Vermont Road Usage Charging Advisory Committee

September 29, 2021
Agenda

2PM Welcome, Roll Call and Review of the Agenda (Chair, Michele Boomhower, VTrans)

2:10 Stakeholder engagement
  • Presentation of outreach results (Mark Fowler and Jonathon Slason, RSG)

2:25 MBUF system definition
  • Presentation of MBUF system definition (James Whitty and Matthew Dorfman, CDM)
  • Preliminary MBUF system definition recommendation

3:25 Per kWh fee system definition
  • Presentation of per-kWh fee system definition memo (James Whitty, CDM)
  • Preliminary Per kWh system definition recommendation

4:20 Fee structure and rate setting
  • Presentation of fee structure (Scott Wilson, CDM)

4:50 Public Comment

4:55 Next Steps and Agenda for third meeting
  • Topics for third meeting (James Whitty, CDM)

5PM Adjournment
Review: Vermont’s road usage charge concept

- Flat Fee
- MBUF
- Per kWh
# Vermont’s Road Usage Charge Concept

<table>
<thead>
<tr>
<th>Applicability</th>
<th>Fee Mechanisms</th>
<th>Possible Eligible Vehicles</th>
</tr>
</thead>
<tbody>
<tr>
<td>VT Registered Vehicles</td>
<td>• Flat Fee, with</td>
<td>• All Electric</td>
</tr>
<tr>
<td></td>
<td>• Optional Mileage-Based User Fee</td>
<td>• Plug-in Electric Hybrid</td>
</tr>
<tr>
<td></td>
<td>• Without location</td>
<td>• High efficiency vehicles</td>
</tr>
<tr>
<td></td>
<td>• With Location</td>
<td></td>
</tr>
<tr>
<td>Out of State Vehicles</td>
<td>Per-kWh Transportation Fee at Public Charging Stations</td>
<td>• All Electric</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Plug-in Electric Hybrid</td>
</tr>
</tbody>
</table>
What determines feasibility for a Vermont RUC program

- A workable system design compatible with existing systems
- Consistency with guiding principles
- Manageable costs
- Adequate net revenues
- Political acceptance
Flat Fee / MBUF for VT Registered Vehicles
Basic elements and Key Considerations
**Annual Registration fee – Typical functions**

- **Identify subject vehicle and its owner/lessee** – connect with vehicle registry

- **Provide invoice to owner/lessee** – notice of the charge

- **Collect payment** – a way or ways to pay

- **Issue acknowledgement of payment** – a receipt

- **Enforce payment** – mechanisms for ensuring everyone pays

- **Remit net revenues to road fund** – integrate revenue collection with financial systems
## Annual Flat Fee – Key considerations

<table>
<thead>
<tr>
<th>Step</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identify subject vehicle and its owner/lessee – connect with vehicle registry</td>
</tr>
<tr>
<td>Identify vehicle’s engine type* – collect data directly or connect with VIN decoding service</td>
</tr>
<tr>
<td>Integration with external systems* – integration with MBUF system</td>
</tr>
<tr>
<td>Provide invoice to owner/lessee – notice of the charge</td>
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<td>Enforce payment – mechanisms for ensuring everyone pays</td>
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<td>Remit net revenues to road fund – integrate revenue collection with financial systems</td>
</tr>
<tr>
<td>Refund* – flat fee refunds</td>
</tr>
</tbody>
</table>

Enhanced registration functions and new functions* to administer annual flat fee
# Annual Flat Fee – Key Considerations

| Identify subject vehicle and its owner/lessee – connect with vehicle registry | Which vehicles are covered? Which rates to apply? |
| Identify vehicle’s engine type* – collect data directly or connect with VIN decoding service | Which mechanisms to identify eligible vehicles? |
| Integration with external systems* – integration with MBUF system | Allow flat fee payers to opt into MBUF? |
| Provide invoice to owner/lessee – notice of the charge |  |
| Collect payment – a way or ways to pay |  |
| Issue acknowledgement of payment – a receipt |  |
| Enforce payment – mechanisms for ensuring everyone pays |  |
| Remit net revenues to road fund – integrate revenue collection with financial systems |  |
| Refund* – flat fee refunds |  |

*Policy & systems questions*
MBUF – Key considerations

- Identify subject vehicle and its owner/lessee – connect with vehicle registry
- Generate distance traveled data for subject vehicle over designated time* – report data
- Access distance data* – receive reporting of distance data
- Apply distance charge rates* – data process to determine amount of charges
- Provide invoice to owner/lessee – notice of the charge
- Collect payment – a way or ways to pay
- Issue acknowledgement of payment – a receipt
- Enforce payment – mechanisms for ensuring everyone pays
- Remit net revenues to road fund – integrate revenue collection with financial systems
- Process refunds* – MBUF refunds

Enhanced registration functions and new functions* to administer MBUF
**MBUF – Key considerations**

- **Identify subject vehicle and its owner/lessee**—connect with vehicle registry
- **Generate distance traveled data for subject vehicle over designated time**—report data
- **Access distance data**—receive reporting of distance data
- **Apply distance charge rates**—data process to determine amount of charges
- **Provide invoice to owner/lessee**—notice of the charge
- **Collect payment**—a way or ways to pay
- **Issue acknowledgement of payment**—a receipt
- **Enforce payment**—mechanisms for ensuring everyone pays
- **Remit net revenues to road fund**—integrate revenue collection with financial systems
- **Process refunds**—MBUF refunds

**Policy & systems questions**

- Vehicles covered and applicable rates?
- Which mileage reporting choices?
- Support inhouse, outsource or hybrid?
- How to protect privacy?
- Cap annual MBUF at flat fee value?
- Offer prepay or post-pay?
- Which payment means?
- Mechanisms to report MBUF revenue
- Which mechanisms and policies to detect and enforce MBUF violations?
- Considerations for adjudications
- Which refund mechanisms for users without GPS reporting?
Flat Fee & MBUF system design options

Flat Fee

MBUF 1
Self reporting option

MBUF 2
Odometer-based option

MBUF 3
Technology based option

MBUF 4
Odometer-based and tech-based options
MBUF options

MBUF 1  Self reporting  option
MBUF 2  Odometer-based option
MBUF 3  Technology-based option
MBUF 4  Odometer-based & tech-based options
MBUF options

MBUF 1
Self reporting option

Report odometer reading

DMV
MBUF options

MBUF 2
Odometer-based option

Self-report

Vehicle inspection stations

Annual Odometer readings

DMV
MBUF options

MBUF 3
Technology-based option

enroll

Provide technology

Account Manager

Report mileage
MBUF options

MBUF 4
Odometer-based & tech-based options

enroll

Vehicle inspection stations

Account Manager

Provide technology

Report mileage

Annual Odo readings

DMV
Summary of MBUF options
Odometer-based & Account-based reporting options

- **MBUF 1**: Self reporting option
  - Report odometer reading
  - DMV

- **MBUF 2**: Odometer-based option
  - Self-report
  - Vehicle inspection stations
  - Annual Odometer readings
  - DMV

- **MBUF 3**: Technology-based option
  - Enroll
  - Provide technology
  - Account Manager
  - Report mileage
  - Vehicle inspection stations
  - Annual Odo readings

- **MBUF 4**: Odometer-based & tech-based options
  - Enroll
  - Provide technology
  - Account Manager
  - Report mileage
  - Vehicle inspection stations
  - DMV
FF & MBUF cost considerations

- MBUF system design options (odometer or account-based)
- MBUF delivery strategy (inhouse, outsource, hybrid)
- Rate setting (flat fee rate and MBUF rate)
MBUF system design options – reporting methods

• Odometer reporting
  ▪ Self-reporting
  ▪ Use of data reported at annual vehicle inspection
  ▪ Odometer image capture

• Automated reporting
  ▪ ODB-II Plug-in devices
  ▪ Native automaker telematics
  ▪ Smartphone app

Vermont Road Usage Charging Advisory Committee September 29, 2021
MBUF delivery strategy

- There are three MBUF reporting paradigms for estimating costs:
  1. **Odometer.** The state only offers odometer reporting.
  2. **Automated.** The state offers only automated mileage reporting.
  3. **Hybrid.** The state offers a hybrid between odometer and automated reporting

For each reporting paradigm, the state may apply different delivery strategies:
- Support inhouse
- Outsource to private vendors
- Hybrid solution (Administer odometer-based methods inhouse and outsource automated methods)
Key policy decisions impacting cost of collection for FF&MBUF

**Flat fee rate.**

- The relative rates at which the flat fee is set will impact the choice drivers will make between the flat fee and the mileage-based user fee.
- For example, if the flat fee is equal to the amount that the median vehicle would pay in MBUF, then we would expect half of vehicles to choose MBUF and the other half to choose the flat fee.
- Those choosing MBUF would be the 50% who reason to save money by driving less than average and, therefore, saving money compared to the flat fee.
# Annual cost estimation for FF/MBUF operating scenarios

<table>
<thead>
<tr>
<th>Cost of operations</th>
<th>Operating scenarios</th>
<th>Scenario 1: Flat fee $209 Hybrid</th>
<th>Scenario 2: Flat fee $278 Odometer</th>
<th>Scenario 3: Flat fee $139 Odometer</th>
<th>Scenario 4: Flat fee $139 Hybrid</th>
<th>Scenario 5: Flat fee $209 Automated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flat fee (% of Average MBUF)</td>
<td>150% ($209)</td>
<td>200% ($278)</td>
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<td>150% ($209)</td>
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<tr>
<td>MBUF system design choices</td>
<td>Odometer &amp; Automated</td>
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<tr>
<td>MBUF delivery strategy</td>
<td>State</td>
<td>State</td>
<td>State</td>
<td>State CAM</td>
<td>CAM</td>
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</tr>
<tr>
<td>% Choosing MBUF over flat fee</td>
<td>83%</td>
<td>97%</td>
<td>50%</td>
<td>50%</td>
<td>83%</td>
<td></td>
</tr>
<tr>
<td>% Choosing Odometer MBUF over Automated</td>
<td>80%</td>
<td>100%</td>
<td>100%</td>
<td>50%</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>% of revenue collected</td>
<td>2030: 15% 2040: 10%</td>
<td>2030: 6% 2040: 2%</td>
<td>2030: 6% 2040: 1%</td>
<td>2030: 20% 2040: 16%</td>
<td>2030: 27% 2040: 22%</td>
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<tr>
<td>% of revenue collected: 2030 → 2040</td>
<td>2030: 15% 2040: 10%</td>
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<td>2030: 6% 2040: 1%</td>
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### Key takeaways

- Odometer-based methods most cost efficient to operate.
- Major driving costs is the number of vehicles choosing automated reporting.
- Lower costs of collection as more users join MBUF program.
Assess feasibility for Flat Fee/MBUF options

- System compatibility & needs
- Consistency with Guiding Principles
- Manageable costs
- Adequate net revenues
- Political acceptance
Guiding principles for policy and system design

- **Do No Harm**
  - Revenue neutrality
  - Sustained EV uptake

- **Equitable & Fair**
  - User pay system
  - Users have choices
  - Privacy and security data protected
  - Equitable cost distribution (rural/urban, income)

- **Feasible & Efficient**
  - Ease of administration/minimal government burden
  - Enforceable
  - Simplicity of compliance and ease of use
  - Accurate and system performance

- **Transparent and Accountable**
  - Open system
  - Open to competing vendors
  - Accountable oversight

- **Adaptive for the future**
  - Integration with other state policies
  - Interoperability with other state systems
  - Flexible, secure, and scalable
## Feasibility Assessment: Consistency with Guiding Principles

<table>
<thead>
<tr>
<th>Guiding Principles</th>
<th>MBUF options</th>
<th>Annual Flat fee</th>
<th>MBUF 1 Self reporting option</th>
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<th>MBUF 4 Odometer based &amp; tech-based reporting options</th>
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<tbody>
<tr>
<td>Do Not Harm</td>
<td>Medium</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Equitable &amp; Fair</td>
<td>Low</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Feasible &amp; Efficient</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
</tr>
<tr>
<td>Transparent &amp; Accountable</td>
<td>High</td>
<td>Low</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Adaptive for the Future</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>High</td>
<td>High</td>
<td>High</td>
</tr>
</tbody>
</table>
## Feasibility Assessment: Systems compatibility & needs

<table>
<thead>
<tr>
<th>Systems compatibility</th>
<th>MBUF options</th>
<th>Annual Flat fee</th>
<th>MBUF 1 Self reporting option</th>
<th>MBUF 2 Odometer-based option</th>
<th>MBUF 3 Tech-based reporting options</th>
<th>MBUF 4 Odometer based &amp; tech-based reporting options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vehicle registry system (DMV)</td>
<td>Existing</td>
<td>Enhanced</td>
<td>Enhanced</td>
<td>n/a</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td>Odometer-based system (Safety inspection)</td>
<td>n/a</td>
<td>n/a</td>
<td>Existing</td>
<td>n/a</td>
<td>Existing</td>
<td></td>
</tr>
<tr>
<td>Account-based system</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>New</td>
<td>New</td>
<td></td>
</tr>
</tbody>
</table>

- System exists to support MBUF option(s)
- Enhancement required to existing system to fully support MBUF option
- New system required to support MBUF option
## Feasibility Assessment: Manageable costs

<table>
<thead>
<tr>
<th>Costs</th>
<th>MBUF options</th>
<th>Annual Flat fee</th>
<th>MBUF 1 Self reporting option</th>
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<th>MBUF 3 Tech-based reporting options</th>
<th>MBUF 4 Odometer based &amp; tech-based reporting options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relative system costs (as a % of revenue collected)</td>
<td>Minimal</td>
<td>Minimal</td>
<td>Low (2-6%)</td>
<td>High (22-27%)</td>
<td>Medium (15-20%)</td>
<td></td>
</tr>
</tbody>
</table>
Key decisions & recommendations for FF/MBUF implementation
## Key policy decisions impacting system design for FF&M BUF

<table>
<thead>
<tr>
<th>Policy decisions</th>
<th>Options</th>
</tr>
</thead>
</table>
| Which vehicles are covered? | • EV/PHEV only  
  • All alternative fuel vehicles  
  • High mpg liquid fuel vehicles  
  • All vehicles |
### Key policy decisions impacting system design for FF&MBUF

<table>
<thead>
<tr>
<th>Policy decisions</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rate considerations</td>
<td>• Allow flat fee payers to opt-in to MBUF?</td>
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<td></td>
<td>• Cap annual MBUF at flat fee value?</td>
</tr>
</tbody>
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### Key policy decisions impacting system design for FF&M BUF

<table>
<thead>
<tr>
<th>Policy decisions</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Refunds or exemptions for vehicles without GPS reporting</td>
<td>• Standard exemption (e.g., 3,000 miles)</td>
</tr>
<tr>
<td></td>
<td>• Variable exemption (based on registration location)</td>
</tr>
<tr>
<td></td>
<td>• Manual refunds</td>
</tr>
<tr>
<td></td>
<td>• No refunds</td>
</tr>
</tbody>
</table>
Key policy decisions impacting system design for FF&MBUF

<table>
<thead>
<tr>
<th>Policy decisions</th>
<th>Options</th>
</tr>
</thead>
</table>
| Privacy          | • non-location based MBUF reporting  
|                  | • require private companies to process location data  
|                  | • guarantee privacy rights in law  
|                  | • offering further privacy rights in user agreements |
### Key organizational decisions for FF&MBUF

<table>
<thead>
<tr>
<th>Policy decisions</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Account Management structure</td>
<td>• Implement a state operated system</td>
</tr>
<tr>
<td></td>
<td>• Implement a private sector operated system</td>
</tr>
<tr>
<td></td>
<td>• Implement a hybrid system operated by state and private sector</td>
</tr>
<tr>
<td>Separation of roles between state and private sector</td>
<td>• Typical private sector functions</td>
</tr>
<tr>
<td></td>
<td>• Account management</td>
</tr>
<tr>
<td></td>
<td>• Technology distribution and management</td>
</tr>
<tr>
<td></td>
<td>• Typical state managed functions</td>
</tr>
<tr>
<td></td>
<td>• RUC Accounting (System to compile data on MBUF usage)</td>
</tr>
<tr>
<td></td>
<td>• Enforcement (Detection and penalization of MBUF violations)</td>
</tr>
<tr>
<td></td>
<td>• Adjudication (Civil appeal of any assigned penalties)</td>
</tr>
<tr>
<td>Procurement strategy for RUC operations</td>
<td>• Single vendor or open market with multiple vendors</td>
</tr>
</tbody>
</table>
## Future system design decisions for FF&MBUF – Roadmap

<table>
<thead>
<tr>
<th>Future Need</th>
<th>State activities to meet the need</th>
</tr>
</thead>
</table>
| Interoperability with other states    | • Sign agreements with other states.  
                                         • Create an interoperability hub with other states.                                                                                                           |
| Integration with automakers           | • Encourage automakers to support MBUF.  
                                         • Integrate automaker support when its available.                                                                                                           |
| Transition MBUF to all light vehicles | • Plan transition (technical, financial, operational)  
                                         • Execute plan                                                                                                                                               |
| Support of commercial fleets          | • Ensure DMV and/or account manager have fleet supporting interface                                                                                                                                                  |
| Inclusion of heavy vehicles           | • Consider if and if so, when, to include heavy vehicles  
                                         • If they will be included, plan policies, technologies, and operations as both will differ from those for light vehicles  
                                         • Execute plan                                                                                                                                                    |
Flat Fee/MBUF recommendations

Short term
1. Begin with a small, flat fee/MBUF option program.
2. Use vehicle inspection odometer records as a basis for MBUF for most vehicles.
3. Use self-reporting or odometer image capture to get odometer records in cases of vehicles exiting the state or leaving the program.

Longer term
4. If enough Vermonters show interest in location-based reporting, the MBUF program should eventually include a Commercial Account Manager offering OBDII plug-in devices for vehicles that do not want to pay for out-of-state or off-road miles driven. This service need not be in place when the system starts.
5. If a Commercial Account Manager is used, employ an open system (open specifications) from the start. When the market is large enough to support multiple account managers, create an open market.
6. Include privacy protection and enforcement provisions in any law creating an MBUF.
7. Consider program expansion after launch and evaluation.
Key considerations for per-kilowatt hour fee for EV charging at public charging stations
Vermont’s per-kilowatt hour fee concept

A **per kilowatt hour fee** is a volume-based fee on the amount of energy transferred to an electric vehicle over one hour.

**Vermont resident EV drivers** would not bear the burden of paying the **per-kWh fee**.

**Per kilowatt hour fee** would be assessed on electricity recharging at public charging stations and paid by non-resident electric vehicles drivers travelling on Vermont roads.
**Per kWh – system functions**

1. **Identify subject vehicle and its owner/lessee** – EV owner presents as payer at PCS
2. **Generate kWh data** – Recharge subject vehicles at public charging stations
3. **Measure consumption data (kWh or Time of Use)** – PCS accurately measures kWh data
4. **Apply per-kWh fee rate to consumption data** – Calculate fee amount owed
5. **Provide invoice to owner/lessee** – notice of the charge
6. **Collect payment** – support way(s) to pay
7. **Issue acknowledgement of payment** – provide receipt for payment
8. **Enforce payment** – mechanisms for ensuring everyone pays
9. **Remit net revenues to road fund** – integrate revenue collection with financial systems
10. **Refunds** – refund mechanisms
**Per kWh – key considerations**

- **Identify subject vehicle and its owner/lessee** – EV owner presents as payer at PCS
- **Generate kWh data** – Recharge subject vehicles at public charging stations
- **Measure consumption data (kWh or Time of Use)** – PCS accurately measures kWh data
- **Apply per-kWh fee rate to consumption data** – Calculate fee amount owed
- **Provide invoice to owner/lessee** – notice of the charge
- **Collect payment** – support way(s) to pay
- **Issue acknowledgement of payment** – provide receipt for payment
- **Enforce payment** – mechanisms for ensuring everyone pays
- **Remit net revenues to road fund** – integrate revenue collection with financial systems
- **Refunds** – refund mechanisms

**Questions:**
- How to identify non-resident drivers?
- How/where EVs recharge batteries?
- Pricing mechanisms for collecting per-kWh fee?
- How to ensure accuracy?
- What details to include? How to protect privacy?
- Where to collect payment?
- How to protect residents from paying?
- Which options to protect Vermonters from paying the fee?
Challenges for a per-kWh fee

• Which business processes for collecting the per-kWh fee?
• How to ensure only nonresident EV drivers are responsible for per-kWh fee?
• How to ensure the accuracy of kWh measurement?
• How to recover the added cost of new data collection and billing system upgrades per kWh measurement and fee collection?
• How to maintain a low cost of collection?
• How to protect the privacy of sensitive information?

Many of these questions do not have answers due to the use of emerging technology, lack of standard practices across the industry for data collection, measurement and pricing.
Preliminary findings and key questions to answer
Charge Vehicles – How EVs recharge batteries

Three levels of EV charging:

- **Level 1**: Alternative-Current (AC) 120 volt. A typical electric outlet at home.
- **Level 2**: Alternative-Current (AC) 208 volt to 240 volt for clothes dryer etc.
- **Level 3**: Direct-Current (DC) 480 volt to 900 volt for fast charging and supercharging (Tesla).

Commercial EV public charging stations apply Level 2 and Level 3 charging.
Pricing mechanisms for collecting per-kWh fee?

Two existing options – kWh and Time of Use

<table>
<thead>
<tr>
<th>Public charging</th>
<th>AC Level 2</th>
<th>DC Fast Charging (Level 3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blink</td>
<td>kWh</td>
<td>Time of Use</td>
</tr>
<tr>
<td>Tesla</td>
<td>kWh</td>
<td>Time of Use</td>
</tr>
<tr>
<td>Charge Point</td>
<td>Time of Use</td>
<td>kWh</td>
</tr>
<tr>
<td>EVGo</td>
<td>Time of Use</td>
<td>Time of Use</td>
</tr>
<tr>
<td>Electrify America</td>
<td>Time of Use</td>
<td>kWh</td>
</tr>
<tr>
<td>Beneficial Charging</td>
<td>Free or at cost</td>
<td>Free or at cost</td>
</tr>
</tbody>
</table>
## Where to collect payment?

Four options based on electricity distribution stream

<table>
<thead>
<tr>
<th>DISTRIBUTION</th>
<th>WHO PAYS</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>DOWNSTREAM</td>
<td>EV OWNER PAYS AT RETAIL</td>
<td>Station owner collects fee from EV owner based on kWh transferred.</td>
</tr>
<tr>
<td>MIDSTREAM</td>
<td>CHARGING STATION OWNER PAYS (GAS TAX MODEL)</td>
<td>Station owner pays fee to state and builds cost into retail price.</td>
</tr>
<tr>
<td>UPSTREAM</td>
<td>ELECTRIC UTILITY PAYS</td>
<td>Utility pays fee to state and builds cost into wholesale price.</td>
</tr>
<tr>
<td>MIDSTREAM</td>
<td>BENEFICIAL (FREE &amp; AT-COST) CHARGING STATION OWNER PAYS</td>
<td>Beneficial station pays fee and collects reimbursement, donation or nothing from EV owners.</td>
</tr>
</tbody>
</table>
How to ensure accuracy of kWh measurement? Availability of revenue-grade metering for per-kWh fee

<table>
<thead>
<tr>
<th></th>
<th>(1) EV OWNER PAYS AT RETAIL</th>
<th>(2) CHARGING STATION OWNER PAYS (GAS TAX MODEL)</th>
<th>(3) ELECTRIC UTILITY PAYS</th>
<th>(4) BENEFICIAL CHARGING STATION OWNER PAYS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dedicated utility meter</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Submetering</td>
<td>Maybe</td>
<td>Maybe</td>
<td>n/a</td>
<td>No</td>
</tr>
<tr>
<td>EV charging equipment</td>
<td>Yes</td>
<td>Yes</td>
<td>n/a</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Options to protect Vermonters from paying per-kWh fee

<table>
<thead>
<tr>
<th></th>
<th>(1) EV OWNER PAYS AT RETAIL</th>
<th>(2) CHARGING STATION OWNER PAYS</th>
<th>(3) ELECTRIC UTILITY PAYS</th>
<th>(4) BENEFICIAL CHARGING STATION OWNER PAYS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Present receipts of fee to get credit</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Present Vermont identification to get discount</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Input discount code to get discount</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Use receipts of electricity purchase to calculate credit</td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>
### Comparisons to other states that enacted per-kWh fees/taxes

<table>
<thead>
<tr>
<th></th>
<th>IOWA</th>
<th>OKLAHOMA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Who pays tax</td>
<td>Licensed electric fuel dealers</td>
<td>EV drivers</td>
</tr>
<tr>
<td>Where tax collected</td>
<td>Point-of-sale</td>
<td>Point-of-sale</td>
</tr>
<tr>
<td>Equipment required</td>
<td>In manner prescribed by Department of Revenue</td>
<td>Requires accurate metering system but exempts legacy systems</td>
</tr>
<tr>
<td>Resident exemption</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Tax rate</td>
<td>$0.026 per-kWh</td>
<td>$0.03 per-kWh</td>
</tr>
<tr>
<td>Effective date</td>
<td>July 1, 2024</td>
<td>January 1, 2023</td>
</tr>
</tbody>
</table>
Per kWh fee recommendations for Vermont
**Per-kWh fee recommended findings**

**Recommended findings:**

- Imposition of per-kWh fee concept on nonresident EV drivers at public charging stations is not imminently doable.
- The gas tax model (Charging Station Owner Pays) shows most promise for application of a per-kWh fee on all transfers of electricity to non-resident EVs at public charging stations but would require accurate revenue-grade metering equipment.
- Imposing a requirement for accurate metering equipment at public charging stations without a method for cost recovery would disrupt the current business operations of many existing public charging stations, especially benevolent stations, and therefore impede opening new EV public charging stations.
Per-kWh fee recommended actions

Recommendations:

• Vermont should undertake a pilot program to test the gas tax model approach to collection of the per-kWh fee. The pilot should include at least the following elements:
  o Research and analyze the cost and impact of requiring all public charging stations in Vermont to have the metering capability necessary to collection the fee.
  o Examine the possibilities for cost recovery of software and hardware upgrades at public charging stations.
  o Determine the impact of imposing the fee on beneficial public charging stations.
  o Evaluate the various possibilities for ensuring resident EV owners are not burdened by per-kWh fee.
Road Usage Charge
Rate Setting
Best practice rate setting in other jurisdictions

Three have established revenue collecting light-duty vehicle MBUF systems

<table>
<thead>
<tr>
<th>Jurisdictions</th>
<th>Basis for rate</th>
<th>Applicable vehicles</th>
<th>AEV rate (Flat fee/MBUF)</th>
<th>PHEV rate (Flat fee/MBUF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oregon</td>
<td>Average gas tax paid per mile by vehicles not paying RUC</td>
<td>Light-duty vehicles of 40 MPG or greater</td>
<td>$158 or $0.018 per mile</td>
<td>$76 or $0.018 per mile</td>
</tr>
<tr>
<td>Utah</td>
<td>Average gas tax paid per mile by vehicles not paying RUC</td>
<td>AEVs and PHEVs only</td>
<td>$120 or $0.015 per mile</td>
<td>$52 or $0.015 per mile</td>
</tr>
<tr>
<td>New Zealand</td>
<td>Cost allocation model calculates rates to raise revenue for projected spending based on allocating costs by vehicle type and impact on spending</td>
<td>All light-duty vehicles not powered by gasoline or natural gas and all heavy-duty vehicles</td>
<td>$0.076 per mile (AEVs exempt until March 31 2024) (No flat fee except registration)</td>
<td>Pays gas tax only at standard rate ($1.86 gallon) (No flat fee except registration)</td>
</tr>
</tbody>
</table>
Guiding criteria for rate setting

- **Revenue generating potential**
  - Net revenue able to be generated

- **Do No Harm**
  - Avoid negative impacts on AEV/PHEV uptake

- **Equitable & Fair**
  - Equity and revenue neutrality
  - Economic efficiency

- **Feasible & Efficient**
  - Operational feasibility

- **Adaptive for the future**
  - Financial sustainability
  - Flexibility

Vermont Road Usage Charging Advisory Committee September 29, 2021
Updated fee estimates methodology

- 2013 estimates reviewed with updated data and assumptions
- Average fuel economy for new or all light-duty vehicles in Vermont?
- Average vehicle miles traveled for light-duty vehicles in Vermont
- Estimated average fuel consumption of PHEVs (to estimate gap in gas tax paid per mile compared to gasoline powered light-duty vehicles).
- Varying assumptions
- Unlike flat fee and MBUF, per kWh fee is not seeking to recover equivalent to gas tax paid

Additional data needed to refine estimates for per kWh fee and PHEV fees, such as proportions of energy charged at public charging stations, relative use of electricity vs. gasoline for PHEVs and recovery of costs of per kWh Vermont vehicle exemptions
## Updated fee estimates - *results*

<table>
<thead>
<tr>
<th>Type of fee/vehicle type</th>
<th>AEVs</th>
<th>PHEVs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Original flat fee estimates</strong></td>
<td>$120 (2013 prices)</td>
<td>$71</td>
</tr>
<tr>
<td><strong>Revised flat fee estimate</strong></td>
<td>$139</td>
<td>$44</td>
</tr>
<tr>
<td><strong>MBUF estimate</strong></td>
<td>$0.013 per mile</td>
<td>$0.013 per mile (with gas tax credit)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$0.005 per mile (without gas tax credit)</td>
</tr>
<tr>
<td><strong>Per kWh estimate</strong></td>
<td>$0.04 per kWh</td>
<td>$0.04 per kWh</td>
</tr>
</tbody>
</table>

Flat fee estimate assumes MPG for all light-duty vehicles in Vermont and VMT for all light-duty vehicles is applicable, assumes PHEVs pay 68% of gas tax of average light-duty vehicle per mile.
Equity and revenue neutrality

High level issues

• Owners of AEVs and PHEVs pay significantly less to use the roads than other light-duty vehicle owners
• Average light-duty vehicle age in Vermont is 9.9 years, but AEV age US-wide averages at 3.9 years, indicating owners of AEVs tend to buy new vehicles
• The amount of gas tax paid for a vehicle’s road use is not capped
• A flat fee is effectively a cap on how much fee is levied to drive
• MBUF and a per kWh fee could be capped or not
• Revenue neutrality seeks to ensure two different light-duty vehicles are levied on average the same for similar road use patterns
• Net revenue neutrality should be considered (revenue after costs of collection for a mature system)
Equity and revenue neutrality

Rural vs. urban owners

• 55% of AEVs (53% of PHEVs) are owned in the three counties with the highest population density (where 44% of the population live)
• Research across nine states indicates rural drivers do not drive on average significantly greater miles than urban drivers (urban drivers drive more frequent shorter trips)
• Further data needed to establish Vermont profile of AEV/PHEV rural vs. urban users

Income and AEV/PHEV ownership

US wide data indicates

• 79% of AEV (80% of PHEV) purchases are from households earning >$50k per annum (57% over $100k per annum in income)
• 78% of owners of AEVs and PHEVs are in households with two or more vehicles
• Profile of AEV/PHEV owners has not changed in eleven years
Future proofing revenues

Three best practice techniques have been applied elsewhere to ensure revenues are not eroded over time

- **INFLATION ADJUSTMENT BASED ON INFRASTRUCTURE COSTS**: Automatic adjustment of rates based on inflation of types of expenditure that the fee is used to fund.

- **MODEL REVENUE TO REFLECT CHANGES IN DRIVER BEHAVIOR**: Regular revenue modeling of projected revenue based on actual observed fleet changes, VMT and energy consumption compared to forecasts.

- **UNDERTAKE A COST RESPONSIBILITY STUDY AND REGULARLY UPDATE IT**: This should inform a revenue model, by forecasting future spending and use well established economic principles to allocate types of spending to different types of vehicles and fees, so fees reflect what money is being spent on whom.
Agenda topics for 3rd Road Usage Charge Advisory Committee Meeting in November 2021
Agenda topics

▪ Reports on additional stakeholder input
▪ Carryover topics from September 29th meeting
▪ Presentation: Financial analysis of Vermont Road Usage Charge Concept
▪ Presentation: RUC management and operational structure
▪ Presentation: RUC concept implementation v. pilot test
▪ Decisions:
  ▪ Management and operational structure
  ▪ Feasibility or pilot program for RUC Concept
  ▪ Recommendation on implementation or pilot test