.5 Professional Development Hours (PDH) – see follow-up email

You must attend the entire webinar.

Questions? Contact Andie Pitchford at TRBwebinar@nas.edu

The Transportation Research Board has met the standards and requirements of the Registered Continuing Education Program. Credit earned on completion of this program will be reported to RCEP at RCEP.net. A certificate of completion will be issued to each participant. As such, it does not include content that may be deemed or construed to be an approval or endorsement by the RCEP.

ENGINEERING
RCEP
REGISTERED CONTINUING EDUCATION PROGRAM

AICP Credit Information

1.5 American Institute of Certified Planners Certification Maintenance Credits

You must attend the entire webinar

Log into the American Planning Association website to claim your credits

Contact AICP, not TRB, with questions

Purpose Statement

This webinar will introduce the newly-launched RUC Guide, an interactive web resource packed with ready-to-use tools, building blocks, best practices, and a well-researched set of considerations. Presenters will give instructions on the use of the self-assessment tool and how to interpret their state or agency's unique results. Presenters will also share the customizable tools and resources available on the website.

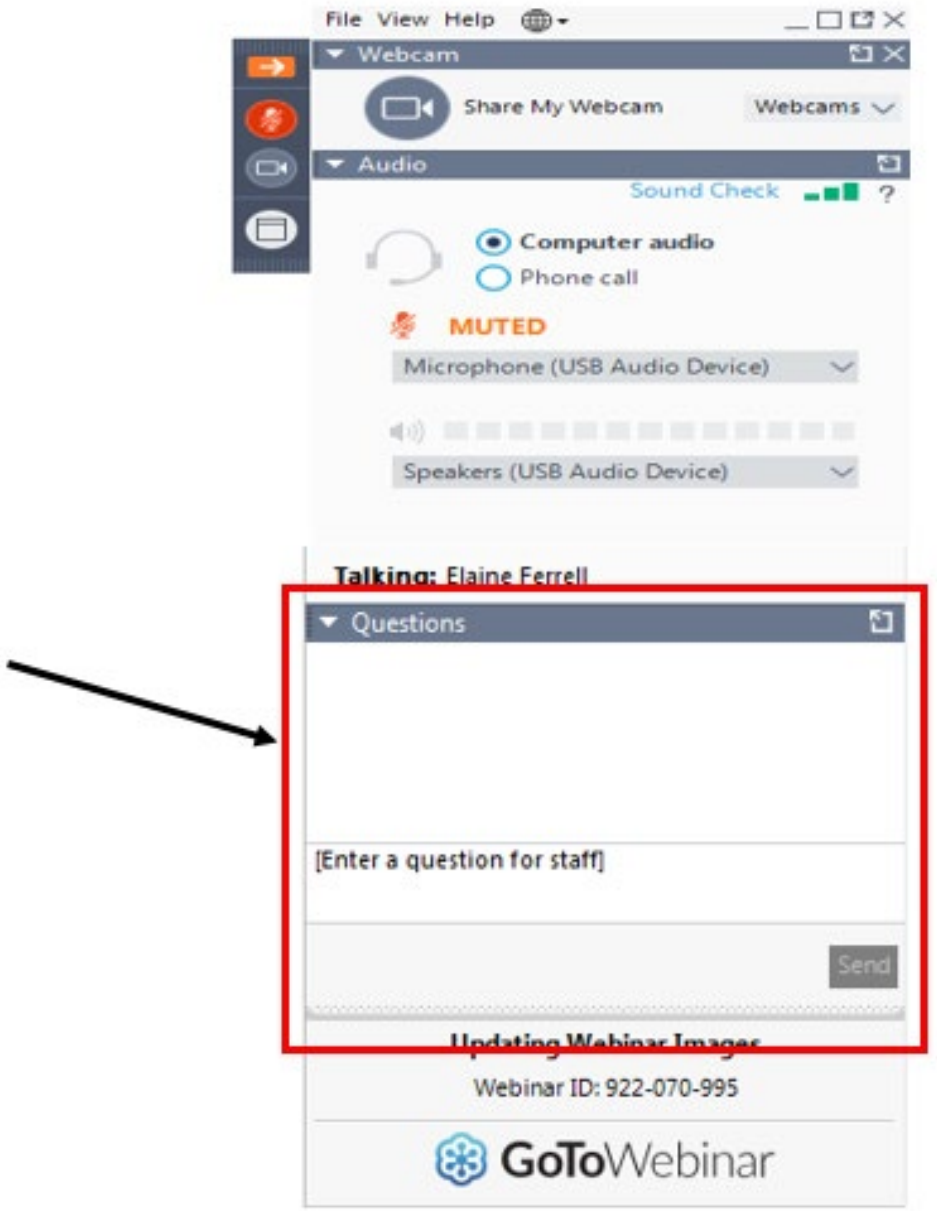
Learning Objectives

At the end of this webinar, you will be able to:

- Utilize the RUC Guide to identify challenges a state may face and strategies to overcome them
- Determine actionable next steps to progress RUC conversations or implementation in a state
- Develop RUC materials using templates provided on the RUC guide website

Questions and Answers

- Please type your questions into your webinar control panel
- We will read your questions out loud, and answer as many as time allows



Road Usage Charge Guide

crp.trb.org/nchrpwebresource2

Scan QR Code

TRB Webinar

March 7, 2024 | 1:00 PM EST

Moderated by:
Jenny Roberts
CDM Smith
National RUC Discipline Lead

NATIONAL ACADEMIES Sciences Engineering Medicine

TRB TRANSPORTATION RESEARCH BOARD

CDM Smith

Your panelists

Maureen Bock	Steven Marfitano	Trish Hendren	Ging Ging Fernandez	Carlos McCloud
RUC Guide Chair Oregon DOT	RUC Guide Author CDM Smith	RUC Guide Panelist Executive Director, The Eastern Transportation Coalition	RUC Guide Project Manager CDM Smith	SIRC Program Manager, Federal Highway Administration
				

Agenda

1. RUC Concept with Jenny

2. Lead Agency Perspective with Maureen

3. Intro to the RUC Guide with Steve

4. User Perspective with Trish

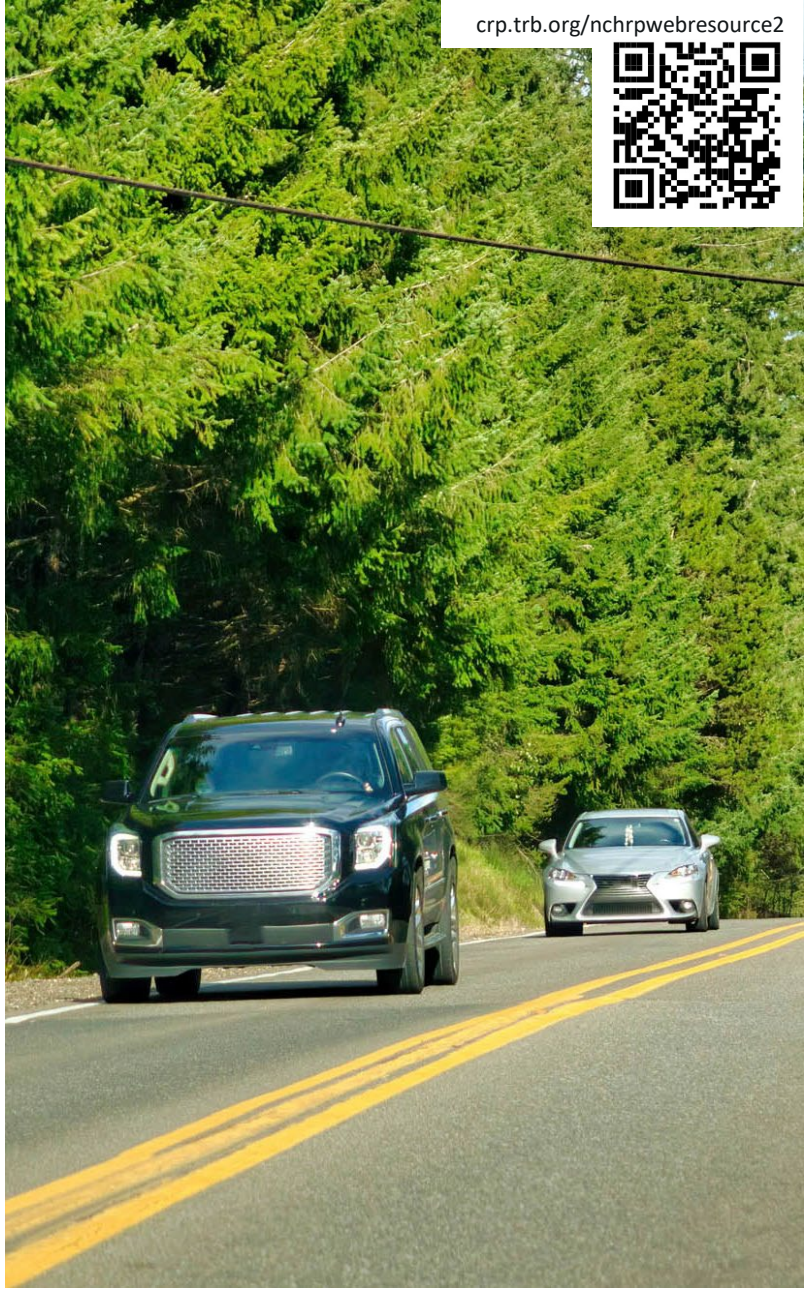
5. Getting Legislation Passed with Ging Ging

6. SIRC Updates with Carlos

View this video here: https://crp.trb.org/wp-content/uploads/sites/31/2023/08/RUC101With_Captions.mp4

Background and Introduction

- Fuel efficiency is improving, and electric/hybrid vehicle sales are growing, resulting in declining motor fuel tax base
- Road Usage Charging (RUC) is one viable long-term option to replace motor fuel taxation as a primary source of transportation revenue
- Implementing RUC can follow many paths and requires extensive policy development, organizational capability building, and communication

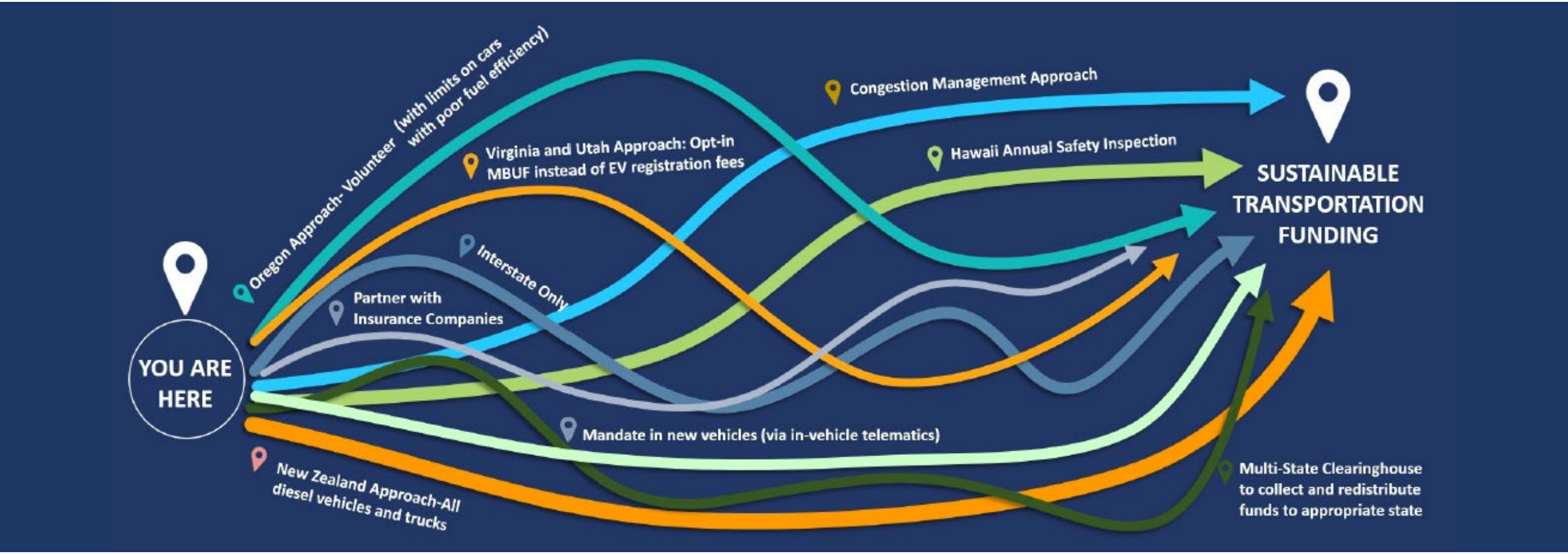


crp.trb.org/nchrpwebresource2

Lead Agency Perspective

Maureen Bock

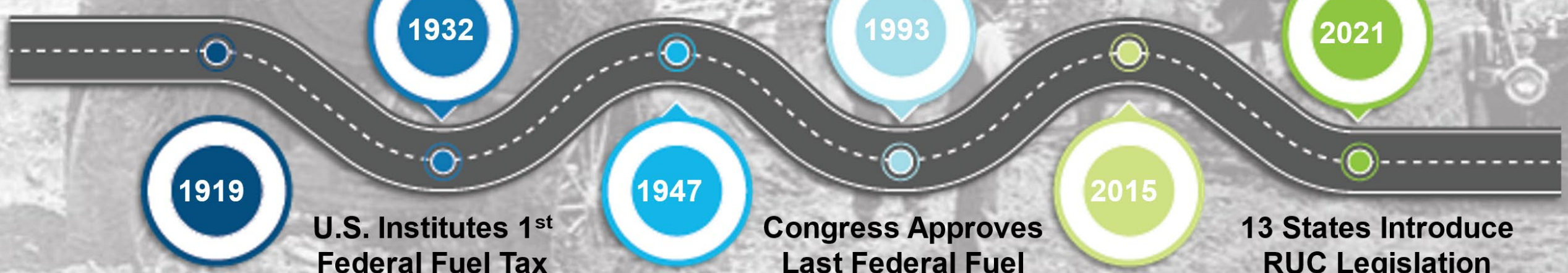
There Are Many Different Paths States Have Taken Towards Implementing RUC



Source: The Eastern Transportation Coalition

crp.trb.org/nchrpwebresource2

Our transportation funding system is old. *Really* old.



1919 — Oregon Introduces 1st State Fuel Tax in U.S.

1932 — U.S. Institutes 1st Federal Fuel Tax

1947 — Oregon Levies 1st Weight-Mile Tax

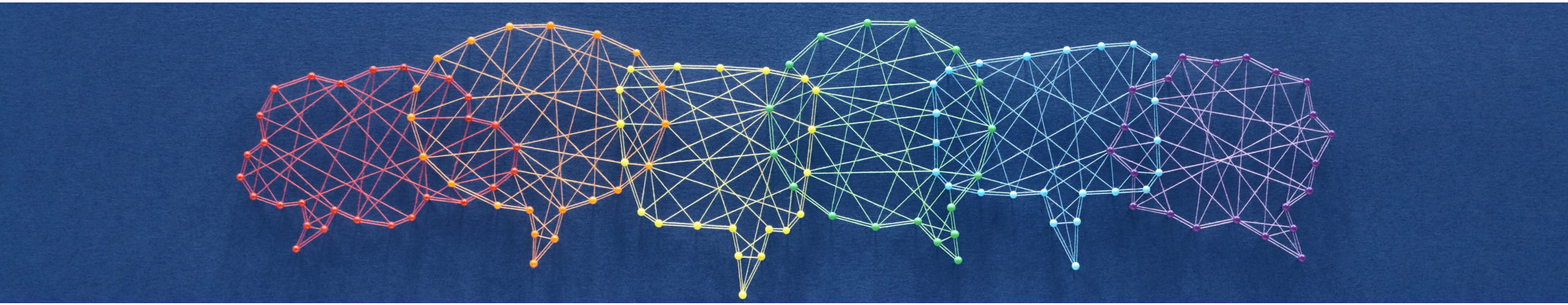
1993 — Congress Approves Last Federal Fuel Tax Increase

2015 — Oregon Begins Nation's 1st RUC Program

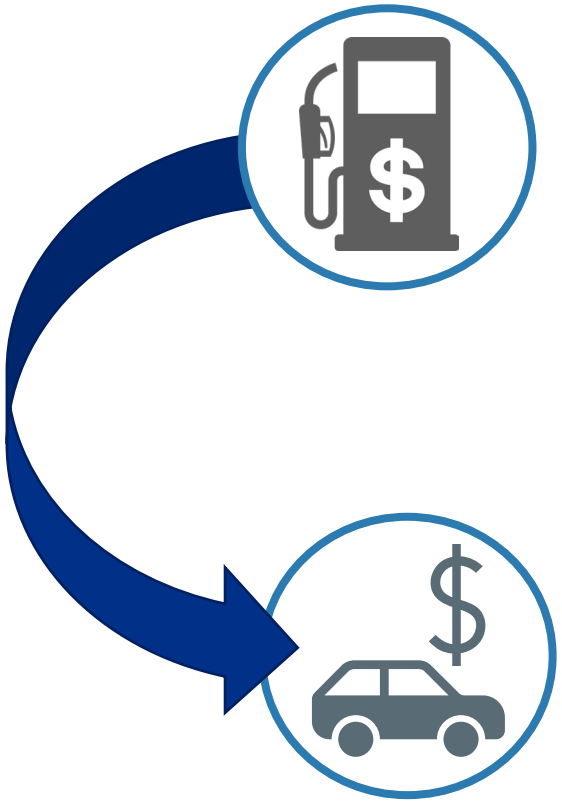
2021 — 13 States Introduce RUC Legislation

If you're looking to progress RUC in your state!

- Outreach to the public
- Prep for briefings with elected officials
- Others within your agency or in partner agencies
- Engage with stakeholders



NCHRP RUC Guide Project Purpose



To evaluate and present viable paths and **strategies for implementing RUC** at the state, multi-state, and regional levels that generate revenues that could supplement and/or replace motor fuel taxes as the primary funding source for surface transportation.

How It All Came Together

Problem statements vetted
and approved by AASHTO, FHWA, and NCHRP

Feedback & Guidance loop

NCHRP was the convener/administrator

CDM Smith conducted the research
and developed the WebResource over the past two years

Panel of volunteer RUC practitioners
from multiple disciplines guided the research
ODOT (Chair), AASHTO, ATRI, Compass Transportation and Technology, FHWA, MnDOT, MoDOT, SEPTA, TETC, VDOT, WSTC

NATIONAL ACADEMIES Sciences Engineering Medicine

TRB TRANSPORTATION RESEARCH BOARD

Staff

- **Dianne Schwager**, CRP Project Officer, TRB
- **Dajaih Bias-Johnson**, Program Assistant NAS

FHWA Liaison

- **Ben Hawkinson**

AASHTO Liaison

- **Susan Howard**

Panelist Assistant

- **Roberto Coto**, Oregon DOT

Panel Members

- **Maureen Bock**, Oregon DOT, Chair
- **Kenneth Buckeye**, Minnesota DOT
- **Ronique Day**, Commonwealth of Virginia
- **Reema Griffith**, Washington State Transportation Commission
- **Patricia G. Hendren**, The Eastern Transportation Coalition
- **Richard "Dick" Mudge**, Compass Transportation and Technology, Inc.
- **Elizabeth Prestwood**, Missouri DOT
- **Jeffrey Bradford Short**, American Transportation Research Institute
- **Emily Addis**, Southeastern Pennsylvania Transportation Authority

crp.trb.org/nchrpwebresource2

Research and WebResource Development completed by:

CDM Smith®

ei enviroissues

RUC Guide Intro

Steven Marfitano

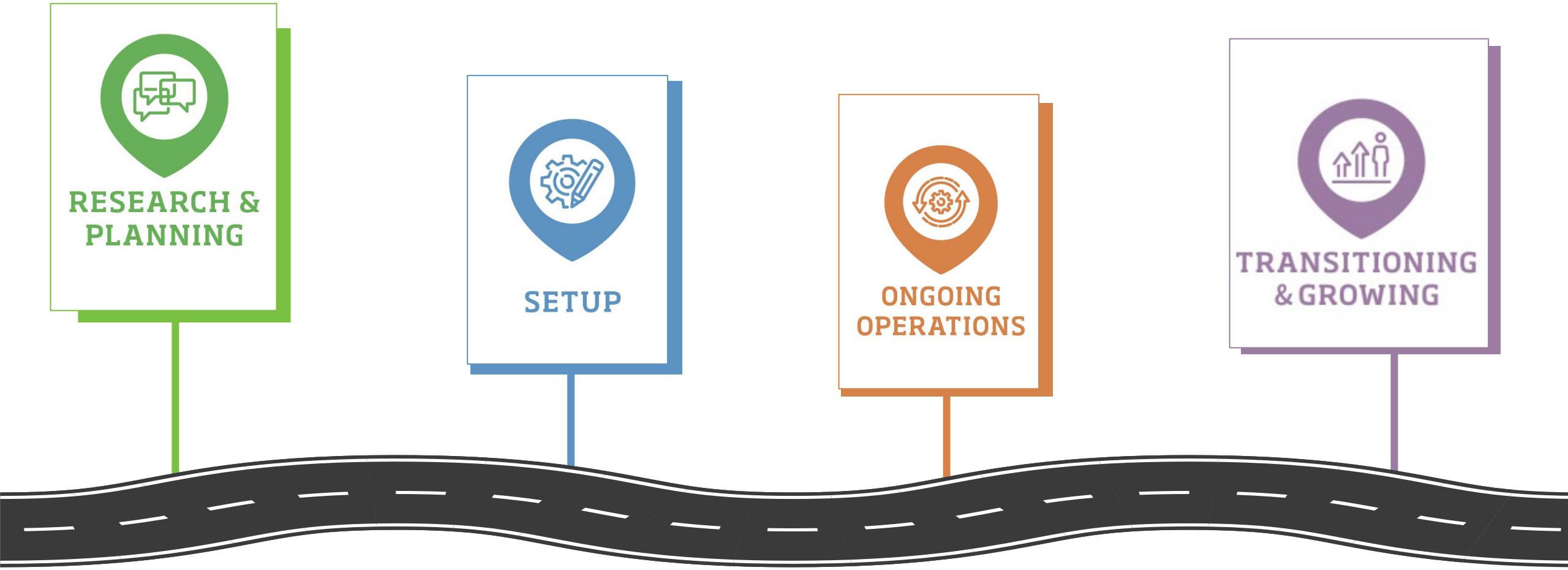
Why is it important?

- First-ever digital RUC Resource Guide for states and other interested agencies, policymakers, and RUC practitioners!
- Most comprehensive guide to date
- Research, benefits, answers to initial questions – available in one, easy-to-use digital guide!
- Provides building blocks that will help inform next steps and decisions

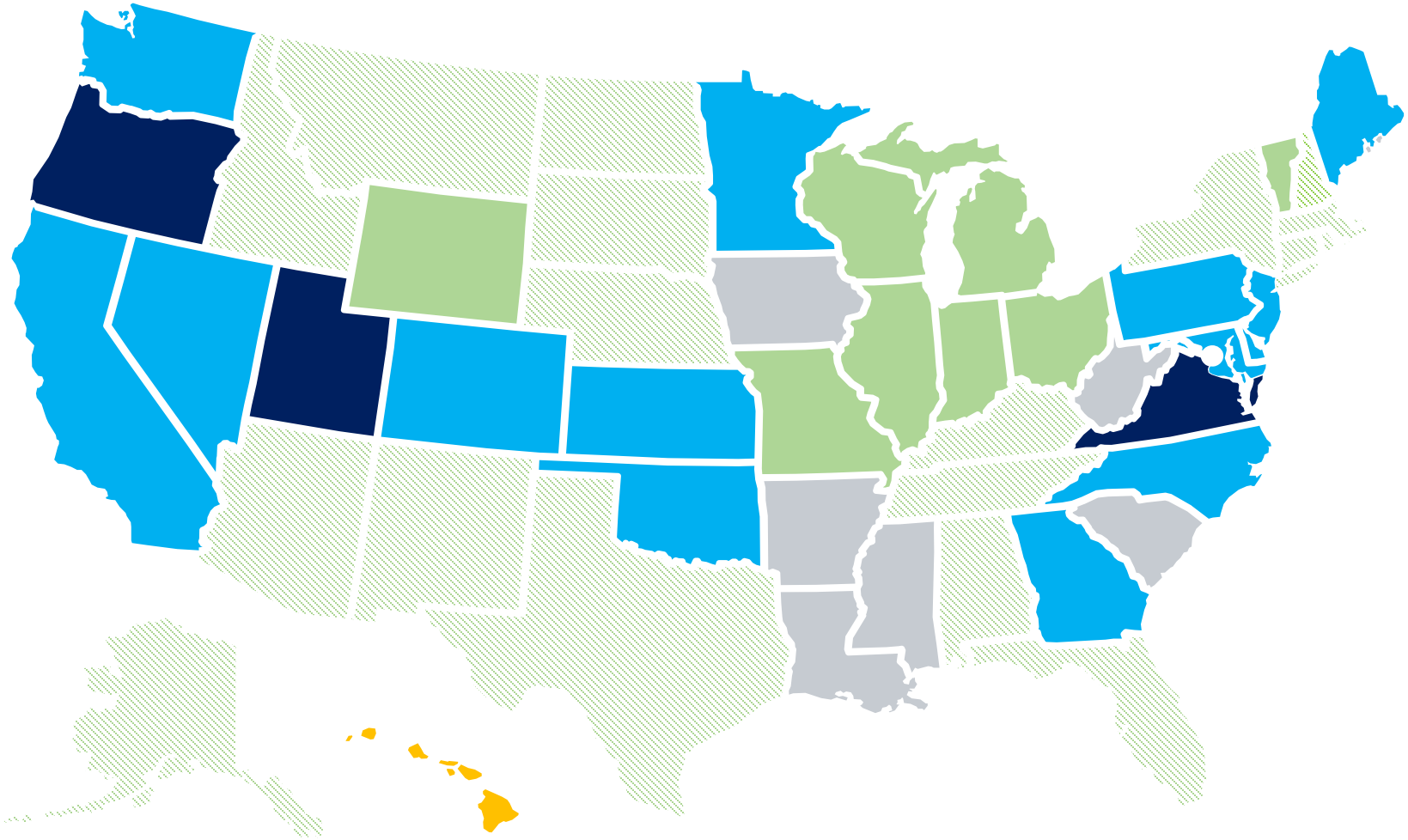
Scan the QR code!

crp.trb.org/nchrpwebresource2

The RUC Guide Provides Resources for Every Stage of Development



State RUC Development Status



Research and Planning

Multi-state Research Participants

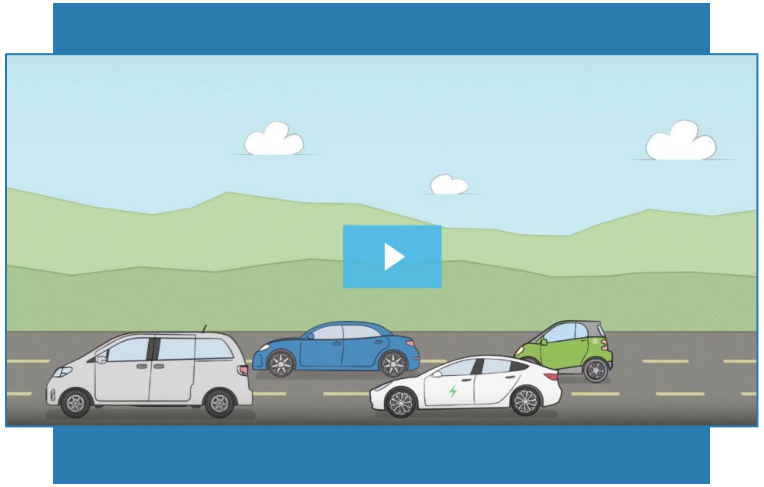
Pilot Conducted

Setup

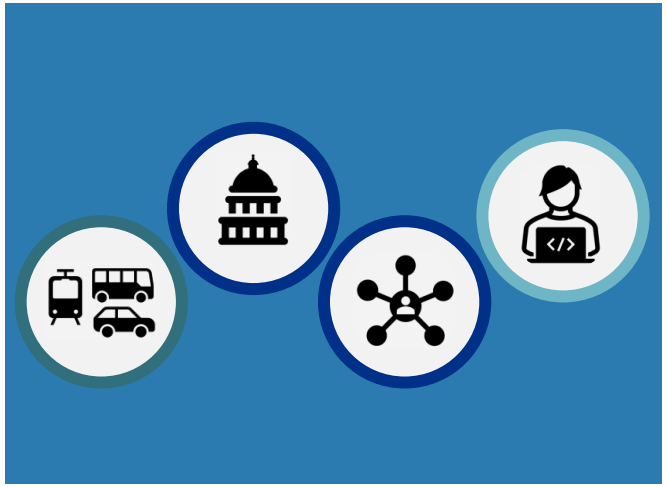
Ongoing Operations / Transitioning & Growing

Updated: February 7, 2024

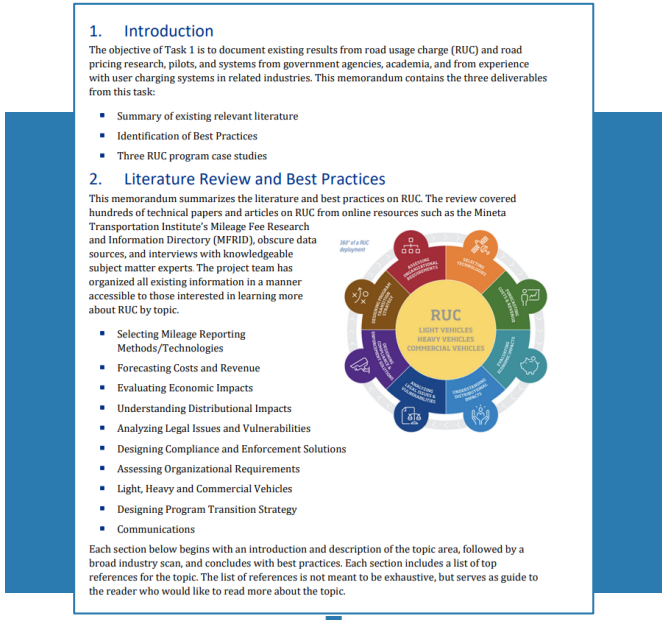
Key Features of the RUC Guide



Videos and other communication collateral



Resources tailored for various categories of practitioners



1. Introduction

The objective of Task 1 is to document existing results from road usage charge (RUC) and road pricing research, pilots, and systems from government agencies, academia, and from experience with user charging systems in related industries. This memorandum contains the three deliverables from this task:

- Summary of existing relevant literature
- Identification of Best Practices
- Three RUC program case studies

2. Literature Review and Best Practices

This memorandum summarizes the literature and best practices on RUC. The review covered hundreds of technical papers and articles on RUC from online resources such as the Mineta Transportation Institute's Mileage Fee Research and Information Directory (MFRID), obscure data sources, and interviews with knowledgeable subject matter experts. The project team has organized all existing information in a manner accessible to those interested in learning more about RUC by topic.

- Selecting Mileage Reporting Methods/Technologies
- Forecasting Costs and Revenue
- Evaluating Economic Impacts
- Understanding Distributional Impacts
- Analyzing Legal Issues and Vulnerabilities
- Designing Compliance and Enforcement Solutions
- Assessing Organizational Requirements
- Light, Heavy and Commercial Vehicles
- Designing Program Transition Strategy
- Communications

Each section below begins with an introduction and description of the topic area, followed by a broad industry scan, and concludes with best practices. Each section includes a list of top references for the topic. The list of references is not meant to be exhaustive, but serves as guide to the reader who would like to read more about the topic.

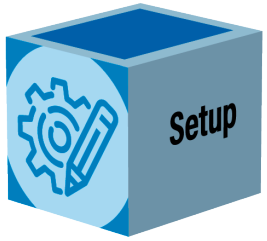
71 building blocks and related technical memos, activities, and other research

RUC Stages and Building Blocks

71 building blocks for every stage of your journey

Stage 1: Research & Planning

- Research Policy & Politics
  1 2 3 4 5 6 7 8
- Stakeholder & Public Engagement
  9
- Study Organizational Structure & Readiness
  10 11
- Demonstrate Possible Approaches
  12 13 14 15 16
- Support Official Policy and Legislation Developmt
  17 18



Stage 2: Setup

- Analyze Authoring Legislation
  19 20 21
- Administrative Rules & Activities
  22 23 24 25
- System Design
  26 27 28 29 30 31 32 33 34
- Vendor Procurement
  35 36 37
- System Implementation & Testing
  38 39
- Organizational Design & Staffing
  40 41 42 43 44
- System Launch
  45 46

Stage 3: Ongoing Operations

- Live Operations
  47 48 49 50
- Live Reporting, Evaluation, & Audit
  51 52 53 54 55
- Live Enforcement
  56 57 58

Stage 4: Transitioning & Growing

- Transition Strategy Development
  59 60 61
- Transition Strategy Execution & Optimization
  62 63 64 65 66
- Ongoing System Innovation
  67 68
- Collaboration with Other Jurisdictions
  69 70 71

RUC Stages and Building Blocks

71 building blocks for every stage of your journey

Stage 1: Research & Planning

- Research Policy & Politics: 1 2 3 4 5 6 7 8
- Stakeholder & Public Engagement: 9
- Study Organizational Structure & Readiness: 10 11
- Demonstrate Possible Approaches: 12 13 14 15 16
- Support Official Policy and Legislation Development: 17 18

Within each stage, building blocks are key components of building and making RUC policies and systems.

Building Block Components

RESEARCH AND PLANNING | SETUP | ONGOING OPERATIONS | TRANSITIONING AND GROWING

Customer Service Setup (31)

Description:

Before launching a RUC program, the state should set up the customer service center and train staff so customer service can be offered on Day One. This process involves physically setting up the customer service center according to the specifications as well as training staff to respond according to the content developed during the *Customer Service Standard Operating Procedures and Frequently Asked Questions* building block. Customer service can be provided in-house by state staff, or outsourced by a third-party customer service company or through a RUC vendor.

Details:

The state or vendor chooses a customer service provider or performs the customer service in-house. The customer service system is physically set up, and all customer service representatives are trained on the standard operating procedures and frequently asked questions (FAQs). The system needs to be thoroughly tested before it goes live.

Primary Use:

Carry out customer service specifications and train staff so customer service staff are ready on Day One.

Best Practices/Lessons Learned:

- In-house customer service provides closer oversight of content, but it is generally more expensive to operate than outsourced customer service.
- Whether customer service is provided in-house or outsourced, testing is vitally important to ensure customer service representatives are trained correctly on standard operating procedures and FAQs. Testing generally involves contacting customer service through various channels to see whether the customer service representatives respond appropriately.
- RUC may not be the only service that customer service representatives support. They may handle multiple different services if their supporting system can facilitate this.
- Ideally, formal customer service is offered during end-to-end testing to test customer service and to train staff or test staff.
- Real, formally operational customer service must be offered during a small-scale operational trial because it is a vital part of the end-user experience.
- Customer service engagement tends to be greatest at the start of a program, so prepare for heavier loads in the first days and months.

State Government Context and Assumptions:

The implementing RUC agency and/or vendor, depending on who will be operating the customer service center, will complete this task. Preparation must be finished so that customer service is operational in time for small-scale operational trial testing; ideally, customer service should be ready in time for end-to-end testing.

Each includes a:

- Description
- Details
- Primary Use
- Best practices/ lessons learned
- State government context and assumptions

Building Blocks Use by State

RESEARCH AND PLANNING	SETUP	ONGOING OPERATIONS	TRANSITIONING & GROWING
1 2 3 4 5 6	19 20 21 22 23 24 25 26	47 48 49 50	59 60 61 62 63 64 65
7 8 9 10 11 12	27 28 29 30 31 32 33 34	51 52 53 54	66 67 68 69 70 71
13 14 15 16 17 18	35 36 37 38 39 40 41 42	55 56 57 58	
	43 44 45 46		

RESEARCH AND PLANNING	SETUP	ONGOING OPERATIONS	TRANSITIONING & GROWING
1 2 3 4 5 6	19 20 21 22 23 24 25 26	47 48 49 50	59 60 61 62 63 64 65
7 8 9 10 11 12	27 28 29 30 31 32 33 34	51 52 53 54	66 67 68 69 70 71
13 14 15 16 17 18	35 36 37 38 39 40 41 42	55 56 57 58	
	43 44 45 46		

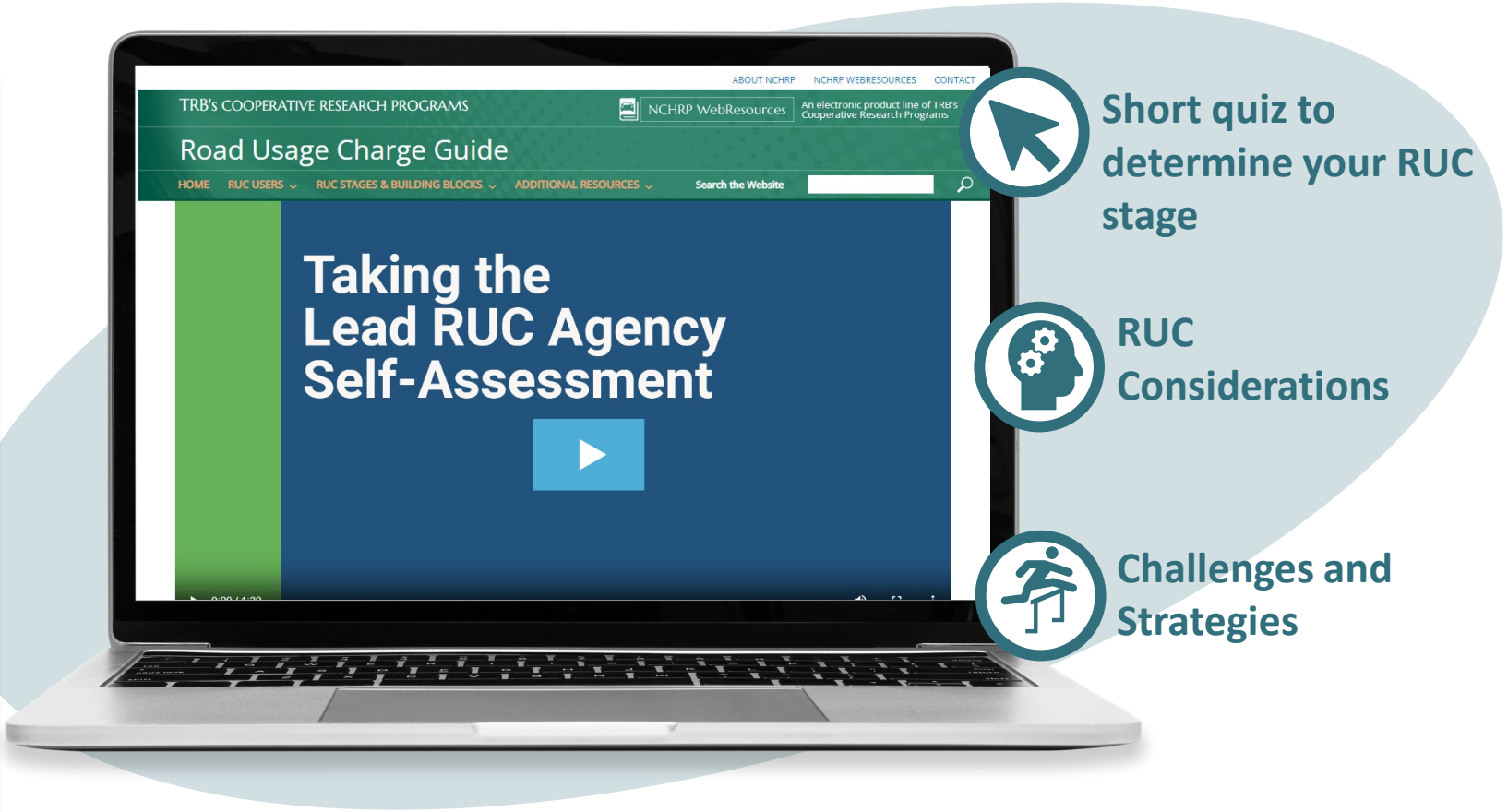
Building Block Activity: None to light — More substantial — Most substantial

Who Should Use the RUC Guide?

The WebResource is customized for different users:

Lead RUC Agencies

- State DOTs
- State Transportation Commissions
- MPOs and Regional Transportation Organizations
- Motor Vehicle Administrators



Short quiz to determine your RUC stage

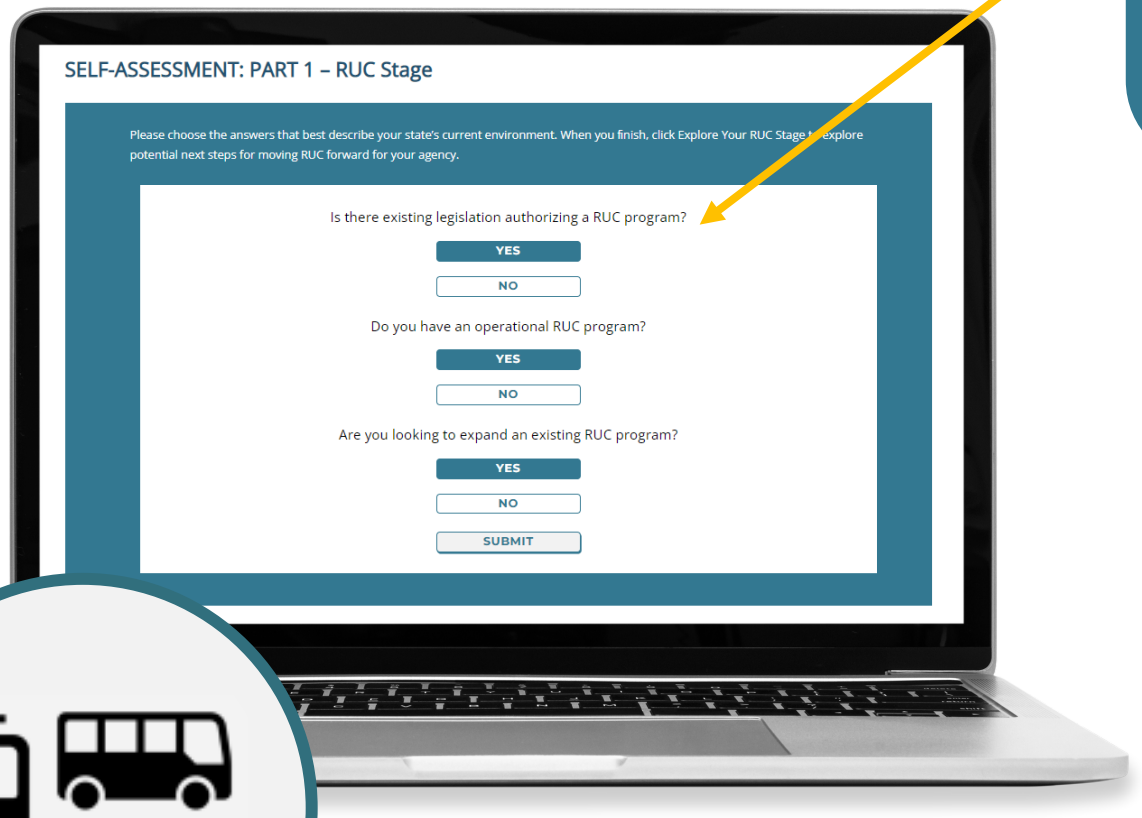
RUC Considerations

Challenges and Strategies

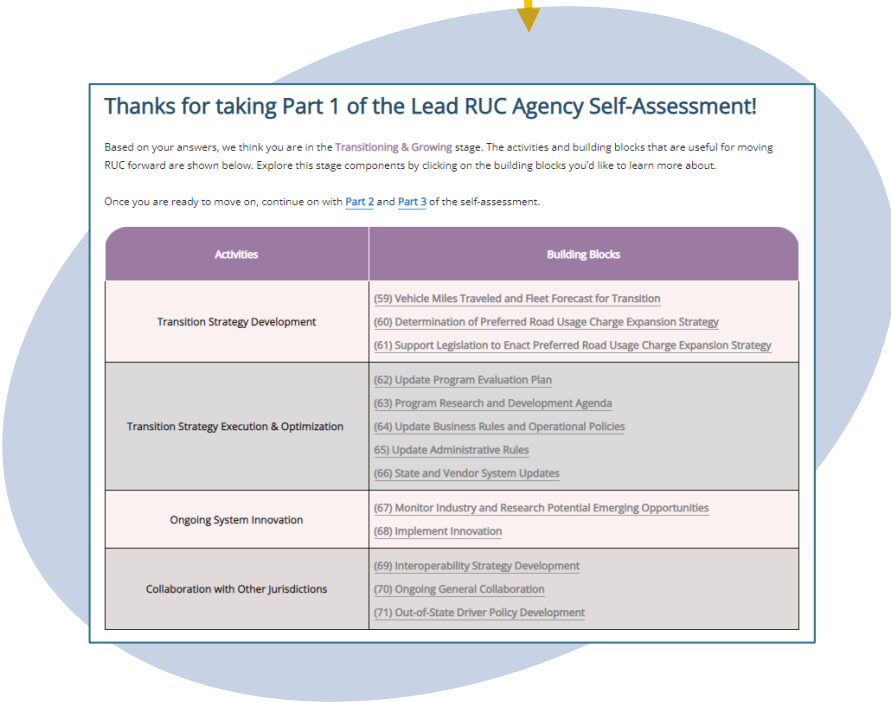
Self-Assessment Part 1 Assessing RUC Stage

Yes/no questions about current state of RUC:

- Legislation?
- Operational RUC program?
- Looking to expand?



Results identify RUC stage and key building blocks



Thanks for taking Part 1 of the Lead RUC Agency Self-Assessment!

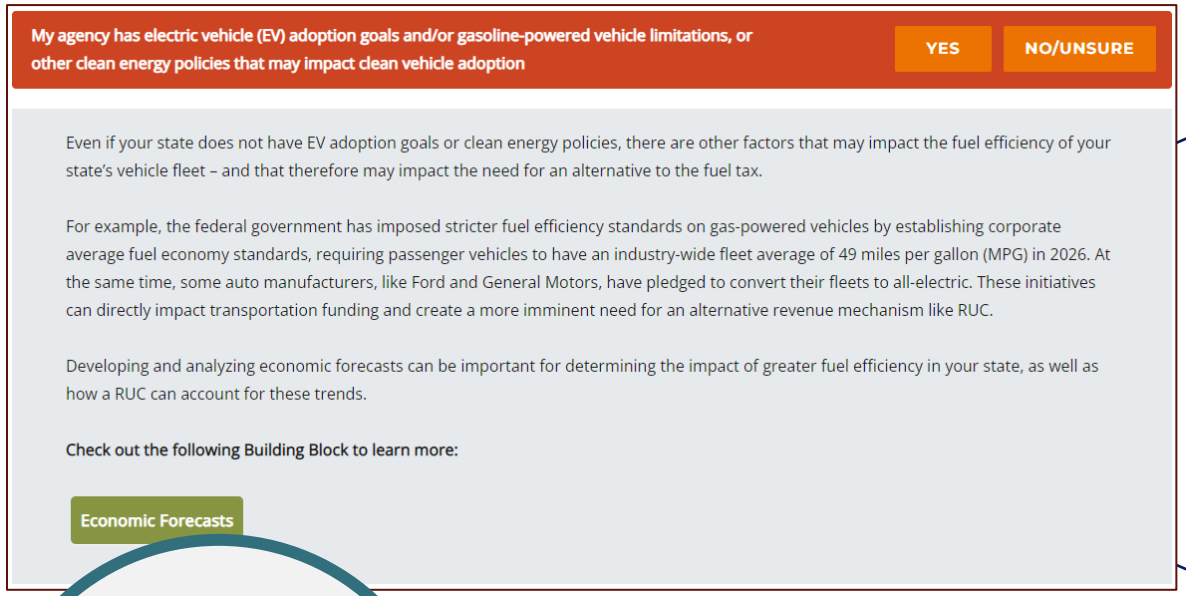
Based on your answers, we think you are in the Transitioning & Growing stage. The activities and building blocks that are useful for moving RUC forward are shown below. Explore this stage components by clicking on the building blocks you'd like to learn more about.

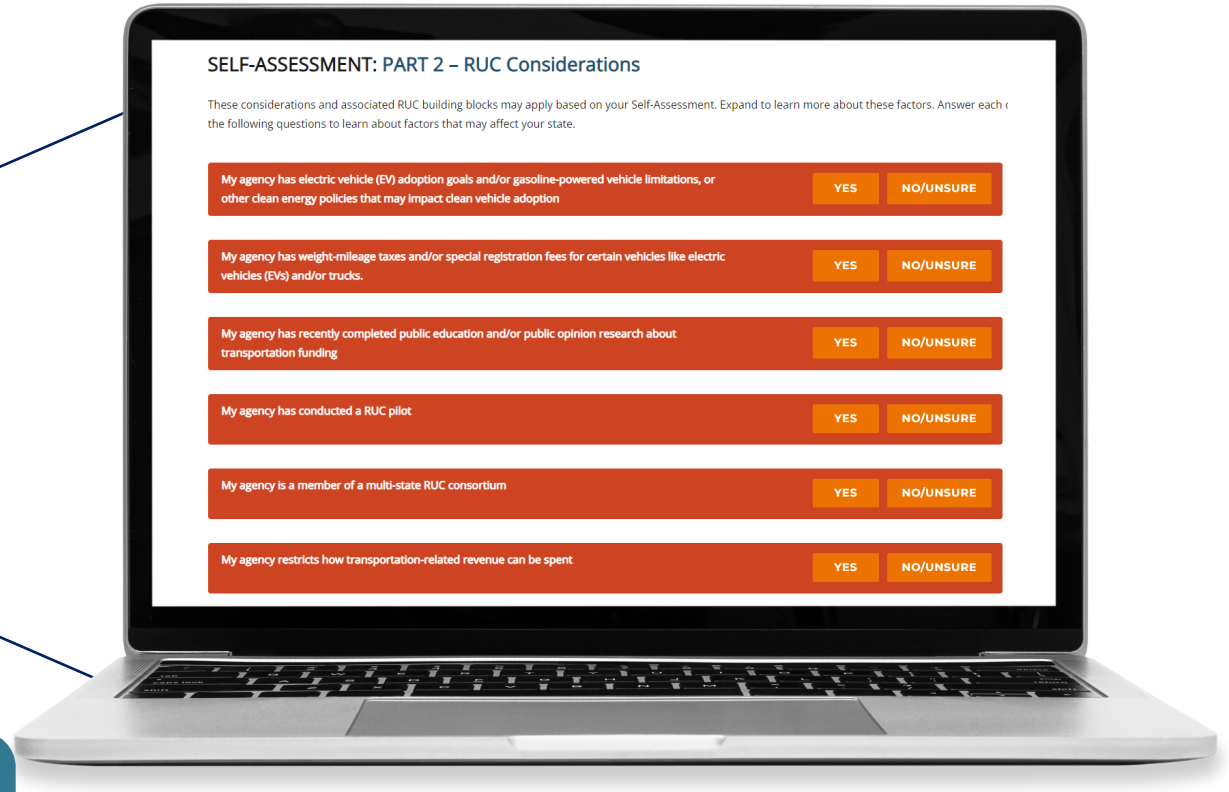
Once you are ready to move on, continue on with Part 2 and Part 3 of the self-assessment.

Activities	Building Blocks
Transition Strategy Development	(59) Vehicle Miles Traveled and Fleet Forecast for Transition (60) Determination of Preferred Road Usage Charge Expansion Strategy (61) Support Legislation to Enact Preferred Road Usage Charge Expansion Strategy
Transition Strategy Execution & Optimization	(62) Update Program Evaluation Plan (63) Program Research and Development Agenda (64) Update Business Rules and Operational Policies 65) Update Administrative Rules (66) State and Vendor System Updates
Ongoing System Innovation	(67) Monitor Industry and Research Potential Emerging Opportunities (68) Implement Innovation
Collaboration with Other Jurisdictions	(69) Interoperability Strategy Development (70) Ongoing General Collaboration (71) Out-of-State Driver Policy Development

Self-Assessment Part 2 RUC Considerations

Yes or no/unsure questions around key RUC-related considerations





Results provide detailed information and guidance on specific building blocks

RUC Guide User Types

Communications Professionals

- Agency communicators
- Consultant communications staff
- Legislative communicators
- Policy communicators

Transportation Professionals

- Researchers
- Agency staff
- Consultants
- Other professionals

Policymakers

- Legislators
- Legislative staff
- Agency support staff

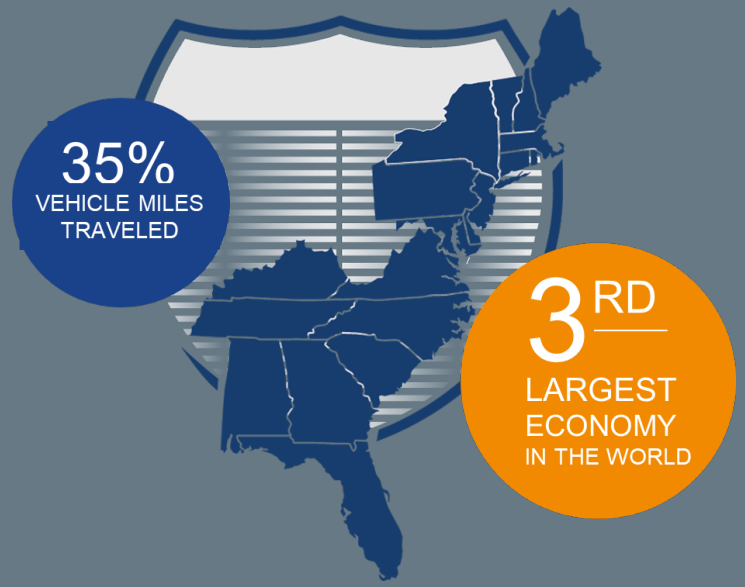
User Perspective

Trish Hendren

Who is the Eastern Transportation Coalition

18 States + D.C.

and 200+ agencies



MBUF Work

10 Passenger Vehicle Pilots*

*5 general public and 4 stakeholder

3 Commercial Vehicle Pilots

2,700+ Passenger Vehicles

14 States Represented Among Participants

3,000+ Public Opinion Survey Respondents

500+ Commercial Trucks

19M Miles traveled

48 States Traveled + Canada

Participant Surveys, Focus Groups, Interviews	Geographic & Socioeconomic Equity Analysis	Tolling, Congestion Mitigation & Rate-Setting Studies	Motor Carrier Working Group

RESEARCH & PLANNING

So you're ready to do a pilot...

— Find relevant research & planning building blocks

Activities	Building Blocks
Demonstrate Possible Approaches	(12) Analysis and Prioritization of Mileage Reporting Methods (13) Analysis of Multijurisdictional Approaches (14) Pilot Design and Development (15) Pilot Execution (16) Pilot Evaluation

RESEARCH AND PLANNING | SETUP | ONGOING OPERATIONS | TRANSITIONING AND GROWING

Pilot Design and Development (14)

Description:

If a state opts to conduct a pilot, clear objectives should be set. Primary pilot goals may include educating the public and soliciting their feedback about RUC, testing policy elements, or testing new technical or operational approaches. After objectives are set, a high-level design of the pilot should be created based on the policy vision, pilot goals, and prioritized mileage reporting methods. If commercial motor carriers are included in the RUC system plans, they also should be included in the pilot. Commercial motor carrier education, communications, and mileage reporting methods likely require separate planning from noncommercial vehicles given the different regulatory operating environments.

Next, develop pilot specification documents that are based on the high-level pilot design, and follow standard systems engineering practice. This includes developing multiple procedures and documents, such as a concept of operations, system requirement specification, an interface control document, and business rules. Finally, develop formal test plans to verify that the system operates according to the specifications. Tests generally include unit tests, integration tests, end-to-end (system acceptance) tests, and user interface testing via a small-scale operational trial before the pilot launch.

Details:

Set high-level goals and objectives for the pilot and then select key pilot parameters, including the following:

- Number of commercial account managers or pilot operators
- Number and composition of participants
- Pilot duration
- Special technical/operational approaches to test
- Number of public surveys and/or focus groups to be conducted

After setting the goals and objectives, develop system specification documents. The first such document is the concept of operations, which uses nontechnical language to set the project context, identify stakeholders, and provide a conceptual design, high-level system architecture, and expected use cases.

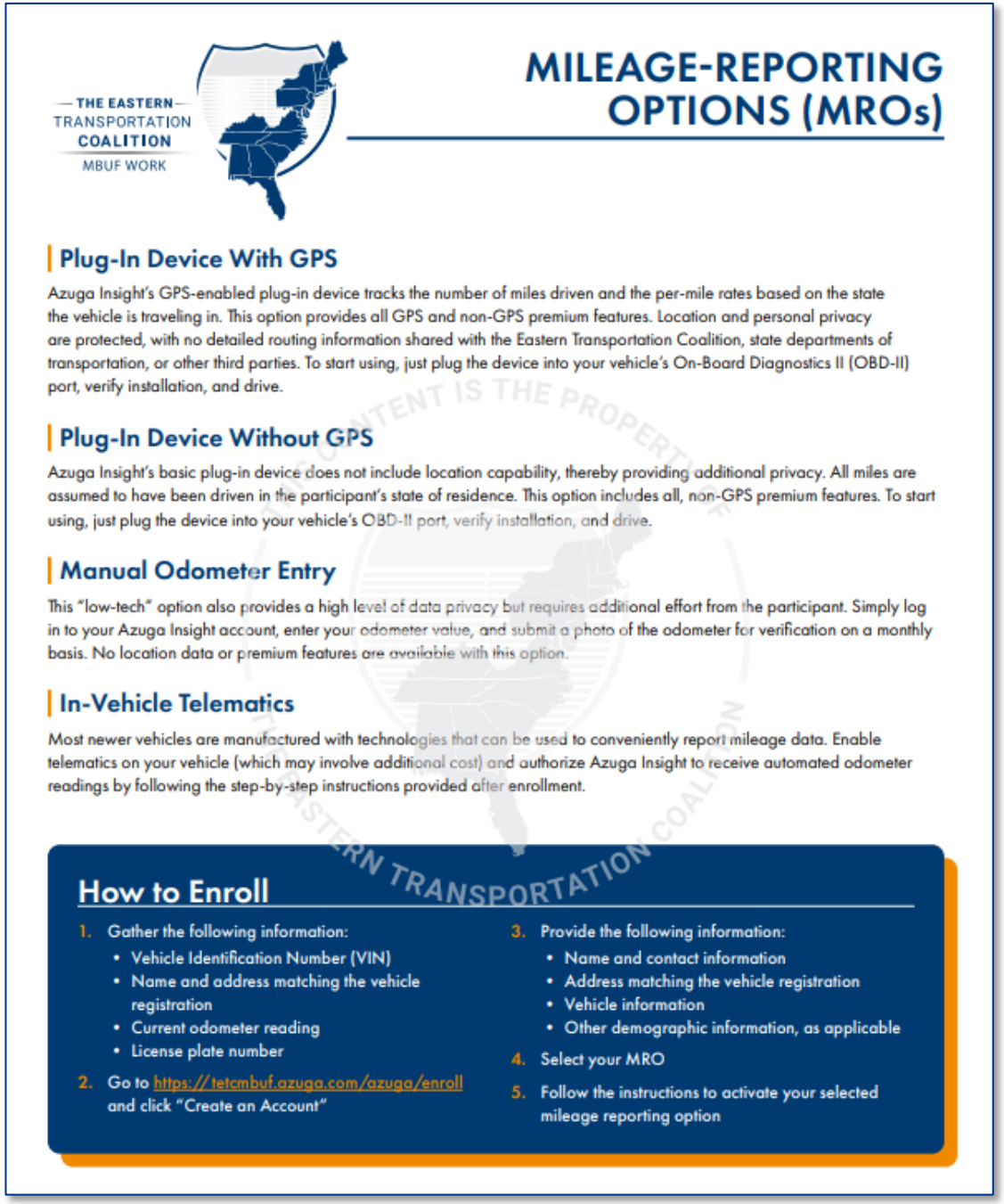
When the concept of operations is complete, develop the following documents:

- *System requirement specification.* This document refers to the technical requirements outlining what the system should do—not how the system should do it—and describes the minimum performance of the system.
- *Interface control document.* This document details the interfaces between systems.
- *Business rules document.* This document details the business rules for the system, including handling of money (real or simulated), customer service, rules for enrollment, and statements.

RESEARCH & PLANNING

So you're ready to do a pilot...

- Find relevant research & planning building blocks
- Look for communications resources for pilot materials



THE EASTERN TRANSPORTATION COALITION
MBUF WORK

MILEAGE-REPORTING OPTIONS (MROs)

Plug-In Device With GPS

Azuga Insight's GPS-enabled plug-in device tracks the number of miles driven and the per-mile rates based on the state the vehicle is traveling in. This option provides all GPS and non-GPS premium features. Location and personal privacy are protected, with no detailed routing information shared with the Eastern Transportation Coalition, state departments of transportation, or other third parties. To start using, just plug the device into your vehicle's On-Board Diagnostics II (OBD-II) port, verify installation, and drive.

Plug-In Device Without GPS

Azuga Insight's basic plug-in device does not include location capability, thereby providing additional privacy. All miles are assumed to have been driven in the participant's state of residence. This option includes all, non-GPS premium features. To start using, just plug the device into your vehicle's OBD-II port, verify installation, and drive.

Manual Odometer Entry

This "low-tech" option also provides a high level of data privacy but requires additional effort from the participant. Simply log in to your Azuga Insight account, enter your odometer value, and submit a photo of the odometer for verification on a monthly basis. No location data or premium features are available with this option.

In-Vehicle Telematics

Most newer vehicles are manufactured with technologies that can be used to conveniently report mileage data. Enable telematics on your vehicle (which may involve additional cost) and authorize Azuga Insight to receive automated odometer readings by following the step-by-step instructions provided after enrollment.

How to Enroll

1. Gather the following information:
   - Vehicle Identification Number (VIN)
   - Name and address matching the vehicle registration
   - Current odometer reading
   - License plate number
2. Go to https://tetcmbuf.azuga.com/azuga/enroll and click "Create an Account"
3. Provide the following information:
   - Name and contact information
   - Address matching the vehicle registration
   - Vehicle information
   - Other demographic information, as applicable
4. Select your MRO
5. Follow the instructions to activate your selected mileage reporting option

RESEARCH & PLANNING

So you're ready to do a pilot...

- Find relevant research & planning building blocks
- Look for communications resources for pilot materials
- Review strategies for common challenges

User Experience

As the gas tax is paid at the pump during each fill-up and is not generally shown as a separate line item on signs or receipts, it is "invisible" to many drivers. A RUC, on the other hand, requires some action by drivers to report mileage and pay mileage fees. New requirements that are too burdensome may hinder the acceptance of RUC and potentially decrease compliance.

Strategy 1: Consider the user experience when selecting a mileage reporting method.

Mileage reporting provides the most direct contact between the RUC payer and the RUC system, so it constitutes a significant portion of the RUC payer's user experience. A good user experience with a technology is vital for success. When the user experience is not polished, users may oppose or choose not to participate in RUC programs. To improve the user experience, online interfaces should be smooth, and setting up a RUC technology should take as few steps as possible.

- Phase: Setup
- Activity: System Design (State and Vendor)
- Refer to the following building blocks:

Customer Service Setup | Customer Service Requirements

Example: New Jersey 2022 Pilot

Pilot Objective:

Move MBUF exploration forward by engaging the general public and additional stakeholders

865

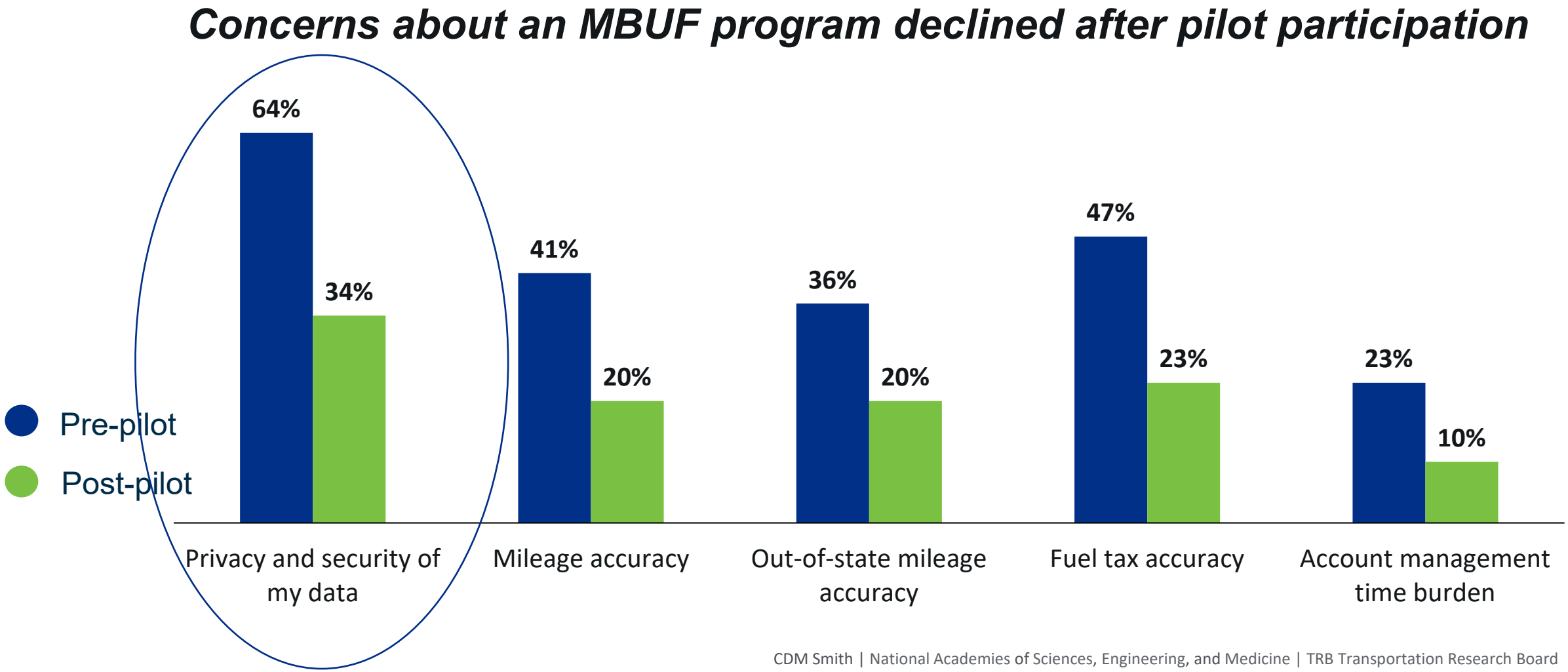
82% Gasoline
9% Hybrid / PHEV
8% EV
1% Diesel

4-month pilot: August – November 2022

53% Plug-in **with** GPS
23% Plug-in
21% Manual
3% In-vehicle telematics

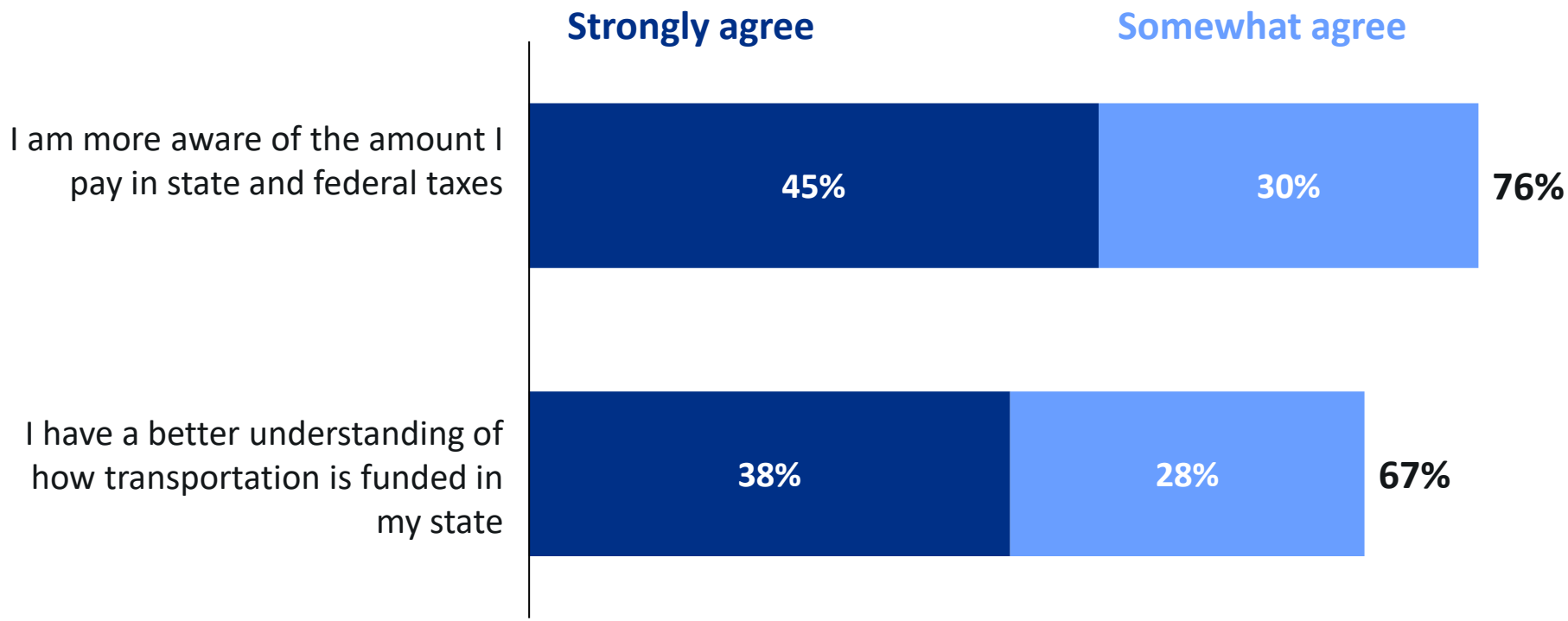
Evaluation: Data Analysis, Participant Surveys, Focus Group

Example: 2022 New Jersey Pilot (cont.)



Example: 2022 New Jersey Pilot (cont.)

NJ pilot participants say they are **more aware** of how much they pay in fuel taxes, how **transportation is funded**, and how many **miles they drive** as a result of participating in the pilot.



SETUP

So your state just passed enabling RUC legislation…

Find relevant setup building blocks

Activities	Building Blocks
Vendor Procurement	(35) Determine Use of Account Manager and Vendor Procurement Strategy (36) Initiate Certification Structure (37) Vendor Procurement
System Implementation and Testing	(38) Technical Specification Documents (39) System Buildout (40) Test Plan and Scripts (41) Test Execution and Analysis
Organizational Design and Staffing	(42) Develop Initial Organizational Design (43) Staff Assignment and Hiring (44) Staff Training
System Launch	(45) System Launch Plans and Execution (46) Post-Launch Status Reports

RESEARCH AND PLANNING | SETUP | ONGOING OPERATIONS | TRANSITIONING AND GROWING

Determine Use of Account Manager and Vendor Procurement Strategy (35)

Description:

During the setup of a RUC program, the state formally determines whether and how account management vendors will be used and how the state will procure them for that use. The state may elect for a fully state-run RUC program, opt to fully contract services out, or settle on a hybrid approach.

In a fully state-run program, the state formally decides what mileage reporting methods the account manager(s) will support, and how many there will be. In a fully contracted program, the state determines whether it will use in-house procurement using traditional requests for proposals (RFPs); direct payment to vendor(s); or a market-type competition among multiple vendors, such as a managed market (subsidized competition among vendors) or an open market (open competition, but vendors have the right to decline enrollees if they do not meet certain qualifications).

After the market structure has been decided, the state determines its precise approach to vendor procurement. The strategy must comply with the new RUC-enabling legislation and all relevant existing laws. The strategy includes the plans to advertise the RFP; the approximate vendor budget; the expected duration of the contract, including any possible renewals; the terms and conditions of the contract; and the schedule of procurement.

Details:

Manual methods, such as safety inspection-based reporting or odometer image capture, lend themselves to in-house procurement. More sophisticated technology methods, like the use of On-Board Diagnostic II plug-in devices, have proven to be better supported by private vendors. For smaller systems with fewer than 100,000 vehicles, having a single vendor may make sense. Larger systems involving hundreds of thousands of vehicles may allow competition among vendors. Competition should encourage better service and lower costs, and prevent any vendor from being locked in. A state procurement officer should assist the project team in setting up the procurement. Performing a standard procurement of one vendor may involve a relatively standard state procurement process. Performing a market procurement will require much more work, including setting up a certification methodology (see *Initiate Certification Structure* building block).

Primary Uses:

Plan to use account managers in the state's RUC market and prepare a strategy for system procurement.

Best Practices/Lessons Learned:

- The use of account managers can evolve as the program expands. The program can use traditional procurement at the start and evolve to market procurement when the program exceeds some number of participants.

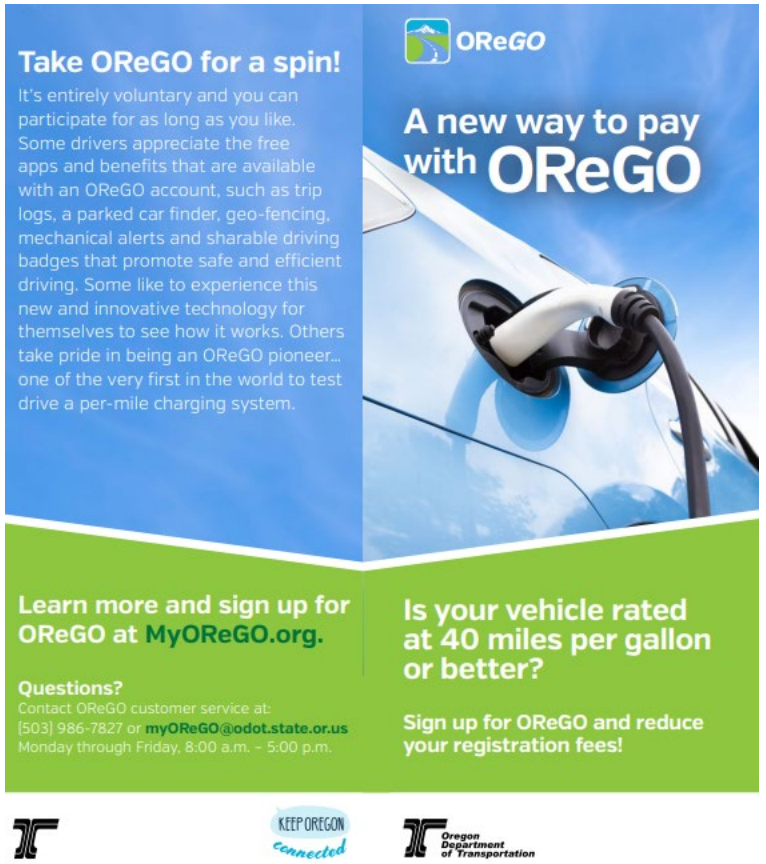
SETUP

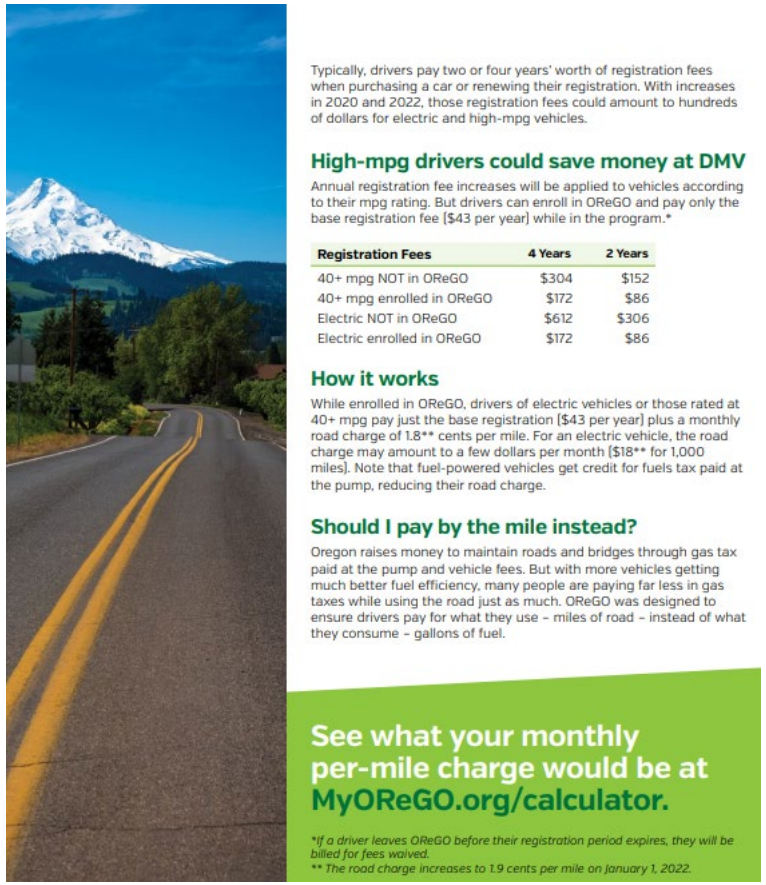
So your state just passed enabling RUC legislation…

- Find relevant setup building building blocks
- Find communications resources for program setup

OReGO - Keep Oregon Connected

OregonDOT
10.5K subscribers
Subscribe
10
Share





SETUP

So your state just passed enabling RUC legislation…

- Find relevant setup building blocks
- Find communications resources for program setup
- Identify strategies for challenges related to program set up

Rate Setting

Rate setting is a policy choice with many impacts to consider, including differential impacts on population groups by geography and demographics, total net revenue, and ability to keep pace with costs.

Rate setting also impacts the cost of administration in several ways. First, rate setting determines total revenue, which serves as the denominator for the popular but often misleading "cost as a percent of revenue" metric. The lower the raw cost, the lower the cost as a percent of revenue. Likewise, the higher the revenue, the lower the cost as a percent of revenue. Raising the rate of a RUC automatically reduces the cost as a percent of revenue. Because of the high variability in revenue targets and rates across tax and fee mechanisms, and across geographic areas, this metric must be used cautiously.

Secondly, the type of rate setting impacts the complexity of the accounting system used to assess RUC charges. For example, the simplest possible configuration is to set a flat rate per mile for all miles driven for passenger vehicles. Assessing this type of charge requires one number per vehicle per reporting period: the number of miles driven. As with the weight tax, one charge rate is multiplied by one number (miles driven) to produce the charges due. More complex rate structures could require or allow charging miles differently by location driven. This would necessarily require measuring miles by location, which increases the cost of mileage measurement technology.

Third, rate structures that introduce complexity often require additional customer service to explain, including additional up-front information presented in numerous formats to allow for ease of understanding and an increased likelihood of initial compliance. Variable rates by vehicle type, for example, may invite customer inquiries about their individual circumstances. However, complexity can also preserve or improve equity and fairness, so these factors must be balanced against complexity.

Strategy 1: Establish a RUC rate that is revenue-neutral with the gas tax for a select portion of vehicles. +

Strategy 2: Use a single RUC rate for all passenger vehicles for ease of administration and public acceptance. –

Rates that vary by other factors, such as time and location, require location-based technology. This could be perceived as intrusive or conflated with congestion pricing, which tends to initially be a more controversial policy. Congestion pricing is typically enacted at the metropolitan level rather than the state level.

- Phase: Setup
- Activity: Administrative Rules and Activities
- Refer to the following building block:

Rate Calculation

Example: Virginia Mileage Choice Program

Voluntary RUC program in lieu of highway use fee (fee cap)

2020: SB 890 established highway use fee and RUC program

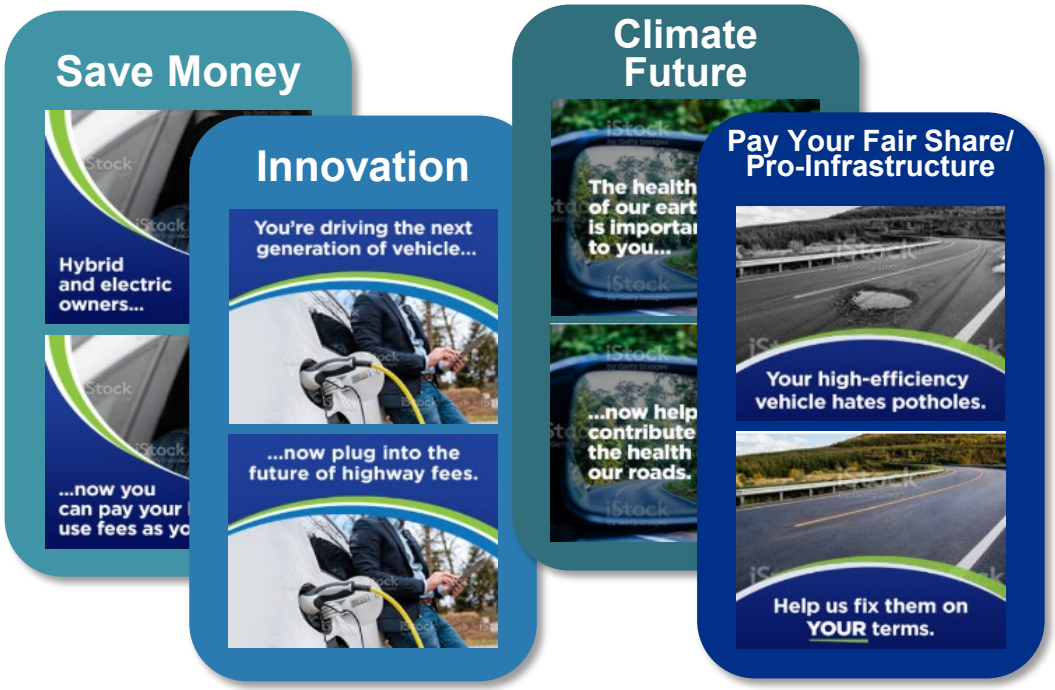
July 1, 2022: Mileage Choice Program Launches

December 2023: 22,000 vehicles enrolled (largest RUC program in U.S.)

Eligible Vehicles:

- Electric Vehicles
- Passenger vehicles > 25 mpg

Outreach campaign helped enrollment

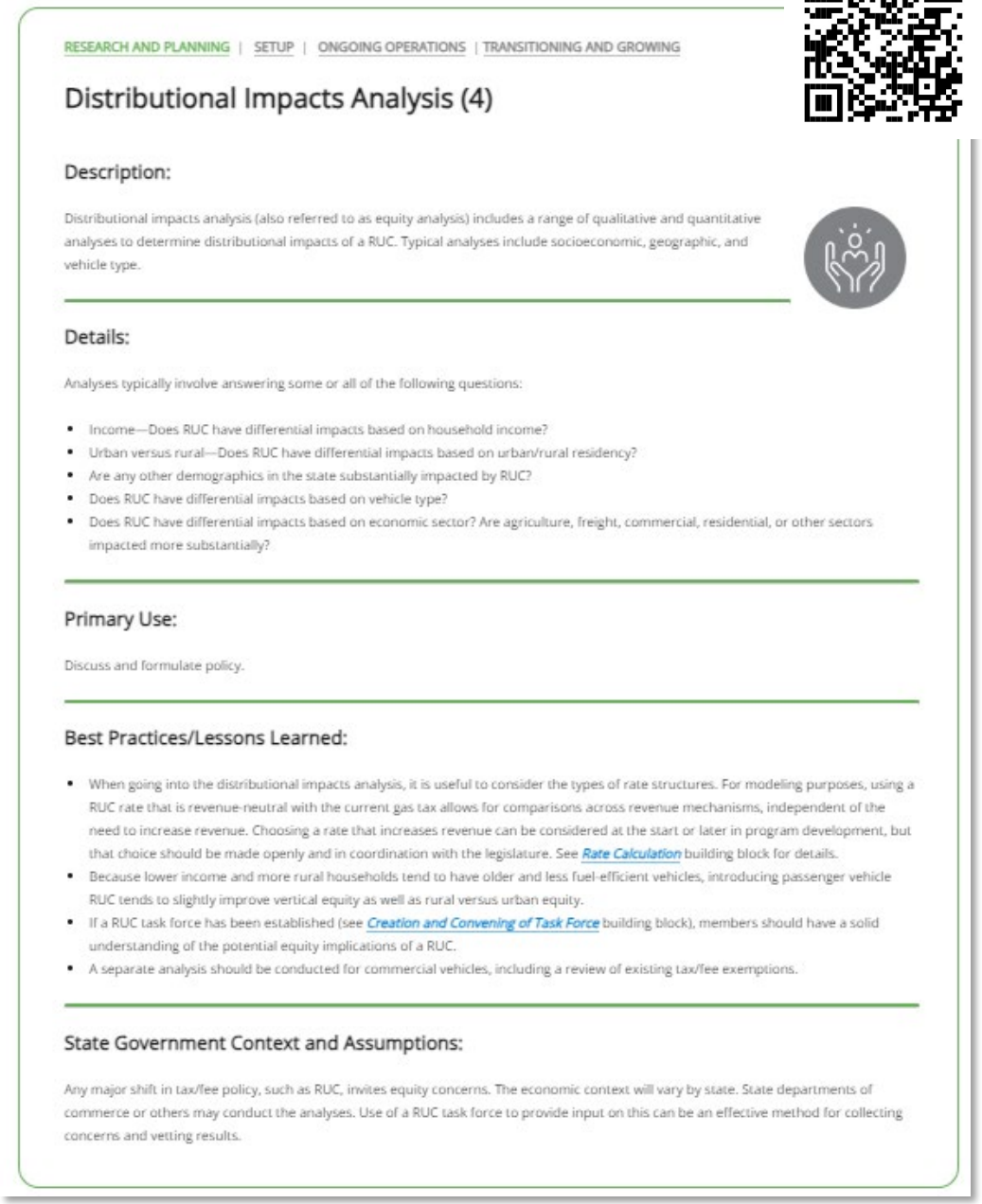


RESEARCH & PLANNING

So you just completed a pilot *or* it's not the right time to do a pilot?

- **Find relevant research & planning building blocks for non-pilot efforts**

Activities	Building Blocks
Research Policy and Politics	(1) Determine Vision and Policy Objectives for RUC (2) Creation and Convening of Task Force (3) Road Usage Charge Legal Analysis (4) Distributional Impacts Analysis (5) Privacy Protection (6) Public Opinion Research (7) Economic Forecasts (8) Revenue Modeling
Stakeholder and Public Engagement	(9) Develop and Execute Communication Plan and Collateral



RESEARCH AND PLANNING | SETUP | ONGOING OPERATIONS | TRANSITIONING AND GROWING

Distributional Impacts Analysis (4)

Description:

Distributional impacts analysis (also referred to as equity analysis) includes a range of qualitative and quantitative analyses to determine distributional impacts of a RUC. Typical analyses include socioeconomic, geographic, and vehicle type.

Details:

Analyses typically involve answering some or all of the following questions:

- Income—Does RUC have differential impacts based on household income?
- Urban versus rural—Does RUC have differential impacts based on urban/rural residency?
- Are any other demographics in the state substantially impacted by RUC?
- Does RUC have differential impacts based on vehicle type?
- Does RUC have differential impacts based on economic sector? Are agriculture, freight, commercial, residential, or other sectors impacted more substantially?

Primary Use:

Discuss and formulate policy.

Best Practices/Lessons Learned:

- When going into the distributional impacts analysis, it is useful to consider the types of rate structures. For modeling purposes, using a RUC rate that is revenue-neutral with the current gas tax allows for comparisons across revenue mechanisms, independent of the need to increase revenue. Choosing a rate that increases revenue can be considered at the start or later in program development, but that choice should be made openly and in coordination with the legislature. See *Rate Calculation* building block for details.
- Because lower income and more rural households tend to have older and less fuel-efficient vehicles, introducing passenger vehicle RUC tends to slightly improve vertical equity as well as rural versus urban equity.
- If a RUC task force has been established (see *Creation and Convening of Task Force* building block), members should have a solid understanding of the potential equity implications of a RUC.
- A separate analysis should be conducted for commercial vehicles, including a review of existing tax/fee exemptions.

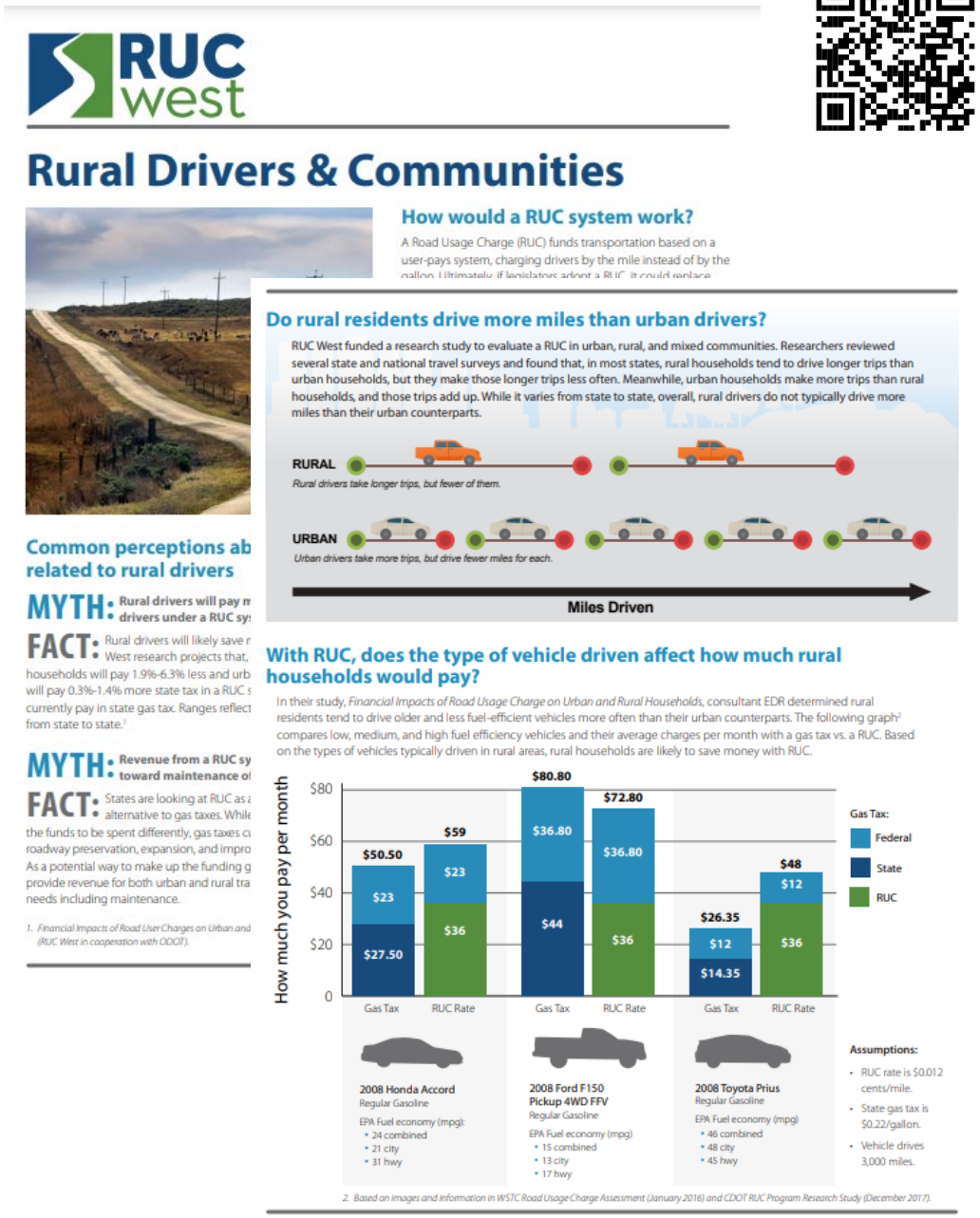
State Government Context and Assumptions:

Any major shift in tax/fee policy, such as RUC, invites equity concerns. The economic context will vary by state. State departments of commerce or others may conduct the analyses. Use of a RUC task force to provide input on this can be an effective method for collecting concerns and vetting results.

RESEARCH & PLANNING

So you just completed a pilot or it's not the right time to do a pilot?

- Find relevant research & planning building blocks for non-pilot efforts
- Look for communications resources for non-pilot research and planning efforts



RUC west

Rural Drivers & Communities

How would a RUC system work?

A Road Usage Charge (RUC) funds transportation based on a user-pays system, charging drivers by the mile instead of by the gallon. Ultimately, if legislators adopt a RUC, it could replace

Do rural residents drive more miles than urban drivers?

RUC West funded a research study to evaluate a RUC in urban, rural, and mixed communities. Researchers reviewed several state and national travel surveys and found that, in most states, rural households tend to drive longer trips than urban households, but they make those longer trips less often. Meanwhile, urban households make more trips than rural households, and those trips add up. While it varies from state to state, overall, rural drivers do not typically drive more miles than their urban counterparts.

RURAL

Rural drivers take longer trips, but fewer of them.

URBAN

Urban drivers take more trips, but drive fewer miles for each.

Miles Driven

Common perceptions ab related to rural drivers

MYTH: Rural drivers will pay m drivers under a RUC sy

FACT: Rural drivers will likely save r West research projects that, households will pay 1.9%-6.3% less and urb will pay 0.3%-1.4% more state tax in a RUC s currently pay in state gas tax. Ranges reflect from state to state.[1]

MYTH: Revenue from a RUC sy toward maintenance o

FACT: States are looking at RUC as a alternative to gas taxes. While the funds to be spent differently, gas taxes c roadway preservation, expansion, and impro As a potential way to make up the funding g provide revenue for both urban and rural tra needs including maintenance.

1. *Financial Impacts of Road User Charges on Urban and* (RUC West in cooperation with ODOT).

With RUC, does the type of vehicle driven affect how much rural households would pay?

In their study, *Financial Impacts of Road Usage Charge on Urban and Rural Households*, consultant EDR determined rural residents tend to drive older and less fuel-efficient vehicles more often than their urban counterparts. The following graph[2] compares low, medium, and high fuel efficiency vehicles and their average charges per month with a gas tax vs. a RUC. Based on the types of vehicles typically driven in rural areas, rural households are likely to save money with RUC.

2. Based on images and information in WSTC Road Usage Charge Assessment (January 2016) and CDOT RUC Program Research Study (December 2017).

RESEARCH & PLANNING

So you just completed a pilot or it's not the right time to do a pilot?

- Find relevant research & planning building blocks for non-pilot efforts
- Look for communications resources for non-pilot research and planning efforts
- Review strategies for common challenges

Equity by Income

It is a common misperception that RUC will disproportionately burden lower-income drivers.

Strategy 1: Conduct a quantitative analysis using National Household Travel Survey data and U.S. Environmental Protection Agency–reported fuel economy estimates. Stratify by income. +

Strategy 2: Use participants from various income brackets in pilot testing. +

Strategy 3: Educate the public and stakeholders about RUC. +

Equity by Vehicle Type

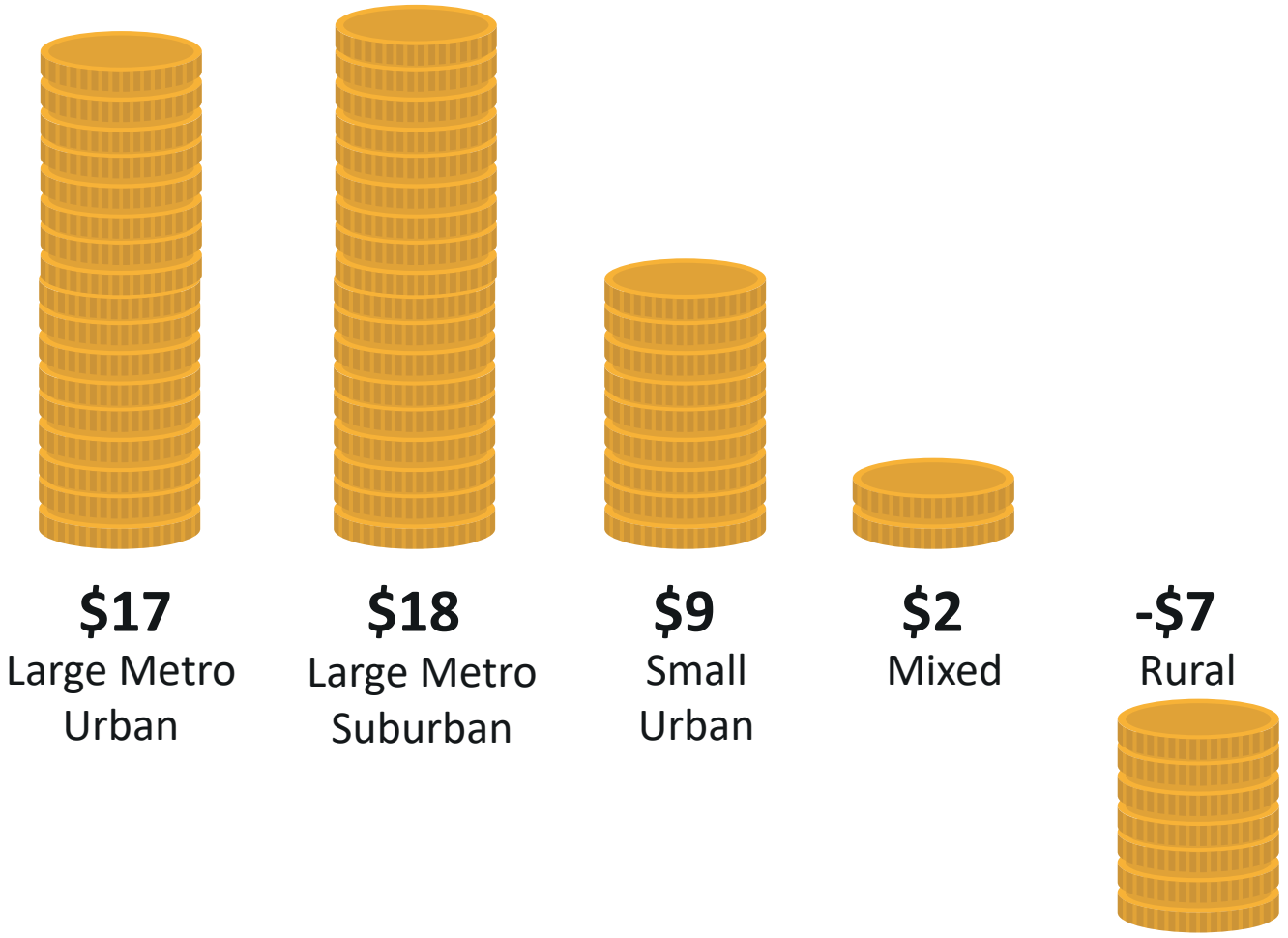
Some have expressed concern that a flat RUC charge would unfairly impact certain vehicle types and contend that heavier vehicles do more damage to the roadway and so should pay more per mile in RUC. Roads are engineered such that vehicles under about 10,000 pounds have equivalent impacts on pavement and congestion. Weight becomes a factor for medium-duty vehicles (10,001 to 26,000 pounds) and heavy-duty vehicles (above 26,000 pounds).

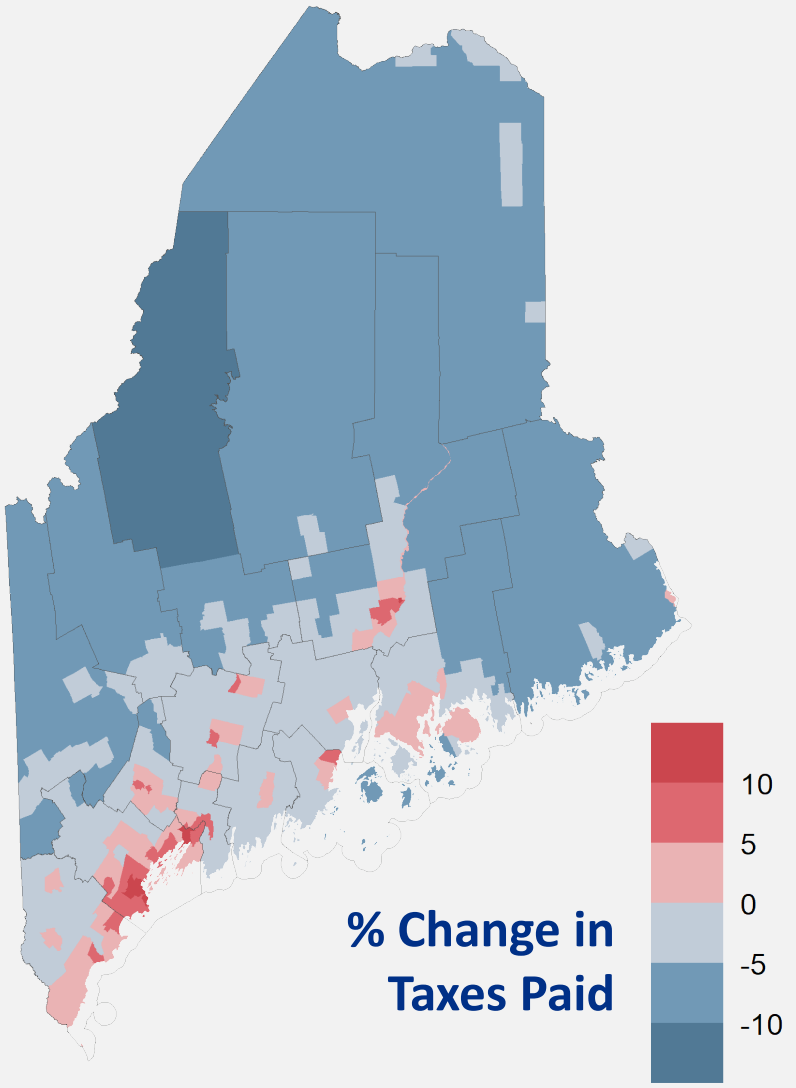
Strategy 1: Conduct a highway cost allocation study in the state, or leverage data that will be generated in the forthcoming federal highway cost allocation study authorized and funded by the Infrastructure Investment and Jobs Act. +

Strategy 2: Reach out to medium-duty and heavy-duty vehicle stakeholder groups to discuss and better understand their concerns, to share information about RUC, and, once an analysis has been conducted, to share the potential impacts on heavy-duty vehicles. +

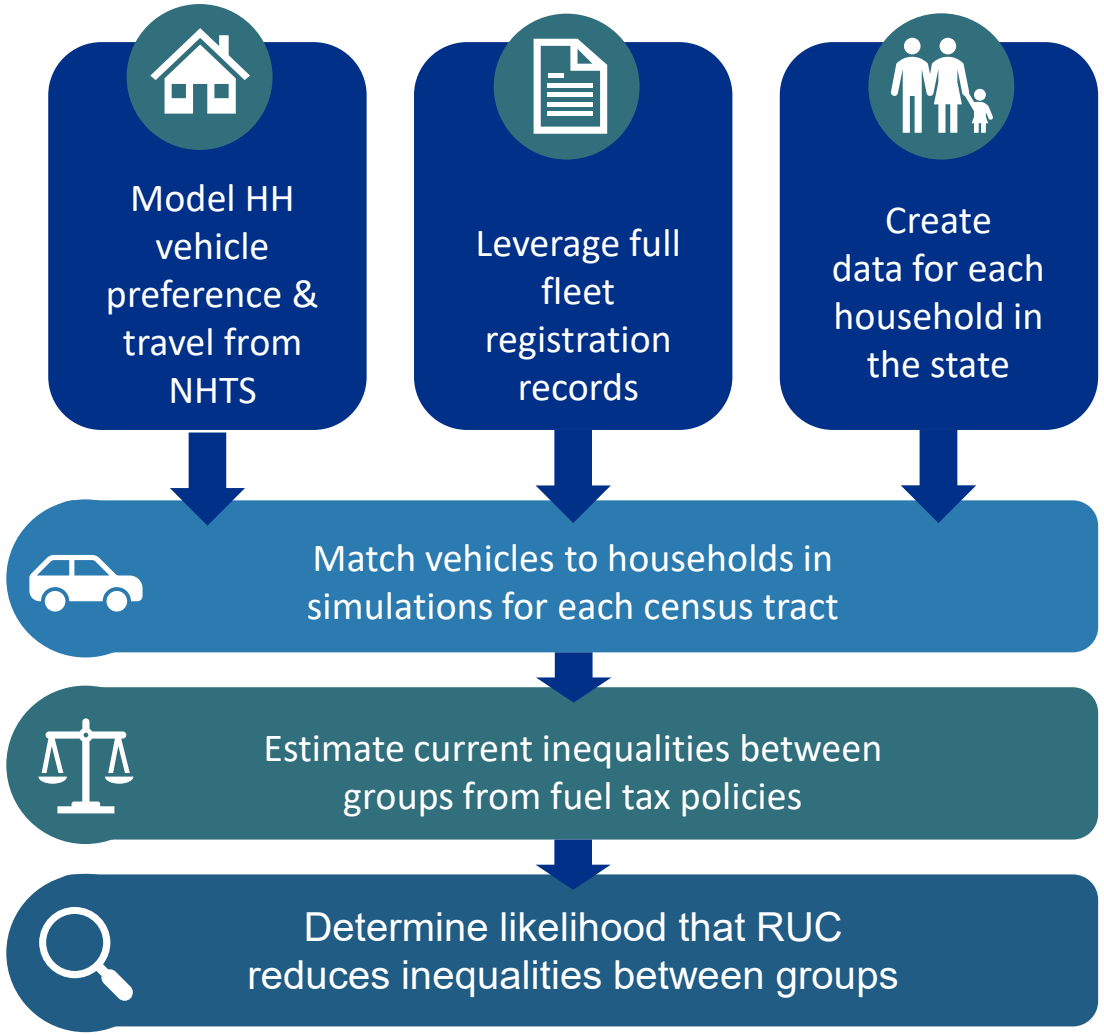
Example: Maine Urban/Rural Analysis

How annual taxes would shift under a RUC



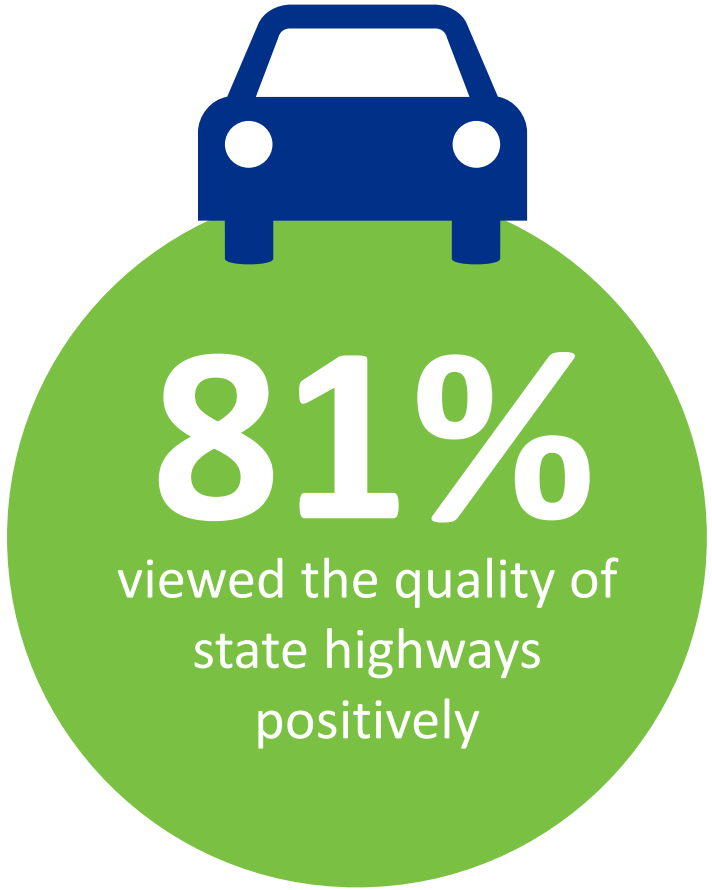


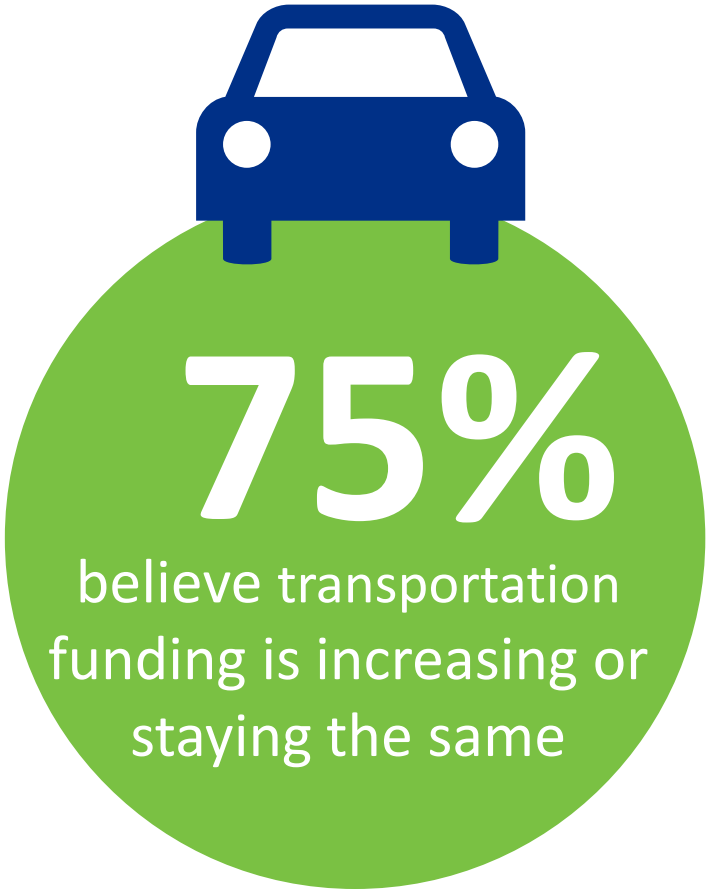
Example: North Carolina Socioeconomic Analysis

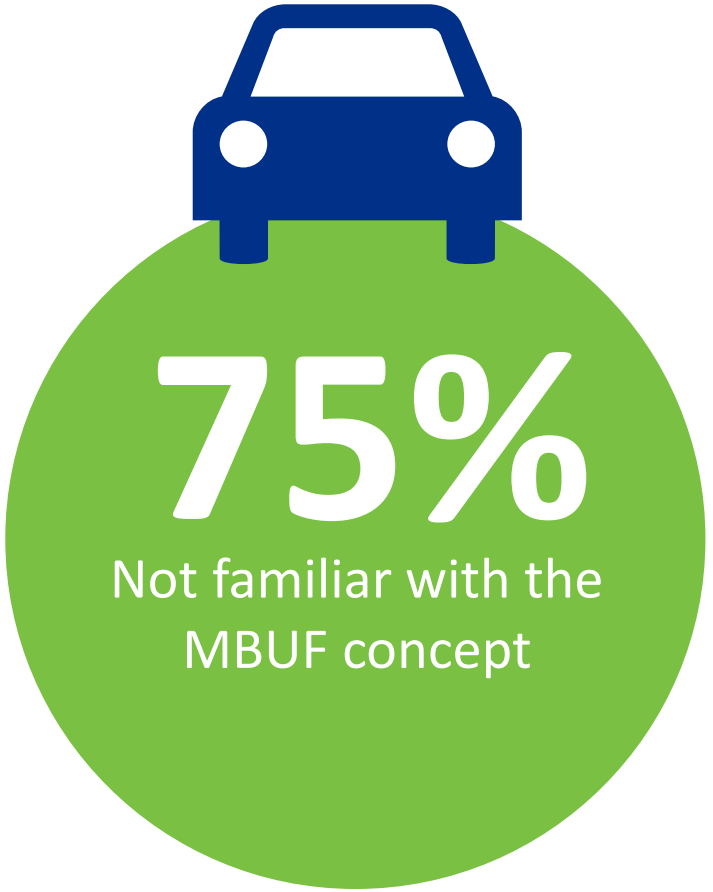


Looked at 3.7 million **individual households** in NC, rather than **census tract averages** –to look at things like income equity.

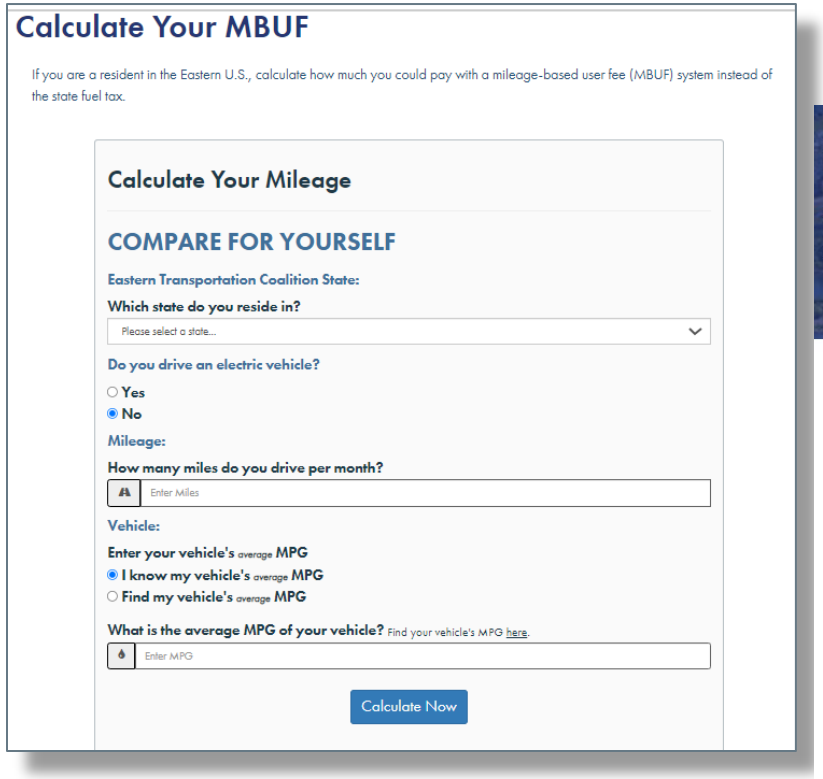
Example: Delaware Public Opinion Research



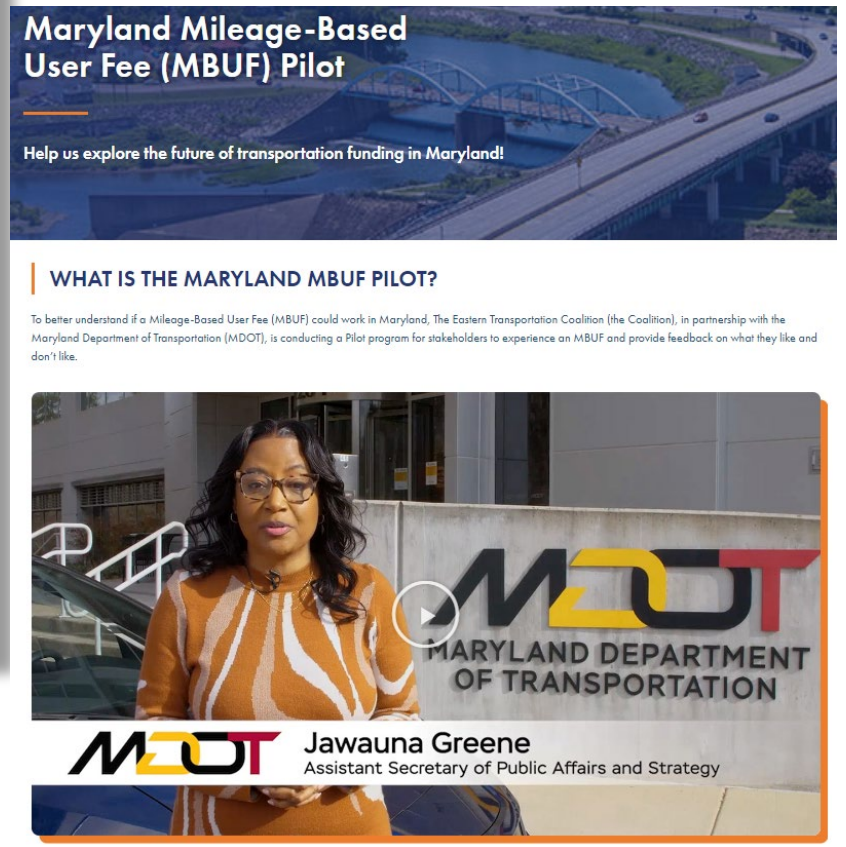




Example: Outreach Materials for States



Calculator



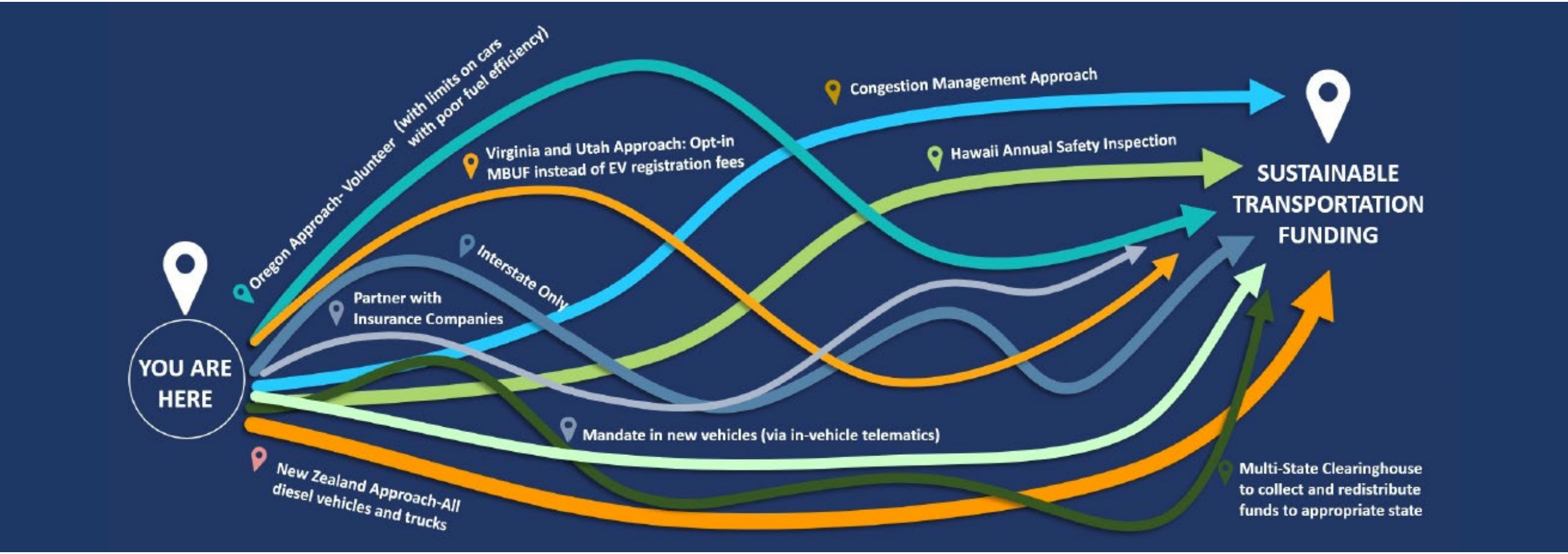
Website

Video

Tackling Challenges and Passing Legislation

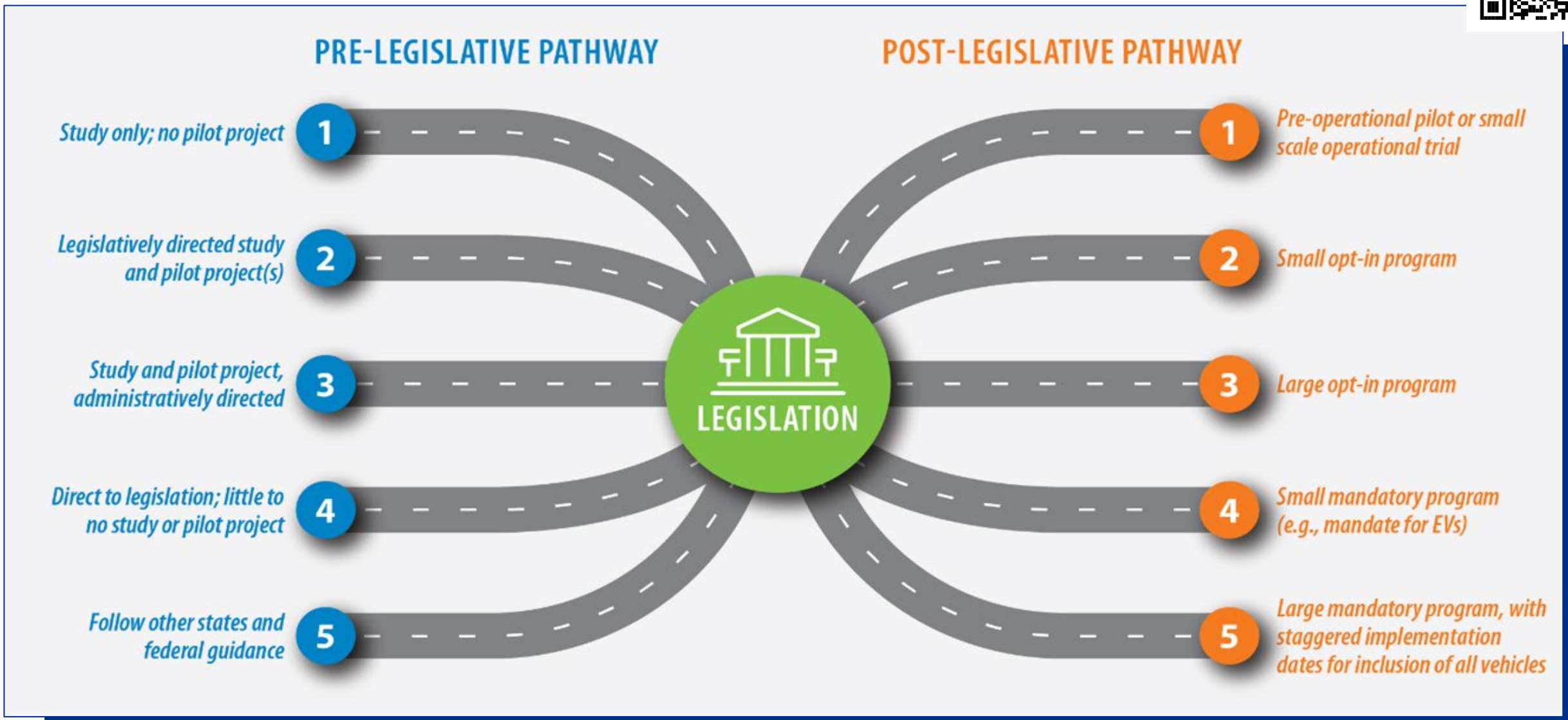
Ging Ging Fernandez

There Are Many Different Paths States Have Taken Towards Implementing RUC



Source: The Eastern Transportation Coalition

Implementation Pathways



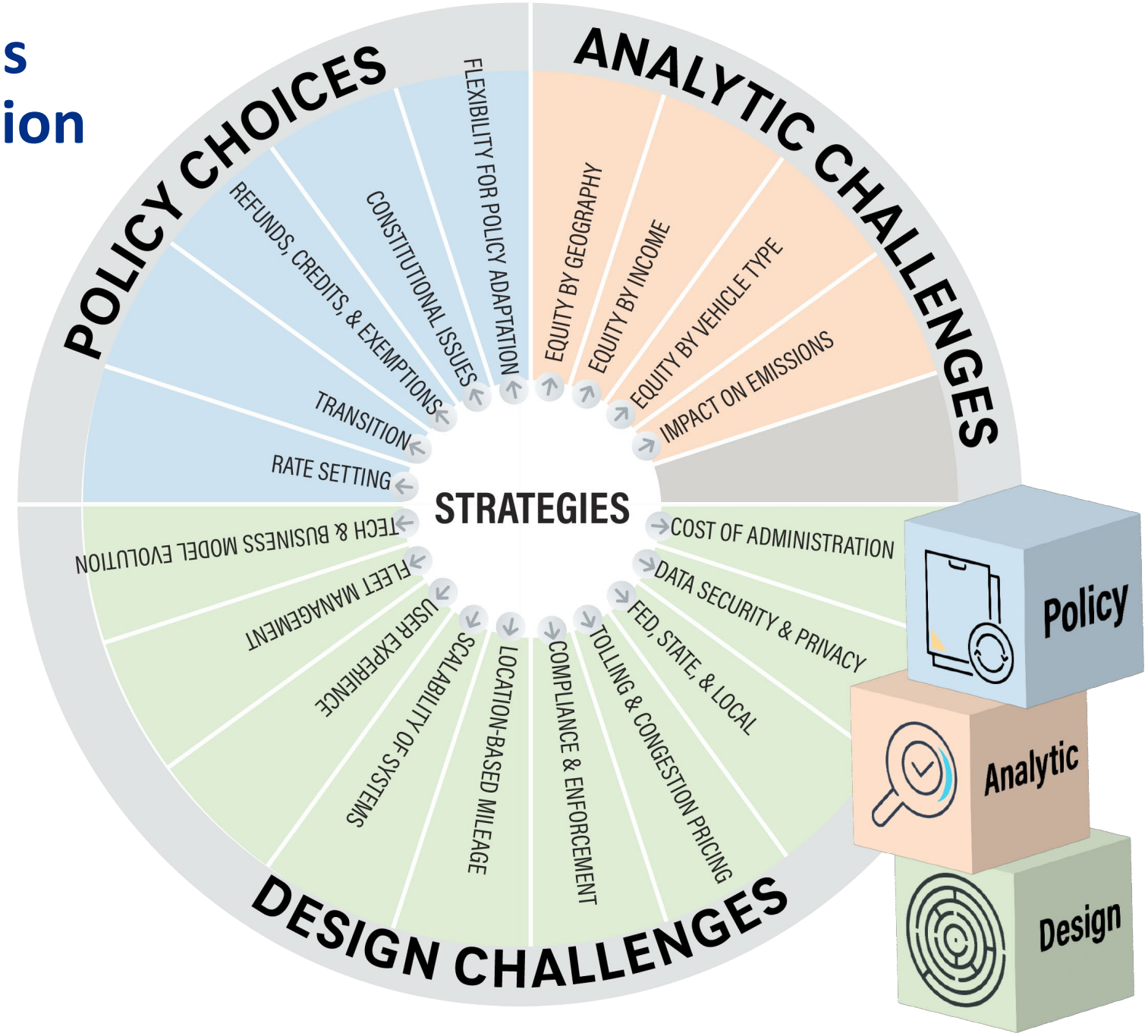
Self-Assessment Part 3 Challenges and Strategies

- Find Challenges and Strategies under Self-Assessment

Challenges and strategies, geared toward RUC Lead Agencies covering the following topics:

- Analytical challenges
- Design challenges
- Policy choices

Part III Challenges & Strategies Section



An analytical challenge

Equity by Geography

A common misperception holds that RUC will disproportionately burden rural drivers since rural trips tend to be longer than urban trips. Although this concern arises wherever RUC is proposed, the concern may be greater in states with large urban-rural divides. For example, San Francisco, California, has a significantly different urban form than Vacaville, California. In states like Montana or Wyoming, urban centers have relatively low population densities, so the experiences of urban and rural drivers may not be significantly different.

Strategy 1: Conduct a thorough quantitative analysis using National Household Travel Survey data and U.S. Environmental Protection Agency–reported fuel economy estimates. Stratify the data by urban and rural geographies (and possibly others, such as suburban). +

Strategy 2: Use geographically representative participants in pilot testing. +

Strategy 3: Educate the public and stakeholders about the impacts of RUC. +

Strategies for tackling challenges

Strategy 1: Conduct a thorough quantitative analysis using National Household Travel Survey data and U.S. Environmental Protection Agency–reported fuel economy estimates. Stratify the data by urban and rural geographies (and possibly others, such as suburban).

Since lower-income and rural households tend to have older vehicles that are less fuel efficient, a passenger vehicle RUC that does not vary by vehicle characteristics slightly improves vertical equity, assuming a flat, revenue-neutral RUC rate. A RUC has been found to slightly improve urban vs. rural equity by shifting some of the burden from rural to urban payers. The level of improvement, however, has been slight. Exact results will vary by state. To conduct this analysis of interstate commercial vehicles, data from the International Fuel Tax Agreement Clearinghouse and the International Registration Plan Data Repository can be accessed. Some jurisdictions may gather this information from intrastate vehicles as well. These data would contribute to a more thorough understanding of the impacts of RUC on the commercial motor vehicle industry.

- Phase: Research and Planning
- Activity: Research Policy
- Refer to the following building block:

Distributional Impacts Analysis

Analysis to Support RUC

RUC implementation is facilitated by detailed technical evaluation. Analysis can support policy decisions by taking into account the impacts on the public and various stakeholders. These short analysis guides provide a description of analyses that have proven useful for various states, the data needs for conducting the analyses, suggested data sources, the steps for the analyses, lessons learned from various jurisdictions, and sample output from other projects.

- Socioeconomic Analysis
- Size and Weight Analysis
- Rate-Setting Decisions Analysis
- Program Admin Costs Analysis
- Driving Behavior Analysis

Socioeconomic Analysis

Description:

Socioeconomic analyses of RUC programs encompass qualitative and quantitative methods that assess and measure the impacts of RUC program design elements on distinct segments of motorists impacted. Results support stakeholders, policymakers, and program administrators in determining how to decide policy and program design choices.

Questions that often arise in studying RUC include: What is the share of transportation taxes and fees among all household expenditures? How would low-income motorists be impacted by RUC? How does RUC compare to fuel taxes by income level? Would RUC be more or less equitable than existing funding mechanisms or other alternative revenue mechanisms? How does RUC compare to fuel taxes based on residence location? Would rural drivers be more severely impacted than urban drivers? Will RUC be equally accessible with ease of compliance for historically underserved communities? What can be done to make a RUC program more equitable?

Much of the discussion of equity in transportation revolves around how revenues are allocated to projects, for example by mode and geography. However, socioeconomic analysis of RUC deals with the impact of the revenue mechanism itself, not with how the funds are spent. Assessment of the socioeconomic impacts of transportation spending and investments comes with a distinct set of questions and analysis methodologies that can be deployed regardless of the revenue mechanism under consideration, whether fuel taxes, vehicle fees, RUC, general taxes, or something else.

Data Required:

Urban-rural classification; demographic data (household size and income, race/ethnicity, gender); vehicle fleet composition (age, value, engine type, fuel efficiency) by location; vehicle miles traveled; transportation taxes/fees (rates and definitions); overall household expenditures and household transportation expenditures by category, broken down by income level; survey results or other experience-based feedback from prospective RUC payers.

For each data type, consider historical, current, and forecasted values

Data Sources:

US Census Bureau; State Vehicle Registry; Economic data and demographic data projections (Woods & Poole Economics, Moody's, etc.); US DOT, FHWA, Highway Performance Monitoring System (HPMS); Transportation revenue data (tax and fee rates and definitions from state revenue department or equivalent); U.S. Bureau of Economic Analysis; U.S. Bureau of Labor Statistics; US DOT, Bureau of Transportation Statistics; U.S. Energy Information Administration, Annual Energy Outlook (AEO); Transportation Energy Data Book.

Analysis Steps:

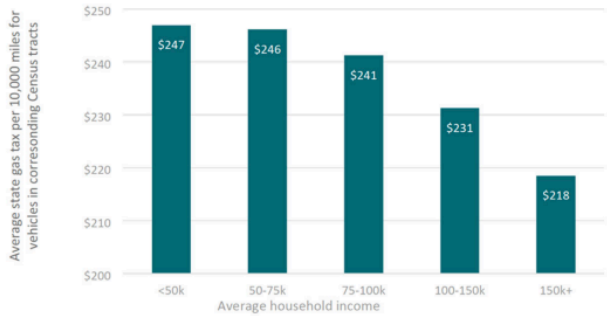
1. Gather questions and concerns from policy makers and stakeholders about what types of socioeconomic impacts are most important to consider.
2. For comparative purposes, evaluate the financial impact of the status quo scenario (existing revenue mechanisms) across socioeconomic groups of interest over time.
3. Consider and study the financial impact of RUC across socioeconomic groups of interests, and how various RUC policy choices impact the groups over time (e.g., by varying the RUC rate, introducing RUC to specific vehicle types). Specifically, measure the financial impact of RUC to various groups Including the average impact and, where possible, the distribution of the impact within groups. Groupings could include vehicles belonging to low-income households, vehicles belonging to rural households, and vehicles belonging to households that include minority racial or ethnic persons.
4. Compare the financial impacts of RUC against the status quo. Impacts should be measured in units that allow comparison between RUC and other funding strategies, and between various RUC policy choices such as per capita, per vehicle mile traveled, and per household.
5. In addition to the quantitative analysis described above, which measures the financial impact of RUC by specific groups, measure the qualitative impact of RUC by surveying and interviewing customers about their experience with RUC, their ability to pay, their preferred methods of reporting and paying, and compare the results to the system design to identify any service gaps that may disproportionately impact certain groups (e.g., rural vehicle owners, low-income vehicle owners).

Considerations/Lessons Learned:

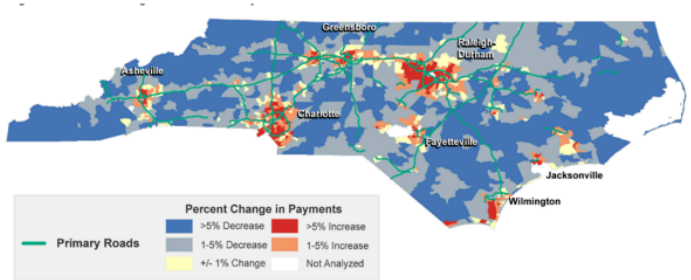
In general, socioeconomic analyses have tended to explore how RUC impacts would vary by geography (urban vs. rural vs. suburban) or demographics (by income level) compared to fuel taxes or alternative fuel vehicle fees. To date, these analyses have shown that a RUC in lieu of fuel taxes would largely benefit rural and low-income households since those households tend to own older, less fuel-efficient cars that burn more fuel and therefore pay more fuel tax per mile driven than their urban and higher-income counterparts, on average.

Sample Output (Optional)

The chart below taken from equity assessment conducted in Washington in 2021 illustrates what the average household pays in fuel taxes per 10,000 miles driven, organized by average income of each Census tract in Washington. Under a RUC, each household would pay the same ($240) per 10,000 miles driven. As the chart shows, households in higher-income Census tracts currently pay substantially less.



The map below illustrates findings from The Eastern Transportation Coalition's analysis of impacts of RUC compared to the fuel tax in North Carolina. The findings corroborate findings from other states showing that vehicles in rural areas would, on average, pay less, while vehicles in urban areas would pay more.



A design challenge

Cost of Administration

While the gas tax is not a sustainable funding mechanism, it is administratively efficient. In most states, fuel taxes are imposed on fuel distributors and suppliers rather than directly on motorists at the pump. This method of collection limits the number of taxpayers to a few dozen or a few hundred companies rather than hu
Muehlegger in "Fuel Tax Incidence a
immediately passed on to consume
even though it is technically levied c
separate line item, the gas tax is "in

Strategy 1: Offering manual mileage reporting as a foundation for RUC can keep costs of collection low. +

Strategy 2: Leverage the private sector for expertise in mileage reporting technology, account management, and customer service. +

Strategy 3: Requiring prepayment of RUC, possibly through an electronic wallet payment, simplifies program administration and reduces the likelihood of evasion and the level of enforcement needed. +

Strategy 4: Aligning incentives between the agencies collecting and dispersing funds can minimize costs. +

Strategy 5: Starting with a small-scale RUC program allows the administering agencies to set up systems, collect revenue, and interact with customers in a relatively low-risk, low-stakes way. +

A policy choice

Rate Setting

Rate setting is a policy choice with many impacts to consider, including differential impacts on population groups by geography and demographics, total net revenue, and ability to keep pace with costs.

Rate setting also impacts the cost of administration in several ways. First, rate setting determines total revenue, which serves as the denominator for the popular but often misleading "cost as a percent of revenue" metric. The lower the raw cost, the lower the cost as a percent of revenue. Likewise, the higher the revenue, the lower the cost as a percent of revenue. Raising the rate of a RUC automatically reduces the cost as a percent of revenue. Because of the high variability in r
cautiously.

Secondly, the type of rate setting
configuration is to set a flat rate p
per reporting period: the number
charges due. More complex rate s
measuring miles by location, whic

Rate Calculation

- Strategy 1: Establish a RUC rate that is revenue-neutral with the gas tax for a select portion of vehicles. +
- Strategy 2: Use a single RUC rate for all passenger vehicles for ease of administration and public acceptance. +
- Strategy 3: Couple the introduction of RUC with a gas tax increase that does not impact the RUC rate so that paying the RUC is cheaper than paying fuel tax. +
- Strategy 4: Index the RUC rate to inflation, construction costs, or some other measure. +

Rate Calculation Building Block (23)

Description:

- Based on the RUC-enabling law, calculate the per-mile rate or rates

Details:

- Follow the guidance included in state law to set the RUC rate.

Primary Use:

- Compute the RUC rate to be paid at the start of the program.

Lessons Learned:

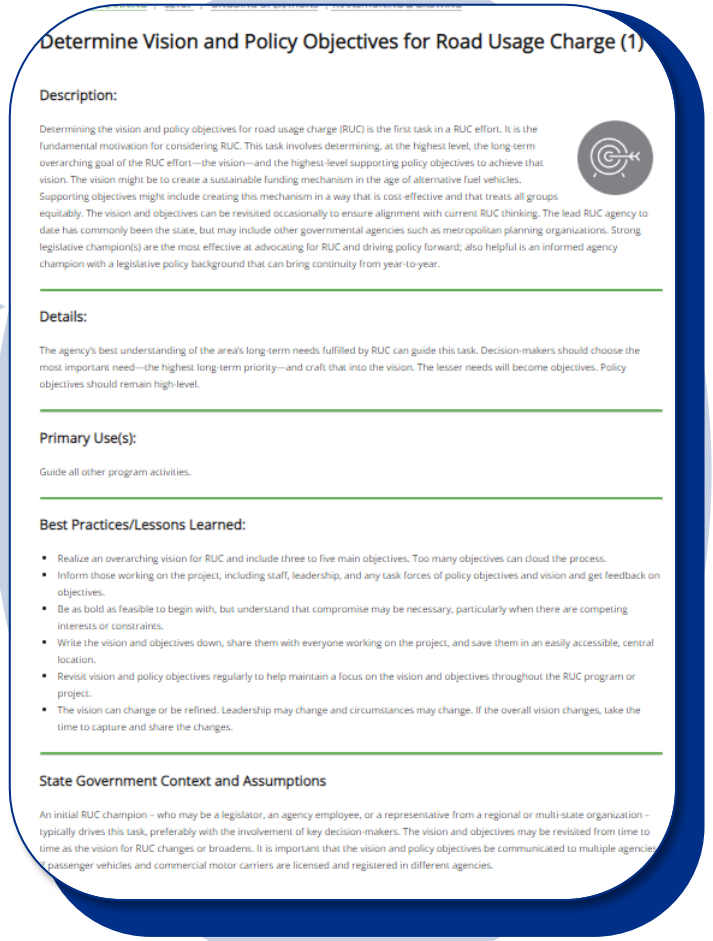
- Rates may vary by vehicle type
- Thus far, RUC programs have featured a single rate for passenger vehicles
- It is likely not desirable to make RUC rates vary by other factors
- RUC rates can track with inflation, rising construction costs
- Consider choosing an initial rate that is revenue-neutral with the gas tax
- If the RUC is paid instead of the fuel tax, then fuel tax credits can be offered

Policymakers

- Legislators
- Legislative staff
- Agency support staff

"How to Pass RUC Policy" Video

RUC Components and Building Blocks


Determine Vision and Policy Objectives for Road Usage Charge (1)

Description:

Determining the vision and policy objectives for road usage charge (RUC) is the first task in a RUC effort. It is the fundamental motivation for considering RUC. This task involves determining, at the highest level, the long-term overarching goal of the RUC effort—the vision—and the highest-level supporting policy objectives to achieve that vision. The vision might be to create a sustainable funding mechanism in the age of alternative fuel vehicles. Supporting objectives might include creating this mechanism in a way that is cost-effective and that treats all groups equitably. The vision and objectives can be revisited occasionally to ensure alignment with current RUC thinking. The lead RUC agency to date has commonly been the state, but may include other governmental agencies such as metropolitan planning organizations. Strong legislative champion(s) are the most effective at advocating for RUC and driving policy forward; also helpful is an informed agency champion with a legislative policy background that can bring continuity from year-to-year.

Details:

The agency's best understanding of the area's long-term needs fulfilled by RUC can guide this task. Decision-makers should choose the most important need—the highest long-term priority—and craft that into the vision. The lesser needs will become objectives. Policy objectives should remain high-level.

Primary Use(s):

Guide all other program activities.

Best Practices/Lessons Learned:

- Realize an overarching vision for RUC and include three to five main objectives. Too many objectives can cloud the process.
- Inform those working on the project, including staff, leadership, and any task forces of policy objectives and vision and get feedback on objectives.
- Be as bold as feasible to begin with, but understand that compromise may be necessary, particularly when there are competing interests or constraints.
- Write the vision and objectives down, share them with everyone working on the project, and save them in an easily accessible, central location.
- Revisit vision and policy objectives regularly to help maintain a focus on the vision and objectives throughout the RUC program or project.
- The vision can change or be refined. Leadership may change and circumstances may change. If the overall vision changes, take the time to capture and share the changes.

State Government Context and Assumptions

An initial RUC champion – who may be a legislator, an agency employee, or a representative from a regional or multi-state organization – typically drives this task, preferably with the involvement of key decision-makers. The vision and objectives may be revisited from time to time as the vision for RUC changes or broadens. It is important that the vision and policy objectives be communicated to multiple agencies if passenger vehicles and commercial motor carriers are licensed and registered in different agencies.

RUC Basics

Why RUC?

Where is RUC being considered?

Federal Highway Administration (FHWA) Federal Grant Opportunity

Carlos McCloud

Disclaimers

This presentation was created and is being co-presented by FHWA and an outside entity. The views and opinions expressed in this presentation are the presenters' and do not necessarily reflect those of FHWA or the U.S. Department of Transportation (USDOT). The contents do not necessarily reflect the official policy of the USDOT.

The U.S. Government does not endorse products or manufacturers. Trademarks or manufacturers' names appear in this presentation only because they are considered essential to the objective of the presentation. They are included for informational purposes only and are not intended to reflect a preference, approval, or endorsement of any one product or entity.

Except for the statutes and regulations cited, the contents of this presentation do not have the force and effect of law and are not meant to bind the States or the public in any way. This presentation is intended only to provide information regarding existing requirements under the law or agency policies.

Strategic Innovation for Revenue Collection (SIRC) Program Discretionary Grant Opportunity

- Program Vision
- Eligible Entities
- Program Funding
- Program Objectives
- SIRC Program Fact Sheet: https://ops.fhwa.dot.gov/ubarm/
- Questions may be sent to: SIRC@dot.gov

Thank You!

RUC_Guide@cdmsmith.com

One last question….

Scan QR Code

crp.trb.org/nchrpwebresource2

crp.trb.org/nchrpwebresource2

Today's presenters

Jennifer Roberts
robertsjm@cdmsmith.com

CDM Smith
listen. think. deliver.

Maureen Bock
maureen.bock@odot.oregon.gov
https://www.myorego.org/

ORe*GO*

Ging Ging Fernandez
fernandezgl@cdmsmith.com

CDM Smith
listen. think. deliver.

Patricia Hendren
phendren@tetcoalition.org
https://tetcoalitionmbuf.org/

THE EASTERN TRANSPORTATION COALITION
CONNECTING FOR SOLUTIONS

Steven Marfitano
marfitanosc@cdmsmith.com

CDM Smith
listen. think. deliver.

Carlos McCloud
carlos.mccloud@dot.gov
https://ops.fhwa.dot.gov/ubarm/

U.S. Department of Transportation
Federal Highway Administration

Questions about the RUC Guide? Email: RUC_guide@cdmsmith.com

Conference

NATIONAL ACADEMIES Sciences Engineering Medicine

TRB TRANSPORTATION RESEARCH BOARD

August 12-14 • Irvine, CA

Symposium on Managed Lanes

Subscribe to *TRB Weekly*

If your agency, university, or organization perform transportation research, you and your colleagues need the *TRB Weekly* newsletter in your inboxes!

Each Tuesday, we announce the latest:

- RFPs
- TRB's many industry-focused webinars and events
- 3-5 new TRB reports each week
- Top research across the industry

Spread the word and subscribe!

https://bit.ly/ResubscribeTRBWeekly

Discover new TRB Webinars weekly

Set your preferred topics to get the latest listed webinars and those coming up soon every Wednesday, curated especially for you!

https://mailchi.mp/nas.edu/trbwebinars

And follow #TRBwebinar on social media

@NASEMTRB
@NASEMTRB
Transportation Research Board

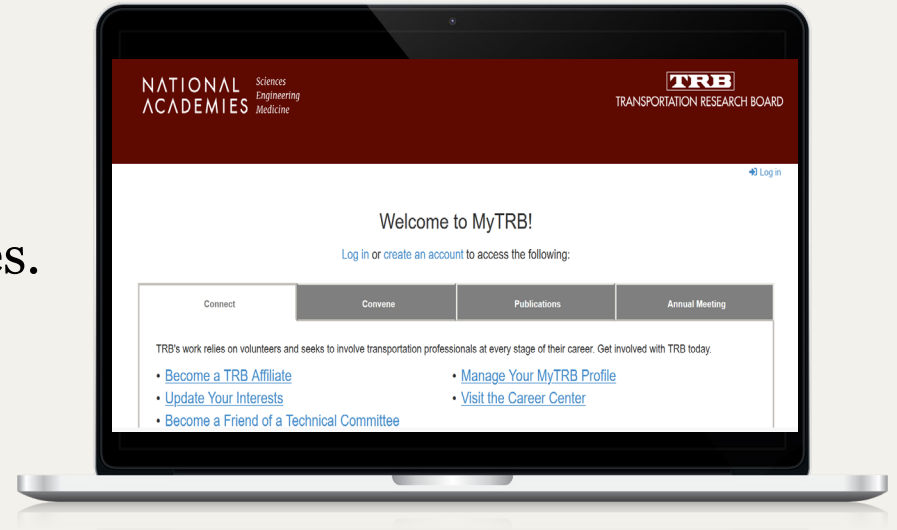
NATIONAL ACADEMIES Sciences Engineering Medicine
TRB TRANSPORTATION RESEARCH BOARD

Get involved

TRB mobilizes expertise, experience, and knowledge to anticipate and solve complex transportation-related challenges.

TRB's mission is accomplished through the hard work and dedication of more than **8,000 volunteers**.

https://www.nationalacademies.org/trb/get-involved



We want to hear from you

- **Take our survey**
- **Tell us how you use TRB Webinars in your work at trbwebinar@nas.edu**

NATIONAL ACADEMIES Sciences Engineering Medicine