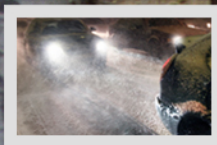




Business Case Evaluation: APPENDICES

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and
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Appendix A: Business Case Evaluation Financial Analysis Assumptions

Summary of Quantitative Assumptions

Key assumptions that determine the costs associated with road usage charge administration and collection are shown here.

Business Case Model Inputs

Category (Units)	Value	Source
Inflation based on 2013 CPI (percent per year)	2.0%	http://www.bls.gov/news.release/pdf/cpi.pdf
30-year nominal discount rate (percent per year)	3.0%	http://www.whitehouse.gov/sites/default/files/omb/memoranda/2013/m-13-04.pdf
Device communications paid by state (percent of total cost)	50%	Assumption
Cost to purchase in-vehicle device for Concept C	\$40	Industry estimate
Average time to conduct an audit (person-hours) – A	0	Assumption
Average time to conduct an audit (person-hours) – B	1	Assumption
Average time to conduct an audit (person-hours) – C	2	Assumption
Average time to conduct an audit (person-hours) – C (private service provider)	2	Assumption
Percent of nonpayment/underpayment recovered by collections	37%	GAO: http://www.gao.gov/assets/280/276666.pdf
Collections cost for slow pay/bad debt	16%	GAO: http://www.gao.gov/assets/280/276666.pdf
Credit card merchant fee – flat	\$0.10	Visa

Category (Units)	Value	Source
Debit card merchant fee – flat	\$0.10	Visa
Electronic funds transfer flat fee	\$0.10	Assumption
Credit card merchant fee – percent	2.70%	Visa
Debit card merchant fee – percent	1.10%	Visa
EFT percent fee	0.00%	Assumption
IT equipment acquisition (if new)	\$20,000,000	Industry estimate
IT equipment acquisition (if integrated)	\$15,000,000	Industry estimate
IT software acquisition	\$5,000,000	Industry estimate
Software licenses (annual cost)	\$1,000,000	Industry estimate
Online payments by 2025	90%	Assumption
Hours per full-time employee	2000	Assumption
Staff per manager, audit division	10	Assumption
Staff per manager, account management division	20	Assumption
Managers per office assistant	3	Assumption
Manager salaries	\$100,000	Assumption
Program manager salary	\$150,000	Assumption

Category (Units)	Value	Source
IT maintenance per year as a percent of capital costs	10%	Industry estimate
IT major maintenance as a percent of capital costs	70%	Industry estimate
Frequency of major maintenance	8 years	Industry estimate
Audit materials cost per audit	\$10.00	Assumption
Burden rate	1.7	Comparative value of overhead from Oregon
Outreach/education per new account	\$1.00	Assumption
Outreach/education per existing account	\$0.50	Assumption
Mileage reporting device equipment failure rate	5 per thousand	Industry estimate
Percent miles out-of-state and off-road by Concept C accounts	2.0%	Assumption

Payment

Payment Location	<p>Upon initial implementation, it is assumed that payments associated with Concepts A and B are made 30 percent online, 35 percent in person, and 35 percent via mail, reflecting the approximate split for DOL registration renewal currently.</p> <p>Concept C begins at 60 percent online, reflecting the fact that approximately that proportion of U.S. adults owns smartphones. 20 percent pay in person and 20 percent via mail.</p> <p>Online payment is assumed to grow to 90 percent by 2025 and remains constant thereafter, to reflect the fact that online payment is still growing, but that a small percentage of people will prefer to pay in a way that does not involve electronic means. This percentage includes “unbanked” people who do not qualify for a bank account (estimated at 3.8 percent in Washington State by the FDIC). The remainder are by mail and in person.</p>
Payment Frequency	65 percent pay annually, with 15 percent semiannually and 20 percent opting for quarterly payments.
Payment Method	<p>Among those paying online, payments are divided equally between credit cards, debit cards, and bank transfers (EFT).</p> <p>Among those paying in person, 50 percent pay via check, 25 percent via debit card, 12.5 percent credit card, and 12.5 percent cash.</p> <p>All mail payments are via check (or money order).</p>

Labor

We assume that account management, auditing, and IT maintenance and operation are performed by Washington State employees. The salaries (cost of time) of these employees are based on the Washington State Human Resources schedule of salaries. The total cost to the program is computed by multiplying their salaries times a burden rate, currently set at 1.7, to reflect additional cost of benefits, insurance, and other workplace overhead.

We used the labor categories in the following table and the average salary within each category.

We assumed no involvement by private service providers for account management; all costs reflect the cost for a state agency to operate a road usage charging system. Service providers would only become involved if their participation could reduce the cost below the levels achieved by the State of Washington.

Function	Labor Category
Account Management	Financial Services Specialist – Level 5
Audit	Audit Specialist – DOT – Level 4
IT	IT Specialist 1

Financial

Audit rates will vary by scenario, and are likely to impact compliance rates. We assumed that Concept A, which has no mileage recording, would have zero audits, and that Concepts B and C would audit 1.0 percent of accounts each year. At these rates, we assumed 5 percent of users will attempt to evade the system:

- We treated the cost of collection as 16 percent of the amount collected, based on rates for state collection agents in other states.
- “Outreach/education per new account” contains the average cost of educating the owner of a new account (paper mailing) as well as more modest costs associated with communications for existing customers.
- Neither the road usage charge rate nor the gas tax is tracked to inflation and remains the same from 2015 onward.

Economic

- Inflation rate of 2 percent, based on historical averages.
- Nominal discount rate of 3 percent, consistent with OMB Circular 94. This represents the nominal interest rate on treasury notes and government bonds.
- Under any road usage charging scenario, we assume there is no collection of gas taxes, but DOL continues to collect diesel taxes from all diesel vehicles. Diesel vehicles pay a diesel tax, not a road usage charge.
- 2 percent of miles are driven out-of-state. Any Principal selecting Concept C do not pay road usage charge on miles driven out-of-state, but those choosing Concept B pay road usage charge for every mile driven regardless of location.

Appendix B: Business Case Evaluation Non-financial Analysis

Overview of Qualitative Evaluation

We rated each alternative, including the gas tax, across the qualitative performance criteria described in Section 4 using a scale from zero to four stars, as shown in Table 8.

Table B.1 Qualitative Evaluation Rating Criteria

Criteria	Rating
Completely Satisfies Criteria	★ ★ ★ ★
Mostly Satisfies Criteria	★ ★ ★
Moderately Satisfies Criteria	★ ★
Minimally Satisfies Criteria	★
Does Not Satisfy Criteria	○

Note that the ratings are the subjective judgment of the consultant team and are included simply to provide a starting point for the Steering Committee’s consideration.

We provide an assessment of how well each of the three operational concepts on a standalone basis achieves each of the criteria, along with commentary explaining our rationale. We then repeated the exercise for each of the combinations of concepts.

Summary of Qualitative Assessment Findings

A summary of the assessment is shown in Table 9. A summary of the qualitative evaluation of both the stand alone concepts as well as the combination concepts are provided in the following pages, followed by the details that led to these ratings. Note that while we have several categories of equity in the detailed assessment, we avoided highlighting these in this summary because equity issues are difficult to assess without considering a lot of the implementation details that have not been decided yet. Also, equity concerns can be mitigated through fine tuning these details.

Table B.2 Summary Evaluation

Concept	Advantages	Disadvantages
Gas Tax	<ul style="list-style-type: none"> ■ Simple ■ Easy to enforce ■ No privacy issues 	<ul style="list-style-type: none"> ■ People are unaware of the tax and how much they pay (not transparent) ■ Imperfect proxy for road usage in that it varies greatly according to the fuel economy of individual vehicles.
Concept A: Time Permit	<ul style="list-style-type: none"> ■ Transparent ■ Relatively simple ■ Easy to enforce ■ No privacy issues 	<ul style="list-style-type: none"> ■ No relationship to use

Concept	Advantages	Disadvantages
Concept B: Odometer Charge	<ul style="list-style-type: none"> ■ Transparent ■ Relatively simple ■ Easy to enforce ■ Privacy not a significant issue (but some might object to mileage reporting) ■ Strong relationship to use 	<ul style="list-style-type: none"> ■ Border residents that travel out of state or drive on private land may pay for many miles driven out of state or off public roads
Concept C: Differentiated Distance Charge	<ul style="list-style-type: none"> ■ Transparent ■ Strongest relationship to use, capturing in-state versus out-of-state travel 	<ul style="list-style-type: none"> ■ Less simple than others ■ Perception of privacy infringement ■ Less easy to enforce

Summary of Qualitative Evaluation of Stand Alone Concepts

Table B.3 Summary Evaluation of Concepts

	Gas Tax	A: Time Permit	B: Odometer Charge	C: Differentiated Distance Charge
Transparency	⊙	★ ★ ★ ★	★ ★ ★ ★	★ ★ ★ ★
Complementary Policy Objectives	★ ★	★	★ ★	★ ★
Equity: <i>Pay for what you use</i>	★	★	★ ★ ★	★ ★ ★ ★
Equity: <i>Urban/ rural</i>	★ ★ ★	★ ★ ★ ★	★ ★ ★	★ ★ ★
Equity: <i>Regressiveness</i>	★ ★	★	★ ★	★ ★
Equity: <i>Border/Non-Border</i>	★ ★ ★	★ ★ ★	★	★ ★ ★ ★
Simplicity	★ ★ ★ ★	★ ★ ★	★ ★ ★	★ ★
Enforcement	★ ★ ★	★ ★ ★ ★	★ ★ ★	★ ★
Privacy (perception)	★ ★ ★ ★	★ ★ ★ ★	★ ★ ★	★ ★
Total¹	21	24	24	25

¹ These totals provide an interesting way to quickly size up an option; however, individual ratings have not been weighted by importance from the Steering Committee, so they could give a misleading view of performance.

Other Important Factors Summary

Table B.4 Summary of Important Factors

Factor/Rating	Gas Tax	A: Time Permit	B: Odometer Charge	C: Differentiated Distance Charge
Ability to distinguish between travel on Washington public roads and private roads.	★	⊙	⊙	★ ★ ★ ★
Ability to charge non-Washington residents.	★ ★ ★	★ ★ ★	⊙	★ ★
Total	4	3	0	6

Summary Evaluation of Combination Concepts









Table B.5 Summary Evaluation of Concepts

	1: A (Time Permit) + B (Odometer Charge)	2: A (Time Permit) + C (Differentiated Distance Charge)	3: B (Odometer Charge) + C (Differentiated Distance Charge)	4: A (Time Permit) + B (Odometer Charge) + C (Differentiated Distance Charge)
Transparency	★★★★	★★★★	★★★★	★★★★
Complementary Policy Objectives	★★★	★★	★★	★★
Equity: <i>Pay for what you use</i>	★★★	★★★	★★★	★★★★
Equity: <i>Urban/ rural</i>	★★★	★★★	★★★	★★★
Equity: <i>Regressiveness</i>	★★	★★★	★★	★★
Equity: <i>Border/Non-Border</i>	★	★★★	★★	★★★★
Simplicity	★★★	★★★	★★	★★
Enforcement	★★★	★★	★★	★★
Privacy (perception)	★★★	★★★	★★	★★★
Total²	24	26	22	24

² These totals provide an interesting way to quickly size up an option; however, individual ratings have not been weighted by importance from the Steering Committee, so they could give a misleading view of performance.






Other Important Factors Summary

Table B.6 Summary of Important Factors

Factor/Rating	1: A (Time Permit) + B (Odometer Charge)	2: A (Time Permit) + C (Differentiated Distance Charge)	3: B (Odometer Charge) + C (Differentiated Distance Charge)	4: A (Time Permit) + B (Odometer Charge) + C (Differentiated Distance Charge)
Ability to distinguish between travel on Washington public roads and private roads.				
Ability to charge non-Washington residents.				
Total	3	7	2	6

Gas Tax – Detailed Evaluation

Table B.7 Gas Tax Evaluation

Performance Criterion/Rating	Analysis
Transparency 	<p>The gas tax is paid at the wholesale terminal rack, and then rolled in to the retail price of fuel. Drivers are generally not aware of the amount of tax they pay, unless they pay attention to news reports when new taxes are proposed. Gas pumps do not typically show the amount of tax paid in a particular transaction (unlike other taxes, such as sales tax). Requiring that the tax be shown on the pump and on receipts could increase transparency.</p>
Complementary Policy Objectives 	<p>The gas tax is correlated with energy reduction and emissions goals, since cars that burn more fuel pay more. So “gas guzzlers” pay more than more efficient vehicles, providing some price incentive to switch to a more fuel efficient vehicle.</p> <p>It is only somewhat correlated with congestion management goals in that cars with high fuel efficiency do not pay as much as less efficient cars, and will not get the same level of price signal regarding additional driving. As cars become more fuel efficient, the connection will become less.</p>
Equity: Pay for what you use 	<p>People that drive more pay more, but the connection varies according to fuel efficiency. Cars that do not use gasoline (or diesel) pay no gas tax (except for the recently enacted per-vehicle charge).³</p>
Equity: Urban/rural 	<p>People that drive more pay more, but the connection varies according to fuel efficiency. Cars that do not use gasoline (or diesel) pay no gas tax (except for the recently enacted per-vehicle charge).</p> <p>According to the National Household Travel Survey, those living in rural areas drive ten more miles in a day than those who live in cities. People living in the suburbs drive only about three to four more miles per day than those within the city.⁴</p> <p>Therefore, rural residents will typically pay more than urban residents, but pay in proportion to the amount they drive. Typically, they drive less fuel efficient vehicles and therefore they also pay more per mile than urban drivers. We have supporting data from Oregon, but we do not have Washington State data to support this.</p>
Equity: Regressiveness 	<p>People of lower incomes will typically pay a greater percent of their income on the gas tax than more wealthy people. To the extent that people of lower income also drive older, less fuel efficient cars, they will pay more than someone who can afford the more expensive electric, plug-in hybrid vehicles. This gap will likely widen over time.</p>

³ In 2013, Washington State enacted a \$100 per vehicle charge for electric vehicles, in lieu of electric vehicles paying gas tax.

⁴ National Household Travel Survey. http://www1.eere.energy.gov/vehiclesandfuels/facts/2012_fotw759.html.

Performance Criterion/Rating	Analysis
Equity: Border/Non-Border ★ ★ ★	There is no significant difference in taxes paid between people on the Washington State border and those that are not. People near the borders of Oregon and Idaho can take advantage of lower tax rates in those states. People from British Columbia, Canada, drive across the international border to purchase less expensive fuel in Washington State (savings are approximately U.S. \$2.00 per gallon)
Simplicity ★ ★ ★ ★	The system is so simple that it goes largely unnoticed by the Principal. Collection is from a small number of distributors.
Enforcement ★ ★ ★	Collection is from a small number of distributors, easing enforcement, but there is a fair amount of evasion that is not enforced.
Privacy (perception) ★ ★ ★ ★	No travel activity is recorded.

Other Important Factors Related to the Gas Tax

Table B.8 Gas Tax – Important Factors

Factor/Rating	Analysis
Ability to distinguish between travel on Washington public roads and private roads. ★	There is no way to distinguish travel between Washington public roads and other roads. However, people that spend a lot of time out of state are likely to purchase fuel in other states more often.
Ability to charge non-Washington residents. ★ ★ ★	Non-Washington residents that purchase gas in the state pay the gas tax.



Concept A: Time Permit – Detailed Evaluation

Table B.9 Concept A Evaluation

Performance Criterion/Rating	Analysis
Transparency ★ ★ ★ ★	Principals would pay a special tax bill related to road usage.
Complementary Policy Objectives ★	With no “pay per use” feature, the only contribution to complementary policy objectives lies in the increased transparency of the fee.
Equity: Pay for what you use ★	Everyone pays the same regardless of road usage.
Equity: Urban/ rural ★ ★ ★ ★	All vehicles would pay the same amount, regardless of type of community.
Equity: Regressiveness ★	People of lower incomes will certainly pay a greater percent of their income than more wealthy people, since everyone pays the same rate. This could be mitigated with need-based rates.
Equity: Border/Non-Border ★ ★ ★	Everyone would pay the same price, so people on the border would pay the same as people in the interior of the state. Some border-region residents might pay proportionately more in Washington if they drive most of their miles out of state.
Simplicity ★ ★ ★	The system is relatively simple in that it can be combined with the registration fee and there is no need to count miles. It does involve slightly more work for Principals than the gas tax.
Enforcement ★ ★ ★ ★	Enforcement is identical to and can be combined with existing registration enforcement.
Privacy (perception) ★ ★ ★ ★	No travel activity is recorded.

Other Important Factors Related to Concept A: Time Permit

Table B.10 Concept A Important Factors



Factor/Rating	Analysis
Ability to distinguish between travel on Washington public roads and private roads. 	There is no way to distinguish travel between Washington public roads and other roads.
Ability to charge non-Washington residents. 	Since there is no ongoing need for data related to actual travel, this is the simplest of the three concepts to adapt for out-of-state travelers.

Concept B: Odometer Charge – Detailed Evaluation

Table B.11 Concept B Evaluation



Performance Criterion/Rating	Analysis
Transparency ★ ★ ★ ★	Principals would pay a special tax bill directly related to road usage.
Complementary Policy Objectives ★ ★	<p>Drivers that drive more, pay more, so there is some correlation to efforts to reduce congestion, energy use, and emissions. However, there is no distinction between vehicles with high and low fuel efficiency, potentially at odds with Washington’s goals to reduce energy use and greenhouse gas emissions.</p> <p>To address this issue, charges could vary by energy or emissions category, thereby increasing this rating, but this would change other aspects of this evaluation.</p>
Equity: Pay for what you use ★ ★ ★	People pay for each mile they drive (but they also pay for miles outside of Washington).
Equity: Urban/ rural ★ ★ ★	<p>People that drive more pay more. According to the National Household Travel Survey, those living in rural areas drive ten more miles in a day than those who live in cities. People living in the suburbs drive only about three to four more miles per day than those within the city.⁵</p> <p>Therefore, rural residents will typically pay more than urban residents, but pay in proportion to the amount they drive. Further cost differences from the gas tax approach caused by different fuel economy would be eliminated.</p>
Equity: Regressiveness ★ ★	People of lower incomes will pay a greater percent of their income than more wealthy people. This could be mitigated with need-based rates.
Equity: Border/Non-Border ★	Since people will pay the same price for all miles, people near the border that frequently travel out of state will pay for more non-Washington miles. However, they may be no worse off than they are now, when they pay gas tax regardless of where they drive. Border residents will not necessarily be worse off than non-border residents from that perspective.
Simplicity ★ ★ ★	The system is less simple than the time permit in that there is a process to estimate miles in advance and then reconcile later on.

⁵ National Household Travel Survey. http://www1.eere.energy.gov/vehiclesandfuels/facts/2012_fotw759.html.

Performance Criterion/Rating	Analysis
Enforcement 	Enforcement is identical to and can be combined with existing registration enforcement, but might require occasional odometer checks.
Privacy (perception) 	No travel activity is recorded, but some people might object to an odometer being read.

Other Important Factors Related to Concept B: Odometer Charge

Table B.12 Concept B Important Factors

Factor/Rating	Analysis
Ability to distinguish between travel on Washington public roads and private roads. 	There is no way to distinguish travel on Washington public roads versus other roads.
Ability to charge non-Washington residents. 	An alternative approach (e.g., Concept A) would be needed to charge non-Washington residents.

Concept C: Differentiated Distance Charge – Detailed Evaluation

Table B.13 Concept C Evaluation

Performance Criterion/Rating	Analysis
Transparency ★ ★ ★ ★	Principals would pay a special tax bill related to road usage.
Complementary Policy Objectives ★ ★	<p>Drivers that drive more pay more, so there is some correlation to efforts to reduce congestion, energy use, and emissions. However, there is no distinction between vehicles with high and low fuel efficiency, potentially at odds with Washington’s goals to reduce energy use and greenhouse gas emissions.</p> <p>To address this issue, charges could vary by energy or emissions category, thereby increasing this rating, but this would change other aspects of this evaluation.</p>
Equity: Pay for what you use ★ ★ ★ ★	People pay for each mile they drive and do not pay for miles outside of Washington.
Equity: Urban/ rural ★ ★ ★	<p>People that drive more pay more. According to the National Household Travel Survey, those living in rural areas drive ten more miles in a day than those who live in cities. People living in the suburbs drive only about three to four more miles per day than those within the city.⁶</p> <p>Therefore, rural residents will typically pay more than urban residents, but pay in proportion to the amount they drive. Further cost differences from the gas tax approach caused by different fuel economy would be eliminated.</p>
Equity: Regressiveness ★ ★	People of lower incomes will pay a greater percent of their income than more wealthy people. This could be mitigated with need-based rates.
Equity: Border/Non-Border ★ ★ ★ ★	Out of state miles will not be charged.
Simplicity ★ ★	The system is less simple than the time permit in that there is a process to estimate miles in advance and then reconcile later on. There is also the added effort of installing an on board unit, and paying a bill periodically. However, if the bill paying is integrated into an existing business relationship (such as through an insurance or utility company), the additional burden should not be onerous.

⁶ National Household Travel Survey. http://www1.eere.energy.gov/vehiclesandfuels/facts/2012_fotw759.html.

Performance Criterion/Rating	Analysis
Enforcement ★ ★	Enforcement is more involved than for the other concepts, in that there is no obvious way to find out if someone is cheating the system in real time.
Privacy (perception) ★ ★	Travel activity is recorded. Privacy can be maintained with proper protections in place, but some Principals may be concerned about the perception of privacy infringement.

Other Important Factors Related to Concept C: Differentiated Distance Charge

Table B.14 Concept C Important Factors




Factor/Rating	Analysis
Ability to distinguish between travel on Washington public roads and private roads. ★ ★ ★ ★	There is no way to distinguish travel on Washington public roads versus other roads.
Ability to charge non-Washington residents. ★ ★	An alternative approach is needed to charge non-Washington residents, unless other states adopt a road usage charge, in which case this becomes easier

Combination 1: Concept A (Time Permit) Plus B (Odometer Charge) – Detailed Evaluation

Table B.15 Combination 1 Evaluation



Performance Criterion/Rating	Analysis
Transparency ★ ★ ★ ★	Principals would pay a special tax bill related to road usage.
Complementary Policy Objectives ★ ★ ★	<p>Drivers that drive more pay more, so there is some correlation to efforts to reduce congestion, energy use, and emissions. However, there is no distinction between vehicles with high and low fuel efficiency, potentially at odds with Washington’s goals to reduce energy use and greenhouse gas emissions.</p> <p>To address this issue, charges could vary by energy or emissions category, thereby increasing this rating, but this would change other aspects of this evaluation.</p>
Equity: Pay for what you use ★ ★ ★	People pay for each mile they drive (but they also pay for miles outside of Washington). People that choose to pay the flat rate that do not drive a lot of miles would end up paying more, however there is no reason they should have to, since
Equity: Urban/ rural ★ ★ ★	<p>People that drive more pay more. According to the National Household Travel Survey, those living in rural areas drive ten more miles in a day than those who live in cities. People living in the suburbs drive only about three to four more miles per day than those within the city.⁷</p> <p>Therefore, rural residents will typically pay more than urban residents, but pay in proportion to the amount they drive. Further cost differences from the gas tax approach caused by different fuel economy would be eliminated.</p> <p>When Concept B is combined with Concept A, there is an upper end limit on mileage, potentially easing the burden for rural residents (and others) that drive a lot of miles.</p>
Equity: Regressiveness ★ ★	People of lower incomes will pay a greater percent of their income than more wealthy people. This could be mitigated with need-based rates.
Equity: Border/Non-Border ★	Since people will pay the same price for all miles, people near the border that frequently travel out of state will pay for more non-Washington miles. However, they may be no worse off than they are now, when they pay gas tax regardless of where they drive. Border residents will not necessarily be worse off than non-border residents from that perspective.

⁷ National Household Travel Survey. http://www1.eere.energy.gov/vehiclesandfuels/facts/2012_fotw759.html.

Performance Criterion/Rating	Analysis
Simplicity 	People would have the option of a simple system (A) or a slightly more complex system (B).
Enforcement 	Enforcement is identical to and can be combined with existing registration enforcement, but also has an element of odometer reading.
Privacy (perception) 	No travel activity is recorded, but some might object to odometer reading.

Other Important Factors Related to Combination 1: Concept A (Time Permit) Plus B (Odometer Charge)

Table B.16 **Combination 1 Important Factors**




Factor/Rating	Analysis
Ability to distinguish between travel on Washington public roads and private roads. 	There is no way to distinguish travel on Washington public roads versus other roads.
Ability to charge non-Washington residents. 	With Concept A as part of this, it could be used to charge out of state drivers.

Combination 2: Concept A (Time Permit) Plus C (Differentiated Distance Charge) – Detailed Evaluation

Table B.17 Combination 2 Evaluation



Performance Criterion/Rating	Analysis
Transparency ★ ★ ★ ★	Principals would pay a special tax bill related to road usage.
Complementary Policy Objectives ★ ★	<p>Under Concept C, drivers that drive more, pay more, so there is some correlation to efforts to reduce congestion, energy use, and emissions. However, there is no distinction between vehicles with high and low fuel efficiency, potentially at odds with Washington’s goals to reduce energy use and greenhouse gas emissions.</p> <p>Drivers that opt for Concept A have little connection to policy objectives.</p> <p>To address this issue, charges could vary by energy or emissions category, thereby increasing this rating, but this would change other aspects of this evaluation.</p>
Equity: Pay for what you use ★ ★ ★	People pay for each mile they drive and do not pay for miles outside of Washington. However, for those that choose not to use Concept A, there is no distinction.
Equity: Urban/ rural ★ ★ ★	<p>People that drive more pay more, if people choose Concept C. According to the National Household Travel Survey, those living in rural areas drive ten more miles in a day than those who live in cities. People living in the suburbs drive only about three to four more miles per day than those within the city.⁸</p> <p>Therefore, rural residents will typically pay more than urban residents, but pay in proportion to the amount they drive. Further cost differences from the gas tax approach caused by different fuel economy would be eliminated.</p>
Equity: Regressiveness ★ ★ ★	People of lower incomes will pay a greater percent of their income than more wealthy people. This could be mitigated with need-based rates. But people that drive less will pay less, if they choose Concept C. Those that are “unbanked” or “underbanked” may not be able to use Concept C.
Equity: Border/Non-Border ★ ★ ★	Out of state miles will not be charged for Concept C, but will be under Concept A.

⁸ National Household Travel Survey. http://www1.eere.energy.gov/vehiclesandfuels/facts/2012_fotw759.html.

Performance Criterion/Rating	Analysis
Simplicity 	This system can be very simple or more complicated depending on the option chosen
Enforcement 	Enforcement is more involved with Concept C, in that there is no obvious way to find out if someone is cheating the system in real time.
Privacy (perception) 	People have a choice regarding whether they would like a system that records no travel activity or one that does. People that choose Option C would be less concerned with privacy.

Other Important Factors Related to Combination 2: Concept A (Time Permit) plus C (Differentiated Distance Charge)

Table B.18 **Combination 2 Important Factors**

Factor/Rating	Analysis
Ability to distinguish between travel on Washington public roads and private roads. 	There is no way to distinguish travel between Washington public roads and other roads under Concept A, but there is under Concept C.
Ability to charge non-Washington residents. 	Concept A is the easiest method to charge out of state drivers.

Combination 3: Concept B (Odometer Charge) Plus C (Differentiated Distance Charge) – Detailed Evaluation

Table B.19 Combination 3 Evaluation

Performance Criterion/Rating	Analysis
Transparency ★ ★ ★ ★	Principals would pay a special tax bill related to road usage.
Complementary Policy Objectives ★ ★	<p>Drivers that drive more pay more, so there is some correlation to efforts to reduce congestion, energy use, and emissions. However, there is no distinction between vehicles with high and low fuel efficiency, potentially at odds with Washington’s goals to reduce energy use and greenhouse gas emissions.</p> <p>To address this issue, charges could vary by energy or emissions category, thereby increasing this rating, but this would change other aspects of this evaluation.</p>
Equity: Pay for what you use ★ ★ ★	People pay for each mile they drive under Concepts B and C. Those choosing Concept C do not pay for miles outside of Washington, but those choosing Concept B do.
Equity: Urban/ rural ★ ★ ★	<p>People that drive more pay more. According to the National Household Travel Survey, those living in rural areas drive ten more miles in a day than those who live in cities. People living in the suburbs drive only about three to four more miles per day than those within the city.⁹</p> <p>Therefore, rural residents will typically pay more than urban residents, but pay in proportion to the amount they drive. Further cost differences from the gas tax approach caused by different fuel economy would be eliminated.</p>
Equity: Regressiveness ★ ★	People of lower incomes will pay a greater percent of their income than more wealthy people. This could be mitigated with need-based rates.
Equity: Border/Non-Border ★ ★	Out of state miles will not be charged For Concept C, but will for Concept B.

⁹ National Household Travel Survey. http://www1.eere.energy.gov/vehiclesandfuels/facts/2012_fotw759.html.

Performance Criterion/Rating	Analysis
Simplicity ★ ★	The system is less simple than the time permit in that there is a process to estimate miles in advance and then reconcile later on. There is also the added effort of installing an on board unit, and paying a bill periodically. However, if the bill paying is integrated into an existing business relationships (such as through an insurance or utility company, the additional burden should not be onerous.
Enforcement ★ ★	Enforcement is more involved than the other concepts, in that there is no obvious way to find out if someone is cheating the system in real time.
Privacy (perception) ★ ★	People have a choice regarding whether they would prefer a system that does not record travel activity.

Other Important Factors Related to Combination 3: Concept B (Odometer Charge) Plus C (Differentiated Distance Charge)

Table B.20 Combination 3 Important Factors

Factor/Rating	Analysis
Ability to distinguish between travel on Washington public roads and private roads. ★ ★	There is no way to distinguish travel on Washington public roads versus other roads under Concept B, but there is under Concept C.
Ability to charge non-Washington residents. ○	Neither Concepts B nor C lend themselves well to charging out of state drivers.

Combination 4: Concept A (Time Permit) Plus B (Odometer Charge) Plus C (Differentiated Distance Charge) – Detailed Evaluation

Table B.21 Combination 4 Evaluation

Performance Criterion/Rating	Analysis
Transparency ★ ★ ★ ★	Principals would pay a special tax bill related to road usage.
Complementary Policy Objectives ★ ★	<p>Drivers have two options where if they drive more, they pay more, so there is some correlation to efforts to reduce congestion, energy use, and emissions. However, there is no distinction between vehicles with high and low fuel efficiency, potentially at odds with Washington’s goals to reduce energy use and greenhouse gas emissions.</p> <p>To address this issue, charges could vary by energy or emissions category, thereby increasing this rating, but this would change other aspects of this evaluation.</p>
Equity: Pay for what you use ★ ★ ★ ★	People can choose the program that is right for them, and whether they need to distinguish between miles within or outside of Washington.
Equity: Urban/ rural ★ ★ ★	<p>People that drive more pay more. According to the National Household Travel Survey, those living in rural areas drive ten more miles in a day than those who live in cities. People living in the suburbs drive only about three to four more miles per day than those within the city.¹⁰</p> <p>Therefore, rural residents will typically pay more than urban residents, but pay in proportion to the amount they drive. Further cost differences from the gas tax approach caused by different fuel economy would be eliminated.</p>
Equity: Regressiveness ★ ★	People of lower incomes will pay a greater percent of their income than more wealthy people. This could be mitigated with need-based rates.
Equity: Border/Non-Border ★ ★ ★ ★	People will have a choice as to whether they want to have miles outside of Washington recorded differently (which is possible under Concept C, but not Concept A or B).
Simplicity ★ ★	Since it is a combination of three concepts, this might be the most confusing of all; however, people can choose the option that best fits their needs and life style.

¹⁰ National Household Travel Survey. http://www1.eere.energy.gov/vehiclesandfuels/facts/2012_fotw759.html.

Performance Criterion/Rating	Analysis
Enforcement ★ ★	With three potential concepts, enforcement might be more challenging.
Privacy (perception) ★ ★ ★	People have a choice regarding whether they would like a system that does not record travel activity; those selecting Concept C are most likely less concerned with the privacy perception.

Other Important Factors Related to Combination 4: Concept A (Time Permit) Plus B (Odometer Charge) Plus C (Differentiated Distance Charge)

Table B.22 Combination 4 Important Factors

Factor/Rating	Analysis
Ability to distinguish between travel on Washington public roads and private roads. ★ ★	There is no way to distinguish travel on Washington public roads versus other roads under Concepts A and B, but there is under Concept C.
Ability to charge non-Washington residents. ★ ★ ★ ★	Concept A is the easiest method to charge out of state drivers.

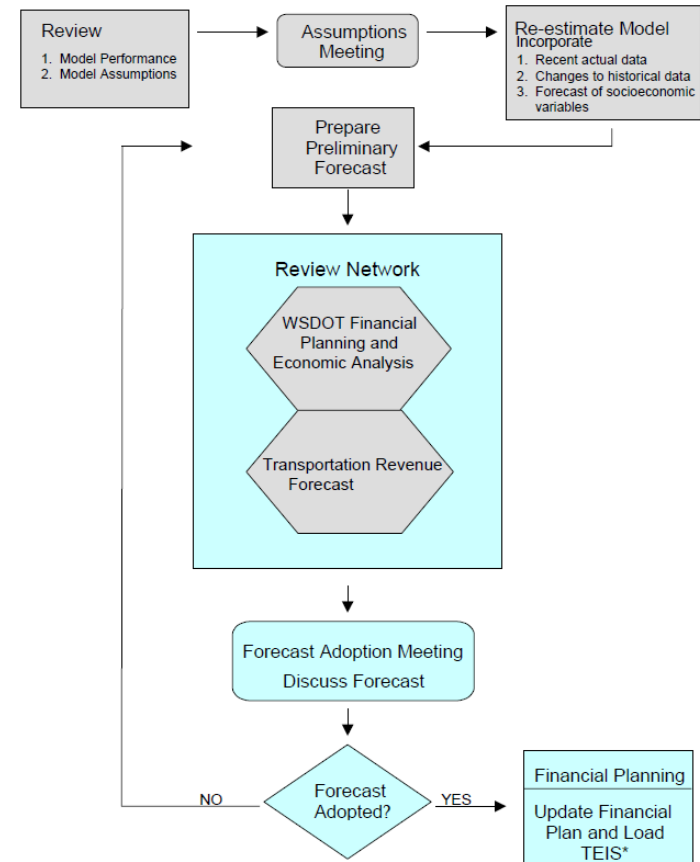
Appendix C: Forecast Details

Overview of Transportation Economic and Revenue Forecasts

We worked with WSDOT and DOL to obtain historic and forecast data for use in the quantitative modeling of costs and revenues of road usage charges and gas taxes. These data are produced by the Transportation Revenue Forecast Council and represent the most up-to-date information on key drivers of gas tax revenue for use in our business case evaluation.

“Washington law mandates the preparation and adoption of economic and revenue forecasts. The organizations primarily responsible for revenue forecasts are the Economic and Revenue Forecast Council and the Office of Financial Management. The Office of Financial Management has the statutory responsibility to prepare and adopt those forecasts not made by the Economic and Revenue Forecast Council (RCW 43.88.020). The Office of Financial Management carries out its forecast responsibilities for transportation revenues through the Transportation Revenue Forecast Council. Each quarter, technical staff of the Department of Licensing, Department of Transportation, Washington State Patrol and the Office of Forecast Council produce forecasts. The revenue forecasts agreed upon by the Transportation Revenue Forecast Council members become the official estimated revenues under RCW 43.88.020 21.”¹¹ A brief overview of the process by which these forecasts are developed by WSDOT each quarter is shown in the figure.

Transportation-Related Economic and Revenue Forecast Process Flow Chart
(Source: WSDOT)



¹¹ Transportation Revenue Forecast Council, “Transportation Economic and Revenue Forecasts,” Volume 1 Summary, June 2013.

We used the most recent quarterly transportation forecasts¹² for the business case model, which at that time was for June 2013.¹³ These are shown below and are referred throughout this report as the “State forecast.”

Vehicle Registrations of passenger cars by type of fuel (gas, hybrid, diesel, electric and other) and truck registrations by type of fuel (gas or diesel).

Total VMT on all roads in Washington and truck VMT only for the State highway portion of the road network.

- We had to make some assumptions to distinguish VMT by vehicle type (light duty/heavy duty) and fuel type (diesel vs. gasoline) in order to utilize the VMT dataset.

Fuel efficiency of the U.S. fleet based on forecasts from Global Insight.

- We also developed an “implied” State forecast of fuel efficiency based on the forecasts of non-diesel VMT and the State forecast of gasoline consumption.

Gasoline consumption

Gasoline tax revenue

¹² All forecasts are by fiscal year.

¹³ Quarterly Transportation Revenue Forecasts have been released subsequent to this report.

The following forecast components are updated quarterly when WSDOT updates its forecast of transportation revenues. Much of this data is provided by Global Insight – a provider of economic data used widely throughout the transportation industry.

Economic Variables. A host of economic variables are updated, including Washington personal income, population, inflation, employment, oil price index, fuel efficiency, U.S. sales of light vehicles, and Washington driver in-migration:

- **Motor Fuel Price.** The price projections include the following variables: U.S. West Texas crude oil, Washington retail prices of gasoline, diesel and biodiesel:
 - Additionally several State models are utilized in the forecast.
- **Gasoline Consumption.** The quarterly gas consumption model includes the following independent variables:
 - Economic activity (Washington non-agricultural employment);
 - Composite variable of Washington retail gas prices multiplied by U.S. average fuel efficiency; and
 - Dummy variable for periods of severe oil supply shortages.
- **VMT.** Total Washington State VMT forecasts are released once a year. Each new forecast calculated from the actual VMT of the prior year, essentially resetting the forecast annually to the last known actual VMT. The forecast model considers three separate types of impacts on VMT:
 - Economic activity, which is essentially non-farm employment;
 - Motor vehicle registrations; and
 - Gas prices.

VMT Forecast of Non-Diesel Vehicles

Distinguishing Vehicle Type

In our evaluation of road usage charge options, we have assumed that non-diesel vehicles (largely gasoline, but also electric and hybrid vehicles) would discontinue paying the gas tax in 2015 and begin paying a road usage charge. Diesel vehicles would continue to pay a diesel tax and would not pay a road usage charge.

	Diesel Tax	Road Usage Charge
Passenger car – gas		■
Passenger car – diesel	■	
Truck – gas		■
Truck – diesel	■	

VMT Forecast Methodology

Since the road usage charge evaluation is only looking at a potential replacement for the gas tax, we needed to develop a reasonable way to make distinct the VMT of non-diesel vehicles. To estimate VMT of non-diesel vehicles, we made the following calculations:

- First, using the State forecast of vehicle registrations provided by WSDOT, we split the vehicle fleet by weight class (light vehicles and heavy trucks by Class) and fuel category (diesel and non-diesel).
- We applied average annual miles traveled per vehicle from the 2002 U.S. Vehicle Inventory and Use Survey (VIUS) to each heavy truck for Classes 3 through 8. This resulted in total VMT for heavy-duty vehicles, broken down by diesel vs. non-diesel.
- We subtracted all heavy duty VMT from the State forecast of total VMT, which left VMT for all light vehicles. We then divided total light vehicle VMT by the number of light vehicles to get average annual miles traveled per light vehicle.
- Using average miles per light vehicle together with the number of light vehicles by fuel type, we computed VMT for light duty vehicles, broken down by diesel vs. non-diesel.
- Last, we combined VMT for non-diesel light duty vehicles and VMT for non-diesel heavy-duty vehicles.

Forecast Notes

A few notes on this data:

- **VMT.** The slowing pace of VMT growth has been widely acknowledged by industry professionals across the county and is reflected in the data. Growth factors used for national reporting account for limited future growth. A summary of the national VMT projections is shown below, with annual growth rate ranging from 1.2 percent (which is the most recent) to 1.85 percent.

Source	Forecast Period	Annual Growth Rate	Basis for Growth Rate
Annual Energy Outlook (2013)	2011-2040	1.2 percent	Unknown
Conditions and Performance Report (2010)	2008-2028	1.85 percent	Represents the composite weighted average annual VMT growth rate based on State forecast of VMT in the Highway Performance Management System (HPMS)
AASHTO Bottom Line Report (2009)	2010-2029	1.4 percent	Center for Urban Transportation Research, model projection
Moving Cooler (2009)	2010-2050	1.4 percent	Consistency with AASHTO Bottom Line Report

The State forecast of total VMT on all roads in Washington includes the following notations:

- The State VMT forecast 2013-2017 from Economic and Revenue Forecast Council’s September 2013 forecast. Forecast 2017-2031 is extended based on the Office of Financial Management (OFM) forecast growth rate, September 2013.
- The State VMT forecast 2013-2031 from Transportation Revenue Forecast Council’s September 2013 Forecast.
- The State VMT forecast 2013-2031 from Transportation Revenue Forecast Council’s September 2013 Forecast.
- The State VMT forecast beyond 2031 is not official.

Forecast Notes (continued)

- **Gasoline Consumption.** The previous WSDOT consumption model had consistently overestimated fuel consumption. WSDOT revised the gasoline consumption forecast model in 2010 and it now includes a variable measuring economic activity to help capture periods of economic recession. The revised gasoline consumption forecast model now reflects a slower growth for future gasoline consumption.
 - As an alternative, we used average on-road fleet fuel efficiency forecasts provided by Global Insight together with non-diesel VMT forecasts to calculate fuel consumption directly.
- **Fuel Efficiency:**
 - **State Forecast.** The State forecast of fuel efficiency is derived by dividing non-diesel VMT¹⁴ by the State forecast of gasoline consumption. This results in an “implied” fuel efficiency based on State forecasts.
 - **Global Insight Forecast.** The Global Insight forecast incorporates the effects of CAFE standards for passenger cars and light trucks for model years 2017 and beyond. On-road fuel efficiency represents the entire fleet on the road in that particular year, meaning that there are still cars using roadways that do not meet the CAFE standard. Actual on-road efficiency is lower than the CAFE standard for new vehicles due to the older vehicles that remain in use:
 - Since the Global Insight forecast only reflects light duty vehicle mpg, we modified it slightly to reflect that fact that 0.9 percent of gasoline vehicles in the forecast of non-diesel VMT are heavy duty. We assumed an average mpg of 10 for all the heavy duty vehicles, and applied the Global Insight forecast for the other 99.1 percent. The result is a minor adjustment to the Global Insight forecast, since heavy-duty vehicles are such a small percent of total vehicles.

¹⁴ As noted, we adjusted the State forecast of total VMT to derive VMT of non-diesel vehicles.

Gas Tax Collection Costs

The Washington State Department of Licensing (DOL) estimated the cost to collect the gas tax at about 0.3 percent of gas tax revenues annually in 2013.¹⁵

In the meantime, we reviewed literature related to the costs associated with administering the gas tax system. Dating back to at least the 1990s, studies have shown that gas tax collection costs represent approximately 1 percent of the revenue collected. A 2011 National Cooperative Highway Research Program (NCHRP) Report titled “Costs of Alternative Revenue-Generation Systems”¹⁶ represents the most robust research recently conducted on this topic, confirming the 1 percent estimate.

The study compared operating costs of highway revenue-generation mechanisms, specifically fuel taxes, tolling, VMT fees, cordon pricing, and parking pricing. Findings show that the existing gas tax system has the lowest operating cost as shown in Table 1.

¹⁵ Washington State Department of Licensing, *Driver and Vehicle Services Fee Study*, December 1, 2013.

¹⁶ NCHRP Report 689, “Costs of Alternative Revenue-Generation Systems,” Transportation Research Board, Washington D.C., 2011.

Table 1. Rates Cost Comparison Between Revenue Systems

	Fuel Taxes ^a Average Cost over States	Tolling ^a Average Cost over Agencies	VMT Fees ^b Average Cost over Providers	Cordon Pricing Average Cost over Providers	Parking Pricing Cost of Single Provider
\$ per lane mile	\$50	\$150, 595	\$4,042	N/A	N/A
\$ per centerline mile	108	829,991	8,245	N/A	N/A
\$ per 1,000 VMT	1.10	38.58	6.26	N/A	N/A
\$ per vehicle	1.22	N/A	75.16	N/A	N/A
\$ per transaction	N/A	0.54	6.95	N/A	N/A
% of total revenue ^c	0.92%	33.5%	6.6%	38.7%	56.6%
Gross income over total revenues (gross margin in %)	99.1%	66.5%	93.4%	61.3%	43.4%

a For the gas tax, tolling, and cordon pricing systems, data were collected from 2003 to 2007. To make a consistent and accurate comparison between the alternative revenue systems, only 2007 data were used in developing these averages.

b For the VMT fee systems, there is only one-year data available for comparison, and it is based on the revenue forecast to be collected in the Netherlands.

c System-generated revenues only.

Source: Recreated from NCHRP 689.

With respect to the gas tax, states report total costs of administering motor fuel taxes as part of the Federal Highway Administration (FHWA) Highway Statistics Series. These figures include the costs associated with gas tax administration, collection, and enforcement. The NCRP Report used the Highway Statistics data from 2003-2007 to estimate the operating costs of the motor fuel tax system. From 2003 to 2007, operating costs as a percent of total tax collections were consistent, with an average of 1.1 percent (Table 2). The NCRP Report selected eight sample states for more detailed analysis. Findings reveal an average of approximately 1 percent of total revenue utilized for operating state gas tax system (Table 3).

Since the cost of collecting the gas tax should not vary based on the actual amount collected, it is also instructive to look at the statistics from the perspective of cost per vehicle. For the eight states surveyed in the NCHRP Report, gas tax collection costs ranged from \$0.74 per vehicle to \$2.38 per vehicle.

Table 2. Net State Motor Fuel Tax Collections and Collection Expenses (2003-2007) (\$000)

	2003	2004	2005	2006	2007	Average
Net motor fuel tax collections	\$33,276,518	\$34,696,386,	\$35,038,064	\$36,278,026	\$39,377,467	\$35,733,292
Collection expenses	\$326,377	\$494,404	\$309,325	\$373,615	\$405,096	\$381,763
Collection expense as a percentage of tax collections	1.0%	1.4%	0.9%	1.0%	1.0%	1.1%

Source: Recreated from NCHRP 689.

Gas Tax Collection Costs (continued)

Table 3. Comparison of Total Operating Costs Between State Fuel Tax Systems (Average Cost 2003-2007)

Cost Item	Average Over States	CA	CO	FL	ID	IA	NJ	TN	TX
\$ per lane mile	\$49	\$63	\$15	\$90	\$30	\$5	\$69	\$63	\$47
\$ per centerline mile	105	141	32	196	61	10	151	133	99
\$ per 1,000 VMT	0.10	0.07	0.06	0.12	0.19	0.04	0.08	0.17	0.13
\$ per vehicle	1.24	0.74	1.49	1.52	2.18	0.35	0.93	2.38	1.78
% of total revenue	0.94%	0.72%	0.50%	1.16%	1.32%	0.28%	1.00%	1.43%	1.03%

Source: Recreated from NCHRP 689.

In 2012 the Reason Foundation published a report titled “Dispelling the Myths: Toll and Fuel Tax Collection Costs in the 21st Century.” The authors challenge conventional wisdom regarding gas tax revenue collection costs, arguing that operating costs are higher, perhaps even 5 percent. It should be noted that there are no supporting data provided in the report so it is difficult to determine from where this percentage is derived.

The authors claim that indirect costs are not captured in these estimates, and therefore the operating costs of the gas tax system are higher than widely believed. Indirect costs are noted as:

- Distributors’ cost of recording and reporting gas taxes are passed on to retailers, which are then passed on to consumers;
- IRS tax filings by exempt users (e.g., costs for processing and managing fuel tax credits);
- Losses due to fuel tax violation, which while uncertain, may be higher than assumed; and
- The opportunity cost of forgoing the benefits of variable or congestion pricing in financing roads with taxes rather than tolls.

However, the VMT forecasts do not distinguish VMT by vehicle type (light duty/heavy duty). As a result, we had to make several assumptions in order to utilize these datasets.

Appendix D: Road Usage Charge Administration Cost Categories

Summary of Cost Categories

Below are summary descriptions of the seven cost categories used to determine the cost of collecting road usage charges in Washington:

- **Program administration.** The cost of management salaries and overhead for the program.
- **Account management.** The cost of operating accounts for individuals paying road usage charges, including the cost of payment transactions.
- **Information Technology.** The cost to state agencies of building and maintaining IT infrastructure sufficient to perform all road usage charge functions.
- **Enforcement.** This category includes two sub-categories:
 - Evasion. The lost revenue due to evasion of road usage charges, which is computed as evasion minus funds recovered through the audits and enforcement; and
 - Debt Recovery. The cost to recover unpaid road usage charges owed to the state.
- **Audit.** The cost to investigate the possibility of fraud in a small subset of road usage charge payers.
- **Public Relations.** Informing the public of the road usage charge program existence, purpose, requirements and alternatives.
- **Cash flow.** Short-term borrowing necessary to keep state finances in its current form in case road usage charge revenues are received post-pay, as opposed to the pre-pay nature of the current gas tax.

Program Administration

This category includes salaries, benefits, and overhead for management of the program. Management includes the following positions (the number of positions is indicated in parenthesis):

- Overall road usage charge program director (1).
- Road usage charge IT director (1).
- Director of public relations and communications for road usage charging (1).
- Compliance manager (1).
- Manager of road usage charge program evaluation (1). This position lasts through 2023 at which time we assume road usage no longer requires a dedicated program evaluation but rather is subsumed into the overall performance monitoring and evaluation functions of the agency overseeing road usage charging.
- In the case that service providers or outside contractors are involved, a manager for road usage charge contracts and service agreements with vendors and service providers (1).
- Managers for the audit division, assuming 1 manager per 10 auditors.
- Managers for the account management division, assuming 1 manager per 20 transaction processing technicians.
- Office assistants, assuming 1 assistant per 3 management positions.

Account Management

Account management involves managing customers, including conducting transactions for opening and closing accounts and, most importantly, accepting payments. The model's estimate of account management costs includes labor (salary, benefits, and overhead), materials, transaction fees (e.g., credit card fees), and in-vehicle equipment.

The estimation of costs is based on transactions, which drive the need for labor and materials and are the events on which fees are based. The model contains a transactions "engine" which calculates the number of transactions by type over the course of 1 year. Examples of transaction types include:

- Concept A, annual payment, online with a credit card.
- Concept B, semiannual payment, in person with a check.

In all there are 135 transaction types assumed for purposes of the simplified business case. The model determines how many customers choose each type of transaction on an annual basis, based on existing data about customer payment methods and future expected trends toward e-commerce. Next, the model calculates the cost of each transaction based on credit card processing fees, materials (e.g., envelopes, printing, stamps for mail-based statements and payments), and average time for staff to process in-person and mail-in payments.

In addition to the above, we consider the cost of any in-vehicle hardware required under Concept C as part of the account management costs. For purposes of simplified business case modeling, we assumed Concept C would require devices that plug into the vehicle diagnostic port. Currently, such hardware is available for under \$50 at small volumes. In addition, this approach requires electronic communications between the device and the agency's back office for transmitting mileage data, which form the basis of invoices. Such costs are currently about \$3-5 per month for the volumes of data envisioned, but declining rapidly as wireless providers accommodate new machine-to-machine applications, including bundling machine-to-machine data with other wireless data (such as mobile phone plans) to reduce prices. We assume that the state will pay for half the costs of the devices and the monthly communications under Concept C, with the other half paid either directly by the customer or the device provider in the case that it is bundled with other services. This is reasonable because in the future Concept C is most likely to be based on factory-installed telematics in the vehicle that the Principal can activate to transmit mileage data either directly from the vehicle or via a wireless link from the vehicle to a mobile phone or tablet.

Information Technology

Information technology is a major cost for the state agency responsible for road usage charging. Although Concepts A and B integrate with existing processes fairly well, to be conservative, we assume significant IT investment for all three Concepts.

- **Setup costs.** Based on industry estimates from vendors who provide IT systems, we estimated the initial acquisition of hardware and software for road usage charging for a program of 6 million accounts at \$30 million. However, we assumed that any acquisitions and/or upgrades would be done as part of a broader IT improvement effort for any agency, and therefore input a cost of \$20 million. In reality, this cost reflects a system with the sophistication to accommodate Concept C. Concepts A and B could be implemented at much lower cost. However, it is reasonable to expect that any system would migrate toward the more automated Concept C in the long run, so we assumed the higher cost for all scenarios.
- **Maintenance.** There are annual maintenance costs equal to 1 percent of the initial investment and major maintenance every 8 years equal to 70 percent of the initial investment.
- **Software.** Ongoing software costs, including licenses, were assumed to be \$1 million per year.
- **Labor.** Finally, we assumed a dedicated IT staff of 10 specialists, which is equivalent to more than two professionals working in parallel 24/7/365. Management of road usage charge IT is counted separately as part of the program administration cost category.

Enforcement

Enforcement encompasses a wide range of activities including operational concept design to maximize voluntary compliance, audits to increase compliance further, and enforcement of evasion through roadside policing and back-office analytics, and collections on accounts payable from noncompliant customers. For purposes of cost modeling, operational concept design is not an additional cost, while the cost of audit is estimated as a separate category. We assume no cost of roadside policing as such enforcement is already widespread. That leaves two categories of costs to consider for road usage charge enforcement in the simplified business case:

- Evasion. The lost revenue due to evasion of road usage charges, which is computed as evasion minus funds recovered through the audits and enforcement.
- Collections. The cost to recover funds owed to the state through State collections processes.

Evasion

For Concepts A and B, we assume that enforcement will occur for road usage charge in the same way it currently occurs for vehicle registration—at the roadside. It is illegal for motorists who fail to register or renew their vehicle’s registration to operate their vehicles on public roadways, and those caught doing so can be fined and penalized. For Concept C, on the other hand, enforcement is more virtual, using automated processes to detect nonpayment, evasion, and fraud.

For Concept A, we assume a compliance rate of 95 percent. This may be conservative given that the number of registered vehicles in DOL’s forecasts represents the number of actual, registered, compliant vehicles in Washington. Any evaders or noncompliant vehicles are not included in the population of vehicles that we estimate. Still, we assume 5 percent will evade payment of the additional time permit, and thus 5 percent of the revenue will be lost.

For Concept B, we assume 90 percent compliance since, although all vehicles must register and estimate mileage, some Principals will underestimate in an attempt to evade. This rate is improved by auditing a certain percentage of Principals. We adopted an audit rate of 1 percent for Concept B in the model and assumed that this measure improved compliance to 95 percent. This is comparable to estimates from New Zealand’s light vehicle road user charge system, for which the Ministry of Transport has estimated 94 percent compliance.

For Concept C, we adopt the same assumptions as for Concept B.

Enforcement (continued)

Recovery of Unpaid Road Usage Charges

State and Federal revenue agencies, including toll agencies, attempt to recover unpaid tax debt from taxpayers. Unpaid tax debt, as long as it is knowable, can be difficult to obtain for a variety of reasons, including insolvency or bankruptcy of the taxpayer, failure to locate, and other reasons. According to the Government Accountability Office, the Internal Revenue Service collected between 30 percent and 41 percent of unpaid tax debt during the years 2002-2007, averaging 37 percent over that period.¹⁷

The cost to recover unpaid debt includes labor (“collections” agents plus overhead), attorney fees, court costs, credit reports, and other costs. There are several benchmarks for estimating this cost. According to the Association of Credit and Collections Professionals, in 2010 private collections agencies earned \$10.3 billion in commissions on \$54.9 billion in total debt recovered, or about 18 percent.¹⁸ State agencies may have lower costs than private agents. For example, an Oregon state agency that does in-house recovery on unpaid tax debt charges 16 percent of the recovered revenue as a service fee. For purpose of this study, we assume a recovery cost of 16 percent of unpaid debt collected.

In summary, for purposes of financial modeling at this time, we assumed 37 percent of evaded revenue could be collected through a collections process, at a cost of 16 percent of the amount recovered. For example, for every \$1 evaded, the agency will recover \$0.37, but spend \$0.06 to collect it, so the net recovery is \$0.31, or 31 percent.

¹⁷ Source: Government Accountability Office. “Tax Debt Collection: IRS Has a Complex Process to Attempt to Collect Billions of Dollars in Unpaid Tax Debt.” Report GAO-08-728, June 2008.

¹⁸ Source: “The Impact of Third-Party Debt Collection on the National and State Economies,” February 2012, <http://www.acainternational.org/products-collections-information-5431.aspx>.

Audit

A critical aspect of the road usage charge program closely related to enforcement is audit of individual Principals to ensure compliance. Although the audit process may identify and recover some unpaid charges, its primary purpose is to encourage voluntary compliance. The model makes the following assumptions:

- For Concept A, there are no audits as the collection of a time permit is linked with the registration renewal process.
- For Concept B, although odometer charges are linked with the registration renewal process, audits will help to ensure accurate reporting and estimation of odometer readings by Principals. We assume an audit rate of 1 percent of active Concept B accounts.
- For Concept C, mileage reporting is automated, but to encourage proper usage of vehicle electronics and to discourage fraud, we assume an audit rate of 1 percent of active Concept C accounts.

Audits are carried out by auditors. For Concept B, an audit is a very simple matter, as it merely requires a verified odometer reading, whether provided in person by the auditor or remotely by a certified odometer reader (e.g., at a vehicle service or repair facility). We assume an average audit requires 1 hour of time to complete. For Concept C, audits may require additional time not only to obtain the odometer reading but to read and understand the data reported by the in-vehicle hardware and locate any possible discrepancies, errors, or instances of possible fraud (e.g., removing the device). We assume an average audit requires 2 hours of time to complete.

Costs of the audit category include the following:

- \$5 in materials per audit, which includes the cost of mailing notices and potentially obtaining third party verified odometer readings; and
- Labor costs associated with auditors averaging 2000 hours per year conducting audits under the supervision of audit managers (1 manager per 10 auditors, whose costs are included in the program administration category). Costs include salary, benefits, and overhead.

Public Relations

Public relations involves costs associated with informing the public of the road usage charge program existence, purpose, and requirements, including Principals' alternatives for registration, operation, payment, and compliance. We assumed a cost of \$1 per new account per year to cover the cost of production and materials for informational materials to be mailed to residents directly, placed in strategic locations, such as DOL agent and subagent offices, and for other media such as public notices via print, radio, TV and electronic media. We assume an additional cost of \$0.50 per existing account per year to cover similar costs to maintain customer information and awareness. Earned media, such as informational news stories, TV reports, and web reports via blogs and other sites, are not counted as part of the PR cost. These activities are overseen by a director of public relations whose labor costs are counted as part of program administration.

Cash Flow

A potential transition from gas tax to road usage charge may create a one-time cash flow issue for WSDOT that rely on regular monthly revenues to fund ongoing operations. The reason for this gap is that the gas tax is “prepay” meaning that the tax is collected at the terminal rack several days or weeks before the gas is used by drivers to travel on roadways. Under a road usage charge, Principals will continue to prepay under Concepts A and B, but under Concept C, payment for road use will not occur until after road usage has occurred, leaving a gap in revenues.

In addition, it is possible that the net revenue from a road usage charge is less than the net revenue from gas taxes in the early years due to higher collection costs.

Therefore, WSDOT may have to borrow funds to fill the gap created by these cash flow issues. The interest payments on these borrowed funds are counted as a cost to the road usage charge program.

