Agenda

▪ RUC Study Status impacting mileage data collection
▪ RUC Lessons Learned impacting mileage data collection
▪ RUC Collection Options
▪ Concluding Remarks
RUC Study Status

Status of RUC research in 2023
2023 RUC studies, pilots, and programs

- Enacted programs
- Pilots (completed)
- Pilots (forthcoming)
- Studies/research
- Multi-state research participants
RUC Lessons Learned

Impacting mileage data collection
Lessons learned about RUC: Policy

▪ Privacy
  ▪ Must be explicitly addressed in every pilot/program. Provisions:
  ▪ Offer non-location based mileage reporting
  ▪ State never gets location data
  ▪ Have privacy policy and legal protections

▪ Rate setting
  ▪ Avoid perception of “double taxation” / “raising taxes”
  ▪ Charging in lieu of flat fee is easier than charging in lieu of gas tax
  ▪ Vehicle owners should understand rate / how it is set
  ▪ Single rate, revenue neutral with gas tax is most common choice
Lessons learned about RUC: User Interaction

**Communications / PR**
- Begin with clear communications about reasons for RUC
- Fairness and “user pays” are popular messages
- Explain how RUC is collected, so it’s not scary/burdensome
- Pilots serve as communications tools

**User experience**
- Simple, clean user interface, with as few touch points as possible
- Have good customer service
Lessons Learned about RUC: Government

- Government role in RUC varies by state
  - DMV provides database, DOT or DMV may lead
  - Exact government role depends on collection method(s)
- States can operate non-location-based methods
- Commercial Account Managers: best option for high tech
  - Private firm collects on behalf of state
  - State oversight required
- Open Market concept
  - CAMs can enter the market in a given state at any time
  - Generally appropriate for larger programs
RUC Collection Options
Spectrum of reporting options

Non-location-based options

<table>
<thead>
<tr>
<th>Pros</th>
<th>Cheaper, private</th>
</tr>
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<tbody>
<tr>
<td>Cons</td>
<td>Does not capture out of state, offroad miles</td>
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</table>

Location-based options

<table>
<thead>
<tr>
<th>Pros</th>
<th>Captures out of state, offroad miles</th>
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<tbody>
<tr>
<td>Cons</td>
<td>More expensive, privacy concerns</td>
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Odometer Reporting (in person)

- Annual/biannual safety inspections required in 12 states, emissions inspections required in regions of 21 states
- Hawaii’s system will leverage existing inspections

<table>
<thead>
<tr>
<th>Pros</th>
<th>Cons</th>
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<tbody>
<tr>
<td>Very high privacy</td>
<td>Challenging to implement in states without inspections</td>
</tr>
<tr>
<td>Low cost in states with inspections</td>
<td>Even in states w/inspections, requires substantial development</td>
</tr>
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Odometer reporting: self

- Type in odometer once or more/year
- Audit some percentage of entries (odometer image and/or CARFAX)
- Cost: Low (~ <$5/vehicle/year)

<table>
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<tbody>
<tr>
<td>Very high privacy</td>
<td>Auditing will require effort to perfect</td>
</tr>
<tr>
<td>Low cost</td>
<td></td>
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</table>
Odometer image capture

- Using camera phone / smartphone
- Employs various fraud protection measures
- “Low confidence” images require manual review
- Cost: $2-3 per photo with account management

<table>
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<tbody>
<tr>
<td>Easy to use</td>
<td>Requires a lot of reminders, penalties for those who don’t submit</td>
</tr>
<tr>
<td>High privacy</td>
<td>Requires manual image review</td>
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<tr>
<td></td>
<td>Need solution for those w/o phones</td>
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<td></td>
<td>Need to link image to vehicle</td>
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In-vehicle device

- Most commonly used option today
- GPS+cellular modem
- Cost: ~$50-100/vehicle/year

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<tbody>
<tr>
<td>Most commonly used option</td>
<td>High cost</td>
</tr>
<tr>
<td>Proven</td>
<td>Distribution/collection/inventory</td>
</tr>
<tr>
<td>Need install device</td>
<td>Limited lifespan</td>
</tr>
<tr>
<td>What if plug is occupied?</td>
<td>Little OEM support, incl errors</td>
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</table>
Smartphone App

- Uses detailed location information
- Phone linked to vehicle (e.g., Bluetooth)
- Requires periodic/annual true up
- Low cost at scale (~$12/vehicle/year)

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<tbody>
<tr>
<td>Can be user friendly</td>
<td>Requires users have smartphones</td>
</tr>
<tr>
<td>Low cost</td>
<td>No location when phone not in vehicle</td>
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</table>
Automaker data (third party API)

- Uses third party to access vehicle telematics data. 2 varieties:
  1. Vehicle “pinging” (no agreement with automakers)
  2. Backend Data (explicit agreement with automakers)
- Cost: $75-100+/year incl API, CAM, automaker

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<tbody>
<tr>
<td>Available today</td>
<td>Location precision varies by provider &amp; automaker</td>
</tr>
<tr>
<td>Backend data approach</td>
<td>For vehicle pinging variety, users may need to subscribe, share username/PW</td>
</tr>
<tr>
<td>has good data</td>
<td>May cost $50-100+/year (could drop)</td>
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<td></td>
<td>Only for sufficiently equipped vehicles</td>
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Vehicle data (direct from automaker)

- Automakers have been reluctant to support
- SAE J3217/R in final stages of development
- Cost: $100+/vehicle/year, incl CAM, automaker

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<tbody>
<tr>
<td>Potential for highest resolution data</td>
<td>Automakers have been very reluctant to support</td>
</tr>
<tr>
<td>Potential for best user experience</td>
<td>Could be quite expensive</td>
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<td>Unique implementation per automaker</td>
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<tr>
<td></td>
<td>Only for sufficiently equipped vehicles</td>
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Concluding Remarks
Payments

- RUC payments have mostly been structured as prepayment
  - Generally in form of electronic wallet
  - Prevents fraud, keeps current cash-flow in place
- Payment methods
  - Card payment is most common, sufficient for limited programs
  - In larger programs, need cash payment (payment network) and apps (Venmo) needed to cover unbanked and underbanked
- Frequency
  - Once a year is cheapest to operate, but requiring users to pay $100+ at once has major equity implications
  - Likely keep wallet refreshes to lower amount and/or offer installment payments
Technology Forecast

▪ Odometer-based methods will be offered as an option in RUC programs for the next 20 (or more) years

▪ Smartphone apps will become and remain the most common location-based method for some time, due to capabilities and cost

▪ In the long-term, telematics will play an increasing role:
  ▪ APIs without automaker agreements/vehicle pinging have limited usage
  ▪ APIs with automaker agreements/backend data need to be trialed, but must be cost-competitive with smartphone apps
  ▪ Automakers may need encouragement to support RUC
Questions are Welcomed