



Road Usage Charge Advisory Committee

December 22, 2021

2:30 to 4:30 pm

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Montpelier

Phone Conference ID: 806 799 117#

Meeting Physical Location

3rd Floor Conference Room

Vermont Department of Motor Vehicles

120 State Street

Montpelier, VT

Agenda with Approximate Times:

2:30 PM Welcome, Roll Call and Review of the Agenda (*Chair, Michele Boomhower, VTrans*)

2:40 PM Per kWh Memorandum and Recommendation

3:10 PM Mileage-Based User Fee Memorandum and Recommendation

4:00 PM Next Steps

4:30 PM Adjournment

Contact

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MEMORANDUM

To: Vermont Agency of Transportation
From: CDM Smith
Date: December 1, 2021
Subject: Work Program for Per Kilowatt Hour Fees

This memo includes recommendations from the consultant, CDM Smith, for consideration and discussion by the Vermont Agency of Transportation and the Road Usage Charge Advisory Committee and does not necessarily reflect the Agency's position or approved policies.

1. Introduction

Since the second Road Usage Charge Advisory Committee meeting on September 29, 2021, the Agency of Transportation has undertaken an analysis of the current value of establishing a Per-kWh Fee for non-residents to pay at Vermont charging stations. The purpose of this analysis was to determine whether it is sensible to establish a Per-kWh Fee in Vermont at this time especially with the limited knowledge on the maturity of the technology required to reliably capture information on electricity transferred to vehicles at public charging stations across the state.

Short Answer: Using conservative (optimistic) assumptions, the Agency of Transportation's analysis estimates that a Per-kWh on electricity transferred to non-resident vehicles will currently generate approximately \$5,000 in revenue per year. Therefore, the Agency of Transportation has concluded, and the consulting team agrees, there is little value in establishing a Per-kWh fee for non-resident drivers at this time.

The technical implications, and thus costs, to measure electricity usage from potentially heterogeneous public charging stations are largely unknown. In the absence of a structural framework and standards for public charging stations to measure and report electricity transferred to vehicles, it does not seem sensible to establish a Per-kWh Fee in the near-term.

The agency should continue to research the topic to better understand the key stakeholders involved and conditions which will indicate value for a Per-kWh Fee on non-resident drivers in the state. This research can aim to identify potential issues for a charging network to collect the fee and cost implications for the state. Research findings will ultimately inform the structural framework required to collect the Per-kWh reliably and consistently.

2. The analysis

Synopsis	
Usage per Year per Station (kWh)	1,650
Number of Public Charging Stations 2021	311
Total Usage (kWh)	513,150
Percent Out-of-Staters	25%
Total Usage by Out-of-Staters	128,288
Per kWh Fee Rate	\$ 0.034
Total Estimated Revenue Generated in 2021	\$ 4,362

To determine the estimated annual net revenue generated by a Per-kWh Fee on non-resident drivers, the analysis must:

1. Estimate the total annual electricity, by kWh, transferred at public charging stations in Vermont by multiplying an estimate of the average annual usage per charging station by the estimated number of public charging stations in Vermont;
2. Determine how much of this transfer to attribute to non-resident drivers;
3. Apply a Per-kWh Fee rate to the total assumed kWh transferred annually to non-resident vehicles to calculate the estimated revenue generated;
4. Determine the costs of measuring electricity consumption and administering the Per-kWh Fee to calculate whether assessing the fee is financially viable.

Assumptions to estimate revenue

- **1650 kWh transferred to vehicles annually on average per public charging station in Vermont.** This is the combined average of annual usage per public charging station for Green Mountain Power (GMP) and Burlington Electric (BED). The combined average is based on the average of BED's 17 stations average of 4,610 kWh per year and the average of GMP's 81 charging stations of 972 kWh per year. BED's charging stations are located primarily in the Burlington area; whereas GMP charging stations are located throughout the state in smaller cities. $[(17 \times 4610) + (81 \times 972) = 1603]$.
- **311 public charging stations where a per-kWh can be collected.** This is the current number of public charging stations shown on the Drive Electric website. This analysis assumes it is technically possible to collect a fee at all these stations, a status which unknown at this point, but improbable.
- **25 percent of non-resident drivers currently using public charging stations in Vermont.** This analysis uses 25 percent because it is consistent with reported gasoline sales by

non-Vermonters based on credit card receipts. This assumption is greater than the percentage of non-resident drivers using public charging stations owned by GMP (13 percent)¹ and BED (16 percent)², but the consumption of electricity by non-resident drivers in Vermont may come into par with current gasoline purchases.

- **3.4 cents per kWh is the assumed Per-kWh Fee rate.** This is the fee rate identified in *Per the Act 12: Section 28 Report (2013). A Study on Replacing Motor Fuel Tax Revenues Not Collected from Plug-In Electric Vehicles.*

3. The recommended research program

It may be financially viable to establish a Per-kWh Fee on the transfer of electricity to non-resident vehicles at public charging stations in Vermont when the number of public charging stations in the state increases and amount of electricity transferred to non-resident vehicles increases to a sufficient amount. A higher fee rate may also improve prospects for financial viability. To draw any conclusion on financial viability, the cost aspects must also be determined.

To determine when conditions become appropriate for establishment of a Per-kWh Fee on non-resident vehicle charging, the state of Vermont should undertake a research program to inform future decision-making. The research program should generate answers for the following issues by obtaining and evaluating the following information:

- **The adoption rate for EVs in surrounding states.** Helpful for determining this adoption rate would be:
 - The current number of EVs registered in surrounding states and forecasted EV adoption rates in those states.
- **Impact on gas tax revenues.**
 - The current impact of non-resident EVs on the state gas tax, including at what point the revenue loss will become significant enough to warrant establishment of a Per-kWh Fee at public charging stations, or some other yet to be determined means.
- **Setting the Per-kWh Fee rate for non-resident vehicles.**
 - Since the 3.4 cents per-kWh rate was based on electricity usage by Vermont vehicles, the agency should gather the following information to determine

¹ GMP provided data for 80 charging locations throughout its service area. Of the 1009 transactions in 2020 with valid zip codes, 75% had a Vermont zip code, 13% had a non-Vermont zip code, and 12% were unknown.

² BED provided data for 17 publicly available charging stations for over 45,000 sessions since 2016. 84% of sessions were by VT residents and 16% non-Vermont residents.

whether a different, higher rate for non-resident vehicles would be warranted for recharging non-resident vehicles based on the relative impact of their driving on the state's road system.

- The non-resident EV travel patterns while traveling in Vermont, including total miles traveled in the state.
 - The locations of places where non-resident EV drivers recharge their vehicles while in Vermont, including public charging stations and charging events at places of lodging or other businesses.
 - Since the 3.4 per-kWh rate was proposed in a 2013 analysis, the agency should determine whether the recommended rate should be raised to account for inflation.
- **Determine the capability of existing public charging stations and plans for the future of public charging in the state.**
 - To determine the capability of public charging stations to accurately collect a Per-kWh Fee, the agency should obtain the following characteristics of non-residential EV charging in the state:
 - The number of existing public charging stations which have the technical capability—a dedicated revenue-grade meter—to collect a Per-kWh Fee and the feasibility and cost of adding dedicated revenue-grade meters to stations without them.
 - Whether charging networks can collect a Per-kWh Fee with or without a dedicated meter.
 - The number of non-residential charging stations accessible to non-resident drivers at places of lodging or other businesses that are not considered public stations.
 - The ownership and operational characteristics of these non-public stations.
 - Whether the state can feasibly collect a Per-kWh fee at these non-public stations and whether enough charging occurs at these stations to justify collecting the fee.
 - To determine the future capability of public charging stations to accurately collect a Per-kWh Fee, the agency should obtain information about the planned growth of public charging station networks in the state and project the nature of this growth.
- **Resident exemptions from the Per-kWh Fee.**
 - Whether Vermont residents should be exempt from paying the Per-kWh Fee at public charging stations. To determine this, the agency should gather the following information:
 - How would paying the Per-kWh Fee impact Vermont registered vehicle owners generally and quantification of the impact.
 - How would paying the Per-kWh Fee impact Vermont registered vehicle owners who are part of groups that have been economically and/or socially marginalized and quantification of the impact.

4. Conclusion

Using conservative assumptions, the amount of revenue estimated to be raised this year from a Per-kWh Fee is around \$5,000 even with an inflation adjusted rate. The general EV market in neighboring states would have to improve by a large amount to warrant the cost of imposing a Per-kWh fee on non-resident EV drivers in the next few years. Later this decade, however, a Per-kWh Fee on non-resident driving may prove viable financially. This possibility encourages the undertaking of additional research about how a Per-kWh Fee on non-resident driving would actually work from a technical standpoint and how much it would cost.

Too little is known about how to technically implement a Per-kWh fee and its cost implications to go forward at this time. This memorandum outlines a research program which should reveal this essential information. Given the expected growth of EVs in Vermont and neighboring states later this decade, the state of Vermont should undertake this research program to prepare for the future.

MEMORANDUM

To: Vermont Agency of Transportation
From: CDM Smith
Date: December 10, 2021
Subject: MBUF Recommendation for Plug-in Electric Vehicles

This memo includes recommendations from the consultant, CDM Smith, based on Road Usage Charge Advisory Committee meetings, subcommittee meetings and follow-up conversations with the agency and its vendors, on (1) the system definition of a Mileage Based User Fee (MBUF), (2) findings on the feasibility of implementation of an MBUF program in Vermont, and (3) resolution of key MBUF implementation issues pursuant to additional examination of the preferred MBUF scenario by the Agency of Transportation (AOT), for consideration and discussion by the Vermont Agency of Transportation and the Road Usage Charge Advisory Committee. This recommendation does not necessarily reflect the Agency's position or approved policies.

1. Introduction

Since the second Road Usage Charge Advisory Committee meeting on September 29, 2021, the Agency of Transportation engaged a subcommittee (Jim Sullivan-Bennington County RPC; Wanda Minoli, Matthew Kostik, Michael Smith – DMV; Trish Hendren-Eastern Transportation Coalition; , Michele Boomhower, Joe Segale, Patrick Murphy - VTrans) to sort through the various issues related to the implementation of an MBUF system in Vermont, including feasibility and cost. The purpose of this engagement was to identify a workable MBUF system that the Vermont Agency of Transportation may want to implement. Since that subcommittee meeting, the consulting team and AOT has had further meetings and follow-up conversations internal to the agency to adjust and flesh-out the recommendations.

Short Answer: Considering practicalities, capital and administrative costs and potential net revenues, among other issues, the consulting team recommends an odometer-based mileage reporting system as the currently preferred system for generating the necessary road usage data to collect a mileage based user fee in Vermont. Odometer readings would be collected during annual vehicle inspections. The consulting team also recommends that the mileage based user fee should apply only to all-electric vehicles and plug-in hybrid-electric vehicles and based on all miles driven. The consulting team recommends a finding that this system is feasible for implementation and that AOT should enter into an assessment process involving DMV and its key stakeholders, IT vendors, and end users to design the optimal system to implement.

2. The considerations for the preferred scenario selection

The MBUF Subcommittee considered several scenarios for possible systems for the MBUF and flat fee. They consisted of whether to collect a flat fee alone, an MBUF alone or collect both as alternatives. They also consisted of collecting mileage data through odometer reporting, automated wireless reporting, or both as alternatives.

Operational feasibility

Research in other states have proven that all of the scenarios have operational feasibility. A flat fee on electric vehicles has been enacted in at least 26 states, two of which provide an alternative MBUF system to avoid paying it. Oregon and Utah have implemented operational programs with automated wireless reporting from an on-board device as the only means of reporting mileage data. Hawaii has developed and tested use of mileage data collected by reading odometers at annual vehicle safety inspections. The state of Washington tested an odometer reporting method as part of the vehicle registration process. All of the scenarios presented are operationally feasible.

Financial feasibility

Despite operational feasibility, not every scenario is financially feasible or desirable for Vermont. Some scenarios simply cost too much to provide adequate net revenues without increasing the MBUF rate. The financial model prepared for this project shows that the operational costs of hiring commercial account managers (CAMs) to provide automated wireless reporting technology and fee collection as much higher than using odometer readings currently reported at DMV's vehicle safety inspections. The capital costs are also high for the CAM model. Since the DMV already collects odometer readings at annual vehicle safety inspections, the costs for the odometer approach should be lower, albeit with additional development costs and potentially additional operational costs if the user experience is not designed appropriately.

MBUF Mileage Reporting Method	Capital Costs (est.)	Operational Costs as a Percentage of Revenue (2030)
Automatic wireless reporting (CAM model)	\$2 to 4 million	22%
Odometer reporting at vehicle inspections	\$1 to 3 million	3.5%

Protection of privacy

Some scenarios raise the challenge of protecting sensitive travel data from improper use. While automated wireless technologies with location-awareness provide the ability to identify whether miles were travels within Vermont or outside Vermont, they generate precise vehicle locations to do so. While many younger drivers show little concern in surrendering their

personal data, other drivers may fear loss of privacy. While other states have identified technological ways to protect data and policies developed in Oregon and Washington show that legislatures can enact legal protections for sensitive data, mere surrender of an odometer number at annual vehicle safety inspections makes the issue moot.

Equity

The flat fee approach is the simplest and the least expensive to implement and operate. Even so, the subcommittee found the flat fee inequitable. Because the flat fee approach charges the same amount for every driver notwithstanding how much they drive, those driving very little—many with low incomes—would essentially subsidize those driving a lot.

Refunds for travel out-of-state

The subcommittee found that the provision of refunds for miles driven outside Vermont is prohibitively expensive from an administrative standpoint. The preference was for an MBUF model similar to collection of the gas tax in that Vermonters pay the gas tax whether or not the miles are driven in Vermont or outside of it. Vermont should collect the MBUF in the same way, with no concern for the location of the miles driven.

The preferred scenario

The MBUF-only approach collected through odometer reporting at Vermont's annual vehicle safety inspection program appears as the preferred scenario, although other odometer reporting methods may have application in certain circumstances, such as mid-year sale of a vehicle. While feasible according to the vendor for Vermont's vehicle safety inspection program, DMV cited concerns about additional cost and operational burden to the existing vehicle inspection and DMV systems that should receive further examination before the state considers implementation.

3. The MBUF system assessment phase

Prior to the implementation of an odometer-based system, the consulting team recommends that AOT engage in a discovery phase to better understand existing systems and functions, as well as key stakeholder and end-user perspectives to inform the system design. This approach would allow AOT to design the optimal experience for end-users, and DMV agents and vehicle inspection station operators who support the program.

The consulting team recommends that the assessment phase last 6 months and comprise three key activities that run concurrently:

- **A DMV impact assessment** to understand how best to align an odometer-based mileage reporting system implementation with DMV initiatives underway for optimal service delivery (and to avoid disruptions to existing services). The assessment has three main

objectives. One, understand organizational capabilities, constraints and needs to minimize the burden on DMV and supporting entities such as vehicle inspection station businesses. Two, understand DMV's suite of services to identify opportunities to best integrate MBUF so it is simple to administer from the DMV perspective and simple to interact with from the end user perspective. Three, understand DMV's technology roadmap to inform recommendations on how to align MBUF implementation with other initiatives to minimize MBUF implementation efforts and ensure MBUF features can be evolved to meet future DMV needs. This activity involves interviews and workshops with DMV representatives and its vendors.

- **Technology assessment** to understand vendors involved and systems that could be leveraged to support odometer-based MBUF reporting. This assessment involves interviews and workshops with the DMV vehicle-registry system vendor (FAST Enterprises) and the vehicle inspection system vendor (Parsons) to understand functions their systems support and the ways their systems could interface to support an odometer-based MBUF program. The technology assessment seeks to answer key questions prior to implementation. A few of these key questions are summarized below:
 - **Odometer data collection.** Confirm that the most viable option to collect odometer readings from vehicles, with minimal disruption to vehicle inspection businesses and end-users, is the fully manual method of a reading taken by the vehicle inspector with confirmation by photograph. Compare this method with other plausible options for viability.
 - **Odometer data verification.** What are the most effective? methods to verify validity of odometer readings collected at inspection stations to minimize administratively costly dispute processes?
 - **Vehicle engine propulsion type identification.** What methods are available to reliably identify vehicle engine propulsion types, in particular, all-electric vehicles and hybrid-electric vehicles?
 - **End user validation.** What are the optimal processes for end users to acknowledge or confirm odometer readings that will be used to compute the MBUF? What are the processes for end users to report alternative odometer readings if they dispute readings collected or under non-ordinary circumstances (e.g., vehicle sale, vehicle loss/theft/destruction)
 - **Invoicing.** How to present MBUF clearly and simply on the invoice (potentially with other fees)? Which invoicing process to implement that provides simple touchpoints for end users and MBUF administrators?
 - **Payment collection mechanisms.** Which choice of payment means, modes, and frequency that could be offered to end users in a cost-effective way? Which payment collection mechanisms to set up to support different payment options offered.
 - **Payment enforcement.** What are the best mechanisms for enforcement? How are outstanding payments communicated across systems to initiate consequences such as a hold on re-registration of the vehicle within the registration system.
 - **Remit fees collected.** Which mechanisms to set up to remit fees collected to DMV and report data are needed for financial reconciliation?

- **Financial reconciliation and audit.** How parties involved in payment collection will report data to state entities for reconciliation and auditing purposes?
- **Data exchange specifications.** Which data to transfer and between which systems (vehicle inspection system, DMV system)? What is the format and frequency of the data exchanges?
- **End-user engagement** to design an optimal and equitable customer journey. This involves engaging a selection of users across the state in focus groups and participatory design activities to design an MBUF experience that is accessible, simple to use, and easy to comply with. Participatory design means involving a few volunteer users to get their direct feedback on plausible MBUF workflow and systems from a usability perspective. Direct user feedback allows to design a system that is most suited to end user needs and is easy for the end user to comply with. Besides offering a positive user experience, a user-oriented system design helps minimize customer support costs and unnecessary enforcement costs. The purpose of this activity is also to investigate relevant equity measures that could be introduced to make MBUF payments more accessible to different population segments (e.g., payment plans). This engagement should allow to answer preliminary questions on the best ways to engage with end users during the following touchpoints:
 - **Data collection and acknowledgment.** What are the best ways to capture odometer reading in ordinary circumstances (regular inspection checks) and non-ordinary circumstances (e.g., vehicle sale)? Should end users be offered the opportunity to dispute odometer readings collected at vehicle inspection stations, and if so, which process flows should be offered?
 - **Invoicing.** Who should distribute the invoices? How should the invoices be distributed? Should MBUF be combined with other fees? Which invoice layouts convey the MBUF in the simplest and clearest way possible? What messaging should be included on invoices to make it easy for end users to comply with payment requirements?
 - **Payment.** Where should payments be collected? What payment choices should be offered for equity purposes?

The outcome of the assessment phase is an odometer-based system design that can be developed and tested in the implementation phase over 18 months.

4. Conclusion

The MBUF system best suited for Vermont is essentially based on odometer reporting at annual vehicle safety inspections. To ensure the system will operate efficiently, with wide public acceptance, and at the lowest feasible cost, AOT should first engage in an assessment process to understand DMV and vendor capabilities, stakeholder impacts, end-user impacts and the best ways to manage them. The assessment phase should set AOT up for a successful implementation phase to prepare the new MBUF system for operations.