Road Usage Charging (RUC): Sustainable transportation funding in the era of eco-friendly cars

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International best practices to promote eco-friendly cars

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• Why RUC?
• How RUC?
• RUC policy issues
• Roadway to RUC
• What’s next?
Why RUC?
Fuel tax revenues are eroding

Fuel taxes are the primary source of funding for highway construction and maintenance in the US at the state and federal levels.
The main reason for the erosion is changes in the vehicle fleet

Some countries are even planning to ban the sale of liquid fuel vehicles in 2035
• Fuel taxes were a fair and efficient way of charging
  • Pay for what you use seems fair to most people
  • Until the 1990s, most light vehicles got about 20 mpg (12L/100km), but no longer
  • Low cost to collect (reported as 1% of revenue)

• Direct user charging (toll collection) was operationally expensive
  • Manual toll collection ~30% of revenue on busy highways
  • Electronic toll collection ~10% of revenue on busy highways

• Policy intent of fuel taxes was to fund roads, not reduce carbon emissions
Fuel taxes in the US and international contexts

**US**
- Separate state and federal fuel taxes, sometimes local
- Fuel tax revenue dedicated to road funding
  - For major roads (local roads from property & sales taxes)
  - Makes funding more steady, less political
  - Needed to ensure funds spent correctly

**International**
- Generally one tax (not federal/state/local)
- Little dedication of revenues
- Revenue still eroding
- In fact, more revenue loss because tax levels higher
RUC: user pays in the era of efficient fleets

Distance-based charging, also called a vehicle miles travelled (VMT) tax or a Mileage-based User Fee (MBUF)

Why RUC?

• What RUC is:
  • Either location-based (miles by state, on/off road) or non-location-based (total miles)
  • Single per mile/km rate for all light vehicles, does not vary by time
  • Generally coupled with fuel tax refund (fuel use measured or estimated)

• What RUC is not:
  • Tolling
  • Congestion charging
  • Carbon tax

• Trying to achieve too many policy goals can lead to political failure

• However, some RUC collection technology can support these other types of charges in addition to RUC

• So far RUC rates have been set to be equivalent to gas taxes for to avoid appearance of raising taxes (~1-2.5 cents/mile)
Why RUC?

Operational opt-in RUC program
Large, Statewide RUC pilot
RUC legislation passed
Considering RUC Legislation now
Targeted RUC pilot

State-level RUC initiatives in the U.S.

- Hawaii 2020
- Oregon 2015
- California 2017
- Utah 2020
- Colorado
- Wyoming
- Washington 2019
- Wyoming
- Virginia
- Pennsylvania
- Delaware
- Minnesota

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How RUC can be collected

No single dominant method

- **Plug-in Device** (vehicle tester / onboard diagnostics port)
- **Odometer photo**
- **Native automaker telematics**
- **Vehicle inspection** (manual odometer reading)
- Options generally found to be undesirable:
  - Pay-at-the-pump / kiosk
  - Smartphone app with location
RUC policy issues
Privacy

Especially privacy of location data. Concerns with “Big Brother” have followed RUC since the start.

- Roadblock to early RUC research, especially in US
- Approaches to combat privacy concerns:
  - User choice of mileage reporting methods
  - Offer private management of data, with state oversight
  - User choice of account managers (open market)
  - Offering a non-location-based method. Drawback: does not enable congestion charging or other location-based charges.
Other policy issues

- Urban/rural
  - Belief that rural residents would be disproportionately harmed by RUC
  - But rural residents pay more in gas tax too
  - Data shows they generally do not have more fuel-efficient cars; in fact, RUC improves their situation slightly

- Cost of collection
  - High for small programs
  - Decreasing, and specific work ongoing
  - Likely will never be as low cost as gas tax. Perhaps 5% of revenue feasible at large scale operation.

- Transition Path: unwise to switch all vehicles to RUC in the same year

- Out of state vehicles not equipped to pay RUC. Solutions: fuel tax in operation until transition completed; vignettes.

- Enforcement methods: currently being developed
Adjacent issue: Heavy vehicle RUC

Used in various countries around the world

- Exists in a variety of countries, including:
  - New Zealand
  - Germany
  - Switzerland
  - Czech Republic
  - Etc.

- Rates generally based on:
  - weight
  - vehicle configuration (number of trailers and axles)

- In US, heavy vehicles charged based on fuel tax except in four states

- A distinct political issue from light vehicle RUC
Roadway to RUC
Pre-legislative activities

- **Feasibility study** (early projects only)
- Form **steering committee**: government and community leaders to ensure views heard
- **Communications**: public outreach and surveys
- **Financial analysis**: demonstrate need with local numbers
- **Policy analysis**: focus on local issues
- **System design**: choose mileage reporting, account management
- **Pilot design**: a policy demonstration, not a technology proof-of-concept
RUC Roadmap (Washington State)

2012-2016
Pre-pilot analysis and design
- Conduct feasibility study
- Complete financial and policy analysis
- Design the pilot project

2017
Recruit pilot participants
- Outreach to general public
- Enroll 2,000 participants
- Recruit nearly 5,000 volunteers

2018-2019
Live pilot test driving
- Conduct surveys and focus groups
- Establish help desk

2019-2020
Pilot evaluation and final reporting
- Gather final feedback from participants
- Compile and analyze data and information gathered
- Establish final findings and recommendations

2020
Final report to decision-makers
WSTC reports to the Governor, State Legislature, and USDOT on final findings and recommendations
Post Legislation: A Path to Go-Live

• This chart illustrates an 18-month path to go-live
• Probably the minimum time to achieve a low-risk program start

Legislation passes

Phase 1
Program Definition (3 mo.)

Phase 2
Program Elaboration and System Design (3 mo.)

Phase 3
System Procurement (3 mo.)

Phase 4
System Development (6 mo.)

Phase 5
Testing and Bugfixing (3 mo.)

Phase 6
Go-Live and Year 1 (12 mo.)

Phase 7
Program Ramp-up (~10 years)
What’s Next?
What’s next?

• Grow existing state programs
  • Oregon
  • Utah

• New state programs
  • Virginia

• International growth

• Biggest challenges
  • Automaker integration for native automaker telematics
  • Cost of collection
Questions and Answers

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Options generally found to be undesirable

How RUC?

- Pay at the pump / kiosk
- Charge at fuel pump or charging kiosk
- The option that is most invisible to users
- Drawbacks
  - Requires retrofitting all commercial fuel pumps — expensive and complex to implement and requires long lead implementation time
  - Most electric vehicles mostly charged at home / not on commercial charging stations
- Smartphone app with location
- No good way of securely linking phone to vehicle
- Requires phone to be in vehicle, charged (can do odometer true-up)

Good options may emerge, but haven't yet