Big Move Implementation Economics:

Revenue Tool Profiles

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A. Introduction to Revenue Tools Profiles

The purpose of this document is to provide readers with detailed information about each of the revenue tools that have been used in other jurisdictions to support the development of transportation infrastructure. These “Revenue Tool Profiles” have been developed through consultation with members of the Metrolinx and AECOM teams, extensive research of leading practices in transportation funding instruments, detailed review of jurisdictions where these revenue tools have been or are currently being implemented, and through the practical experience of the AECOM team members.

The intention of these Revenue Tool Profiles is to provide adequate revenue estimates and create a basis to evaluate qualitatively the tools to help inform the development of Tool Kit options for funding the Metrolinx Investment Strategy. The assumptions used in developing the revenue estimates have been laid out for each revenue tool, using the best information available publicly, and were used for the sole purpose of creating an adequate basis to assess the revenue potential of the tools.

The implementation scopes identified in the Revenue Tool Profiles do not constitute recommended implementation scopes and would require further examination for each tool selected. In some instances, valuable features for the scheme were identified and stated as “smart design features”. As revenue tools are shortlisted and Tool Kit options are brought forward, detailed implementation and legislative considerations will need to be considered.

Throughout this document, several of the tools are referred to as a “tax” or “levy”. For the most part, the naming conventions used in this document are based on common terminology used to identify the revenue tools in other jurisdictions where the tools are in place. In other instances, such as the sales tax, the tool is leveraging a mechanism that is already in place and has therefore been identified using the same naming convention. It is worth noting that in light of legislative and other considerations, various implementation schemes and structures may be envisaged for the desired tools, which may lend themselves to different naming conventions.

A.1 Overview of Tool

Part 1 of the Revenue Tool Profiles provides an overview of the tool including how the tool works, where it is being used in other jurisdictions, and how it is being considered for the purposes of this analysis. The purpose of this section is to ensure the reader has a basic understanding of how the tool can be used to generate revenues for use in funding transportation initiatives.

A.2 Tool Evaluation Results

Part 2 of the Revenue Tool Profiles provides readers with the evaluation results for each tool including a brief discussion outlining some of the key characteristics for why a particular score was given. At a high-level, the evaluations looked at the following criteria for each tool:
Revenue potential;
• Two concepts in this section that warrant a description are the static and dynamic revenues. For each tool, a static revenue estimate for 2014 has been provided that indicates the revenue potential of the tool without adjusting for any feedback effects on revenue due to changes in the behaviour of people affected by the tool. The majority of the tools also indicate a dynamic revenue estimate which are calculated in the same manner as the static revenue estimates, but have been adjusted to account for changes in demand and travel behaviour stemming from the implementation of the tool. Both revenue estimates are presented in current year currency (i.e. nominal figures) and do not account for any costs associated with collecting or processing the revenues.

Incremental costs;
• These consist of additional capital, operating, maintenance and compliance costs required to implement the tool and collect the revenue over the economic useful life of any investment required. Compliance costs refer to the time, effort and any out-of-pocket costs borne by those who pay the charges.

Impact on travel behaviour and transportation network performance;
• Impacts on travel behaviour and network performance (mode shifts, time savings, changes in auto usage costs and environmental impacts) are conceived relative to a base case characterized by the absence of the proposed revenue tool.

Scheme design;
• A number of the tool profiles reference smart charges or dynamic pricing while discussing the scheme design. This means that rather than charging a flat rate to all users, the tool (if utilizing dynamic pricing) can actually differentiate between user groups based on a wide variety of factors, including time of day, demand, vehicle type, and driving record, all of which are designed to incentivize desirable changes in behaviour.

Technical implementation considerations;
• These identify how the tool can be implemented with a particular focus on the ease and time required for implementation, such as whether mechanisms that are currently in place can be leveraged for monitoring and collecting revenues. It is important to note that the scores assigned for time to and ease of implementation do not take political or social acceptance considerations into account.

Governance considerations;
• Several of the tools are likely to require additional legislation or approvals, which are identified in this section. The transparency of the scheme, that is who will be
collecting the revenues and how the revenues can be allocated for use in transportation funding, is also discussed for each tool;

- **Equity and distributional impacts;**
  - A discussion of the impacts on various socio-economic groups (vertical equity) and whether individuals targeted by the tools are also the beneficiaries of the uses of the funds (horizontal equity) is provided for each tool; and

- **Overall efficiency impact;**
  - This considers whether the GTHA would be better off with the revenue tool in place, taking account of the incremental costs, any costs associated with economic distortions and the impacts on travel behaviour and network performance. It does not take into account revenue recycling (i.e. alternative uses for the revenue proceeds). In economic terms, this is equivalent to assuming that all the revenue collected is returned to those who made the payments.

Within each of these criteria specific characteristics have been identified for evaluation purposes and scored on a 5-point scale, where 5 is the best score and 1 is the worst. The table below displays the characteristics that were evaluated for each of the tools and provides a guide for how the scores were arrived at. The majority of scores were assigned relatively, meaning that if Tool X was assigned a score of 3 for one criterion, then Tool Y should be a 4 for the same criterion based on the analysis of the quantitative and qualitative characteristics of the two tools. For example, the scores for the revenue potential of the tools have been based on the revenue estimates developed for each tool, as well as the revenues that could be generated using the identified upper bound rates. In instances where there were no quantifiable measures that could be used for scoring, the professional judgment of the team members was used to determine those scores.

<table>
<thead>
<tr>
<th>Breakdown of Scoring for Each Criterion Evaluated</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Revenue Potential</strong></td>
</tr>
<tr>
<td><strong>Revenue Potential</strong></td>
</tr>
<tr>
<td>Tool has limited revenue potential</td>
</tr>
<tr>
<td>Tool has below average revenue potential</td>
</tr>
<tr>
<td>Tool has moderate revenue potential</td>
</tr>
<tr>
<td>Tool has above average revenue potential</td>
</tr>
<tr>
<td>Tool has the potential to generate significant revenues</td>
</tr>
<tr>
<td><strong>Sustainability</strong></td>
</tr>
<tr>
<td>Revenues are not sustainable in the short- or long-term</td>
</tr>
<tr>
<td>Revenues are not sustainable in the long-term</td>
</tr>
<tr>
<td>Revenues could be sustainable depending on user perception of the tool</td>
</tr>
<tr>
<td>Revenues are likely sustainable in the long-term</td>
</tr>
<tr>
<td>Revenues will be sustainable in the short- and long-term</td>
</tr>
</tbody>
</table>
### Breakdown of Scoring for Each Criterion Evaluated

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cyclical Variability</td>
<td>Revenues will vary significantly with changing economic growth over the business cycle</td>
<td>Revenues will vary with changing economic growth over the business cycle</td>
<td>Potential for revenues to vary with changing economic growth over the business cycle</td>
<td>Revenues are for the most part sheltered from changing economic growth over the business cycle</td>
<td>Revenues are essentially unaffected by changing economic growth over the business cycle</td>
</tr>
<tr>
<td>Incremental Costs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall Incremental Costs</td>
<td>Very high costs associated with implementing the tool</td>
<td>High costs associated with implementing the tool</td>
<td>Moderate costs associated with implementing the tool</td>
<td>Small or insignificant costs associated with implementing the tool</td>
<td>No incremental costs associated with implementing the tool</td>
</tr>
<tr>
<td>Impact on Travel Behaviour and Transportation Network Performance</td>
<td>Impact on Network Performance</td>
<td>Tool has no impact on network</td>
<td>Tool may have minimal positive impact on network</td>
<td>Tool will improve network performance</td>
<td>Tool will significantly improve network performance</td>
</tr>
<tr>
<td></td>
<td>Travel Time Savings</td>
<td>Tool will increase travel times</td>
<td>Tool has no effect on travel time</td>
<td>Tool may decrease travel times slightly</td>
<td>Tool will generate travel time savings</td>
</tr>
<tr>
<td></td>
<td>Savings due to Decreased Auto Use / Fuel Savings</td>
<td>Tool will increase auto use and fuel consumption</td>
<td>Tool has no effect on auto use or fuel consumption</td>
<td>Tool may cause minimal decrease in auto use and fuel consumption</td>
<td>Tool will decrease auto use and fuel consumption</td>
</tr>
<tr>
<td></td>
<td>Reductions in Traffic Collisions</td>
<td>Tool has no effect on traffic collisions</td>
<td>Tool may slightly reduce the number of traffic collisions</td>
<td>Tool will reduce the number of traffic collisions</td>
<td>Tool will significantly reduce the number of traffic collisions</td>
</tr>
</tbody>
</table>

- **Cyclical Variability**: The variability of revenues with changing economic growth over the business cycle.
- **Incremental Costs**: Overall costs associated with implementing the tool.
- **Impact on Travel Behaviour and Transportation Network Performance**: Effects on travel time savings, fuel consumption, and traffic collisions.
### Breakdown of Scoring for Each Criterion Evaluated

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<th>3</th>
<th>4</th>
<th>5</th>
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</thead>
<tbody>
<tr>
<td><strong>Air Pollution and Emissions Savings</strong></td>
<td>Tool will increase air pollution and emissions</td>
<td>Tool has no effect on air pollution or emissions</td>
<td>Tool will minimally decrease air pollution and emissions</td>
<td>Tool will reduce air pollution and generate emissions savings</td>
<td>Tool will significantly reduce air pollution and generate emissions savings</td>
</tr>
</tbody>
</table>

### Technical Implementation Considerations

<table>
<thead>
<tr>
<th></th>
<th>Ease of Implementation</th>
<th>Time to Implementation</th>
<th>Governance Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ease of Implementation</strong></td>
<td>Significant barriers to implementation (costs, approvals, etc.)</td>
<td>High levels of coordination between multiple entities required</td>
<td>There are several entities involved in the collection and allocation of funds; difficult process for administering funds for transit</td>
</tr>
<tr>
<td><strong>Time to Implementation</strong></td>
<td>Significant planning, testing and infrastructure is required prior to implementation</td>
<td>Significant infrastructure is required to be built prior to implementation</td>
<td>Lines of accountability between authorities is vague; revenues are pooled or lumped in with other revenue streams</td>
</tr>
<tr>
<td><strong>Governance Considerations</strong></td>
<td>Lines of accountability between authorities are clear; revenues are dedicated to transportation</td>
<td>An authority will be responsible for collection but will require assistance allocating the revenues to transit</td>
<td>The authority collecting the fees also has the ability to use or allocate the funds; direct relationship between revenues and transit funding</td>
</tr>
</tbody>
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### Equity and Distributional Impacts

<table>
<thead>
<tr>
<th></th>
<th>Horizontal Equity</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Horizontal Equity</strong></td>
<td>None of the groups targeted / affected by the tool receive a benefit</td>
</tr>
</tbody>
</table>
## Breakdown of Scoring for Each Criterion Evaluated

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>commensurate with the charge paid</td>
<td>benefit from the tool</td>
<td>benefit; however, other groups will benefit without being targeted directly</td>
<td>some groups may benefit without being targeted directly</td>
<td>commensurate benefits from the tool</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Vertical Equity</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tool places a higher burden (in terms of proportion of income) on low-income groups</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lower income groups do not pay lower charges under this tool. So tool may represent a higher burden or proportion of income for low-income groups</td>
<td>Lower income groups sometimes pay lower charges under this tool, due to the lower value or quantity of their purchases (not to a lower charge rate)</td>
<td>Lower income groups often pay lower charges under this tool, due to the lower value or quantity of their purchases (not to a lower charge rate)</td>
<td>Lower income groups always pay lower charges under this tool, due to the lower value or quantity of their purchases (not to a lower charge rate)</td>
</tr>
<tr>
<td><strong>Availability of Alternatives</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>There are no practical alternatives to avoid this tool for groups targeted / affected</td>
<td>Few alternatives exist for groups targeted / affected by the tool; undue burden will be put on users looking to avoid the tool</td>
<td>Alternatives are available for targeted groups looking to avoid the tool, but likely in some form of modal shift</td>
<td>Alternatives exist; however, they may not be as convenient as the desired option</td>
<td>Equally suitable alternatives are conveniently available for groups targeted / affected by the tool</td>
<td></td>
</tr>
<tr>
<td><strong>Overall Efficiency Impact</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Costs of Economic Distortions</td>
<td>Tool will generate very high costs, from economic distortions (representing a large majority and possibly exceeding the revenue collected)</td>
<td>Tool will generate substantial costs from economic distortions (representing a substantial portion and up to a majority of revenue collected)</td>
<td>Tool will generate moderate costs from economic distortions (i.e., representing a significant portion of revenues collected)</td>
<td>Tool will only generate small and potentially insignificant costs from economic distortions (i.e., representing a small or negligible portion of revenues collected)</td>
<td>Tool will not generate any costs associated with economic distortions and may well reduce any pre-existing distortions</td>
</tr>
</tbody>
</table>
Finally, for each tool, two institutional features were assessed using a yes or no description; (1) whether the tool is a new revenue tool and (2) if a municipal role is implied in implementing the tool. A tool was considered to be a new revenue tool if there is no similar tool currently in place within the GTHA. For example, HOT lanes are considered to be a new revenue tool, while highway tolls are not as they are currently utilized on Highway 407. Additionally, if a tool was already in place it was not considered to be a new tool even if it did not have a portion of funding explicitly dedicated to transportation funding (e.g., sales tax, driver’s license tax, etc.).

In instances where the implementation of a tool implies municipal involvement, such as the imposition of tolls on municipal highways, or where the tool is encroaching on municipal revenue sources (e.g., property taxes), it has been indicated for each tool. In other cases, municipal engagement may be required in order to implement the tool, like in the case of the vehicle registration fee.

A.3 Case Study

For the majority of the Revenue Tool Profiles, a case study (or multiple case studies in some instances) have been provided in part 3. The case studies include examples from both Canada and international jurisdictions where the revenue tool has been implemented. The purpose of the case studies is to provide readers with an overview of the items discussed in parts 1 and 2 using a relevant, real-world example. The case studies attempt to summarize the:

- Policy objectives and motivations of the revenue tools;
- Revenue potential and pricing;
- Operational aspects, such as the collection and enforcement technology;
- Availability of alternative means of travel and any complementary measures implemented alongside the revenue scheme;
- Impact on travel behaviour and the transportation network;
- Governance considerations
- Equity and distributional considerations; and
- Overall efficiency impact.

A.4 Lessons for Metrolinx

Part 4 of the Revenue Tool Profiles provides lessons for Metrolinx gleaned from the tool evaluations, the case studies (if applicable) and any related research undertaken by the team. This section provides some important lessons gleaned through researching the tools and identifies aspects of the tool that worked well (or could be improved) during the implementation of the tools in other jurisdictions.

Some overarching lessons for Metrolinx that could be applied to almost all of the tools include:
• Introducing public education campaigns to increase awareness of the tools and how they work;
• A province-wide implementation of most revenue tools can reduce the economic distortions, with any revenue raised outside the GTHA going to the province; and
• Smart charges can be used to encourage desirable changes in behaviour.
B. Tool Profile: Auto Insurance Tax

B.1 Overview of Tool

B.1.1 How the Tool Works and Where it is Being Used
An auto insurance tax is a fee paid by vehicle owners when making auto insurance payments. The revenues would be dedicated to funding transportation initiatives. The fee is collected by the auto insurance company on behalf of the regional transportation authority. The charge can take the form of either a fixed monthly fee per vehicle or per driver, or can be implemented as a smart charge, for example, based on vehicle emissions (see Scheme Design section).

B.1.2 How the Tool is Being Considered for Evaluation
For the purposes of this analysis, a flat fee is added to the auto insurance premiums already paid by vehicle owners in the GTHA. The auto insurance companies are assumed to then collect the revenues from consumers as part of their regular auto insurance payments and direct the funds to Metrolinx (or to the Province, which would in turn remit the revenue to Metrolinx).

Since this is a new type of funding mechanism within the region, utilizing a simple fixed fee per auto insurance plan would likely cause the fewest issues during the implementation of the tool. Thus, for the purposes of the evaluation, a flat-fee per vehicle pricing scheme has been assumed rather than a smart charge.
B.2 Tool Evaluation Results

B.2.1 Revenue Potential

An auto insurance tax has the potential to generate a modest amount of revenues within the region depending on the amount of the tax. For the purposes of generating a revenue estimate from the implementation of an auto insurance tax within the GTHA, a fixed monthly fee charged per vehicle has been assumed.

Using a rate of $5 per month and the assumption that there will be approximately 3.3 million vehicles within the GTHA by 2014, it is estimated that an auto insurance tax could generate between $150 million and $250 million annually in 2014. Assuming a 1.20% annual increase in the number of vehicles in the region, the tool has the potential to generate $165 million to $265 million by 2021.

Further, if an upper bound rate of $10 per month is used, there is the potential to generate $400 million per year. This upper bound was determined based on a rough estimate of the applicable range for the estimated elasticity of demand for auto insurance. It is expected that at a rate greater than $10 per month, the demand response of users may diverge significantly from that implied by the point estimate used in the dynamic revenue calculation.

The implementation of this levy would impact all drivers living within the GTHA and is a reasonable way to directly charge users of the road network. Since having auto insurance is a legal requirement for operating a vehicle, it is likely that revenues generated by an auto insurance tax would be sustainable in the long-run (i.e., tax revenue would grow with fleet size). Similarly, changes in the business cycle should not have a significant impact on the number of insured vehicles, meaning that the revenues generated by the levy should be relatively stable.

The revenue estimate prepared for this tool uses data from the Transportation Tomorrow Survey (TTS)\(^1\) for the number of light vehicles in the GTHA for 2006 and assumes an annual increase in the number of vehicles within the Region of 1.20% per annum. Although only light vehicles were used to generate revenue estimates, this does not reflect the potential scope of implementation. There

\(^1\) The Transportation Tomorrow Survey is a comprehensive travel survey conducted in the GTHA once every five years.
were 216,000 heavy vehicles reported in Ontario in 2009\(^2\). To account for this approach, a range for the revenue potential of the tool has been provided.

### B.2.2 Incremental Costs

Incremental costs associated with implementing an auto insurance tax would be minimal as payment and collection mechanisms already exist in the auto insurance sector. These fees could simply be an additional fee or tax added to the monthly or annual statements of insured drivers.

There may be some incremental administrative costs associated with processing the collection of the new tax and remitting to Metrolinx; however, these costs are not expected to be significant. Moreover, there would be no additional compliance costs on users paying the auto insurance tax.

### B.2.3 Impact on Behaviour and Transportation Network Performance

The implementation of an auto insurance tax is not expected to have any significant impact on the overall performance of the transportation network. While there may be a slight reduction in the number of drivers in the region (particularly those who drive infrequently) caused by the increased cost of driving, the reduction is expected to be minimal. The implementation of the tool is not expected to do much to discourage everyday drivers.

As discussed in more detail in the scheme design section, if the tool is converted from a fixed fee structure to a smart charge model where the fee varies with an individual’s driving record for example, there is the possibility for this tool to have at least a partial impact on the driving behaviour of some drivers. This is because a smart pricing model can be linked to the driving record of each driver and may incentivize individuals to be safer drivers. It could lead to a slight reduction in traffic collisions; however, the magnitude of the impact is expected to be minimal. The scoring of the evaluation criteria assumes flat-fee pricing.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Assessment (1 to 5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall Impact on Behaviour and Transportation Network Performance (simple average)</td>
<td>2</td>
</tr>
<tr>
<td>Impact on Network Performance</td>
<td>2</td>
</tr>
<tr>
<td>Time Savings</td>
<td>2</td>
</tr>
<tr>
<td>Savings Due to Decreased Auto Use / Fuel Savings</td>
<td>2</td>
</tr>
<tr>
<td>Reduction in Traffic Collisions</td>
<td>2</td>
</tr>
<tr>
<td>Air Pollution and Emissions Savings</td>
<td>2</td>
</tr>
</tbody>
</table>

B.2.4 Scheme Design

Utilizing a fixed fee scheme would make implementing the tool easier in the short-run; however, if after a few years of implementation a sound process has been established for the collection and transfer of transportation related revenues, it may present an opportunity to convert the fee into a smart charge. This could involve varying the fee based on the driving record of the insured (the higher the number of demerit points for unsafe driving, the higher the charge), which could potentially help curb undesirable behaviour related to unsafe driving, and as a result reduce the number of traffic collisions. A similar type of smart charge (dependent on demerit points) is currently in place in the Province of Quebec and is collected through the vehicle registration and the mandatory provincial auto insurance for personal injury.

Smart charges could also take the form of fees based on vehicle kilometres travelled, but this would be very difficult to monitor accurately. However, most insurance companies currently collect self-reported annual mileage from customers which could be used under this type of scheme design.

Combining a fixed fee with a variable element (e.g., driving record) has the potential to achieve both the behavioural change desired through reduced traffic collisions and moving violations while at the same time ensuring revenue sustainability for Metrolinx.

The size of the fee could have an impact on the number of insured drivers within the region if it is a significant share of the annual insurance premiums. This is particularly the case for infrequent drivers.

Relying on an ad valorem tax (instead of a flat fee), where the charge is a percentage of the driver’s auto insurance premium, would be less desirable than a flat fee, because it could discourage the purchase of additional insurance coverage. It could also be viewed as inequitable to some demographics (e.g., young male drivers) that are charged higher premiums due to their age, gender, or type of vehicle. Using an ad valorem tax would mean that individuals in these groups would be contributing a disproportionate amount to the transit funding.

B.2.5 Technical Implementation Considerations

The auto insurance companies would collect this new fee from consumers as part of their regular auto insurance instalments and direct the transportation related funds to Metrolinx (or to the Province). The tax can be implemented shortly after receiving the necessary approvals and consulting with the auto insurance industry. Incremental operating and compliance costs should be minimal as collection will be through payment mechanisms that already exist.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Assessment (1 to 5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ease of Implementation</td>
<td>3</td>
</tr>
<tr>
<td>Time to Implementation</td>
<td>4</td>
</tr>
</tbody>
</table>
As mentioned earlier, smart charges could also be introduced as a method of incentivizing good driver behaviour; however, this type of fee structure may be too complex for the initial implementation of the tool.

Although GTHA-only implementation is possible, an Ontario-wide application of the auto insurance flat fee would be preferable, because it would reduce the tax avoidance potential and thereby mitigate the economic distortions from the tax. Tax avoidance potential exists for GTHA-only implementation due to residents registering their vehicle at second addresses outside the GTHA, for example at cottages in other regions.

**B.2.6 Governance Considerations**

The introduction of a new tax will require Provincial legislation and regulatory approval. The use of a variable fee scheme may require additional data protection legislation amendments as the fee would be based on an individual’s driving record.

Implementing this tool will require Metrolinx to develop a partnership with insurance providers to assist in the transfer of funds between the two parties (or revenue can be remitted to Province as in the case of other excise taxes). Using a flat fee scheme initially, could help make this interface easier to track and manage. A flat fee scheme would also be easily understood publicly and would make tracking the revenues that are earmarked for transportation easier.

Should the smart charge option be linked to driver behaviour, the tax would need to be aligned with the legal framework for demerit points. This system would require enforcement by local police and coordination with individual insurance records. While insurance premiums are currently linked to driving records, using a percentage-based fee would be inequitable to drivers who may have a clean driving record but are part of a demographic that incurs higher than normal premiums (as discussed previously).

If an auto insurance tax is introduced as a direct source of revenue for improving public transit within the region, users would have a fairly good understanding of how their money is being invested (i.e., users should be aware of the projects being developed by Metrolinx in the region). The use of a fixed fee structure and public education campaigns could help improve the transparency of the scheme.

The use of a variable fee could initially have an adverse effect on the transparency of the scheme as there are more complications involved in the pricing of the fee. Implementation of variable pricing in a second phase would be preferable.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Assessment (1 to 5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transparency of Scheme</td>
<td>4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Institutional Features</th>
<th>Y/N</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Revenue Tool?</td>
<td>Y</td>
</tr>
<tr>
<td>Municipal Role</td>
<td>N</td>
</tr>
</tbody>
</table>
B.2.7 Equity and Distributional Impacts

There is no availability of alternatives to this tool. Since having valid auto insurance is a legal requirement for operating a vehicle, all drivers must either pay the fee or choose not to own a vehicle.

The flat fee version of this revenue tool would impact all vehicle owners. The same holds for the smart or variable fee version of the scheme, provided that there is a minimum fee even for drivers with a clean record (no demerit points).

If a substantial share of Metrolinx revenue is raised from this tool (or similar road-user tools), and if no visible highway or road improvement elements were indicated in the projects and initiatives supported by these revenues, vehicle owners could feel over-burdened and develop a perception that they are providing the majority of funding for the public transit system, even though they may or may not be public transit users. It is therefore important for the funding burden to be shared across groups (e.g., road users, public transit users, property owners, visitors, etc.) to ensure that each group feels that they are being treated the same as any other groups.

B.2.8 Overall Efficiency Impact

The auto insurance tax is not expected to have any appreciable impacts on either travel behaviour or on the performance of the transportation network. However, costs arising from economic distortions may be substantial. These distortions include drivers reducing their insurance coverage (e.g., purchasing only the minimum required insurance coverage if the revenue tool is structured as a percentage based scheme), shifting their insurance purchases to locations outside the GTHA (e.g., to second residences) as well as some infrequent drivers giving up their driver’s license. The shifting of insurance purchases can be mitigated either through a province-wide application of the tax or through more stringent enforcement, although more stringent enforcement will entail additional implementation costs.

Incremental costs required to implement, operate and comply with auto insurance tax are likely to be very modest.

As a result, the overall efficiency impacts are likely to be moderately negative due to the substantial costs associated with the economic distortions.
B.3 Case Study – Other Sales and Excise Taxes (Canada, US)

B.3.1 How the Tool Works
An auto insurance tax is an example of a sales tax. Hence, three case studies have been highlighted to show the effects of sales and excise taxes. These are the Motor Vehicle Sales Tax (MVST) in Minnesota, and the Rental Vehicle Tax (RVT) and Hotel Occupancy Tax (HOT) in Allegheny County, Pennsylvania. All three sales and excise taxes are similar to the auto insurance tax in that they apply to a very narrow tax base as compared to general sales taxes which apply to a large basket of goods and services. These three excise taxes are applied as follows:

- MVST: a 6.5% tax on sales of the majority of new and used vehicles in Minnesota
- RVT: US$2 per day charge on majority of vehicle rentals in the Pittsburgh metropolitan area
- HOT: 7% tax levied on the purchase price of a room in the Pittsburgh metropolitan area

B.3.2 Policy Objectives / Motivation
Twelve states have vehicle sales tax revenues dedicated to transportation, of which Minnesota is one. The Minnesota Motor Vehicle Sales Tax (MVST) was not originally intended for transportation funding but has evolved to become a key source.

Most car rental fees in the US have been used to fund the construction of sports and cultural facilities. Only in a minority of cases have the resulting revenues been dedicated to specific or general transportation needs. The Allegheny County Rental Vehicle Taxation (RVT) in this case fully funds the operating subsidy of the Port Authority transit operations and provides local match funding for capital projects.

Many states have introduced hotel occupancy taxes as revenue tools, but only a small number are dedicated to transportation uses. The Allegheny County Hotel Occupancy Tax (HOT) raises revenues to fund convention related purposes in support of tourism and business sectors.

B.3.3 Revenue Potential and Pricing
Vehicle sales taxes can be important revenue generators, as indicated below. Car rental and hotel room rental fees are only marginal revenue generators.

- MVST: US$252M in 2012, but revenue has been declining since 2006, suggesting that it is sensitive to the business cycle
- RVT: US$6.2M forecast for 2012
- HOT: US$24.6M in 2010
B.3.4  **Impact on Travel Behaviour and Network Performance**

The most likely behavioural effects are largely unintended (from a policy perspective) and would involve shifting purchases to lower-value items, such as lower-value vehicles, which may not mean lower-emission vehicles. Yet, the largest inefficiency costs are associated with shifting purchases to non-taxed or lower-taxed jurisdictions. As for taxes which affect tourism and business travel, these taxes could make the taxed region less attractive as a travel destination. This effect may be material for relatively price-sensitive segments of the tourist market, such as convention business.

B.3.5  **Technical Implementation Considerations**

The types of excise taxes considered here are relatively easy to implement and this can usually be achieved within a year following legislative approval:

- Vehicle sales taxes are collected by dealerships or when the (used) vehicle is registered.
- Rental vehicle and hotel occupancy taxes are collected by the businesses selling these services, notably rental car companies and hotel operators; remittances to county tax authorities are made monthly or quarterly, depending on the level of sales.

B.3.6  **Governance Considerations**

The MVST was enacted by the Minnesota legislature and will be dedicated entirely to transportation uses as of fiscal year 2012, with the revenues split 60/40 between the highway fund and public transit. The car rental fee and hotel accommodation tax were introduced by Allegheny County.

All three types of excise taxes are likely to be characterized by limited transparency. This is especially the case for the car rental fee and hotel accommodation taxes, since buyers do not typically receive a detailed breakdown of costs at the time they book their hotel room or order their car rental although they may well receive a more detailed breakdown on their final bill.

B.3.7  **Equity and Distributional Considerations**

Excise taxes typically rate poorly in terms of horizontal equity, which refers to the application of the user/beneficiary pays principle, because the revenue generated is not destined to benefit the users in any direct way.

In terms of vertical equity, these taxes appear to rank relatively well, because the goods and services subject to these taxes are not essential goods. To ensure the best vertical equity ratings, users should be charged on the basis of ad valorem rather than flat charges, thereby ensuring that users pay more when they purchase higher end goods and services.
B.3.8 Overall Efficiency Impact

These three types of excise taxes are likely to entail much higher efficiency costs than broad-based and country- or province-wide consumer sales taxes, because they are typically applied to a narrow consumption base (i.e. to very small parts of overall consumer spending) and often to restricted geographic areas. Hence, consumers are likely to be fairly sensitive to changing their consumption patterns in response to these excise taxes, including the value and types of goods and services purchased as well as the locations where they are purchased. These inefficiency costs are likely to lie at the top end of the following range: from $0.12 to $0.38 per dollar of revenue generated. In addition, we would need to add the costs of administering each tax, which are not included in the above estimates and could be significant.

B.4 Lessons for Metrolinx

B.4.1 Lessons from Revenue Tool Evaluation

Through the evaluation of auto insurance tax as a potential tool for implementation in the GTHA, some key points were identified for consideration by Metrolinx:

- A flat fee structure may be more beneficial when introducing the tool to allow users to become familiar with the process. It will make the process more transparent for users and reduce potential implementation issues.
- Percentage based schemes would likely lead to adverse behavioural effects as users may choose cheaper insurance and reduce the number of “extras” to reduce the overall premium.
- A smart charge system could be introduced at a later date once implementation has been accepted. Such a scheme, based on demerit points for example, could lead to improved driver behaviour.
- An auto insurance tax does not strictly adhere to the premise that those that use public transport should pay for it.
- The tax could be implemented province wide to eliminate potential tax avoidance.

B.4.2 Lessons from Case Study

The overview of excise and other sales taxes (i.e. taxes on specific goods and services rather than broad-based sales taxes) included a case study on motor vehicle sales tax, a second on car rental fees, and a third on hotel occupancy fees. An auto insurance tax is also an example of a sales tax. While the case studies referred to above apply to commodities or services that differ from auto insurance, one can nevertheless draw several lessons from those case studies to the extent that each of these excise or sales taxes applies to a relatively narrow tax base:
First, in terms of revenue potential, these tools tend to generate modest revenues, although there are some exceptions. For example, the Minnesota Vehicle Sales Tax MVST is an important revenue generator – in the range of $250M/ year for the state – but this is in a very specific context where the MVST takes the same tax room that would otherwise have been taken by the state sales tax. In other words, it cannot be a major revenue generator if the vehicle sales tax is considered in addition to a pre-existing sales tax, because only a small incremental tax of say 1-2% would be feasible without creating significant distortions in consumption patterns. However, the case of auto insurance may well be one such exception, because insurance premiums in Ontario are not subject to the HST.

Additional lessons follow:

• These revenue tools rank highly in terms of sustainability, because the tax base tends to rise with economic activity in the long-term.
• Avoid high excise tax rates, which can lead to large distortions in consumption patterns when the tax is applied to a circumscribed geographic area like the GTHA and there is ample room for avoiding the tax by “shopping” at other locations that are not subject to the tax. In fact, one can think of a “feasible tax threshold” as the highest tax rate that does not generate significant distortions in consumption patterns.
• Apply the tax to as broad a geographic area as feasible in order to mitigate the economic distortions mentioned above. Ideally this would mean an Ontario-wide tax base. However, should that not be feasible, Metrolinx could envisage including municipalities adjacent to but outside the GTHA (even if the tax is applied at a lower rate in those municipalities). For equity considerations, revenue generated outside the GTHA can go to the relevant municipalities or to the province rather than to Metrolinx.
C. Tool Profile: Car Rental Fee

C.1 Overview of Tool

C.1.1 How the Tool Works and Where it is Being Used

A car rental fee is a daily charge levied on the cost of renting a vehicle that is dedicated to transportation funding within a specified region. The charge can be a fixed fee charged per day or can be in the form of a percentage of the total cost of renting the vehicle. The fee is borne by individuals renting a vehicle within the region and is collected by the rental car company on behalf of the regional transportation authority.

A rental vehicle tax is currently in place in Pittsburgh, Pennsylvania.

C.1.2 How the Tool is Being Considered for Evaluation

For the purposes of generating a revenue estimate from the implementation of a car rental fee within the GTHA, it has been assumed that a fixed daily fee per vehicle would be added to the cost of renting a vehicle. The fee would be added to the cost of renting a vehicle at all car rental companies within the GTHA. For hourly car rental services such as AutoShare or Zipcar, it is assumed that the daily fee will be prorated based on the number of hours the vehicle was rented. The car rental companies would collect these revenues from consumers and direct the funds to Metrolinx for use in funding transportation initiatives within the region.
C.2 Tool Evaluation Results

C.2.1 Revenue Potential

A car rental fee charge has minimal potential to generate revenues within the region since the fee only impacts car rentals rather than a larger component of the transportation system. This tool will have difficulty achieving annual revenues above $30 million.

Based on the assumption of approximately 5.3 million car rental days in the GTHA annually and a conservative rate of $2.00 per day, a car rental fee could generate revenues between $9 million and $15 million in 2014. If the number of car rentals increased at a rate of 2.25% per year, the tool could potentially generate $11 million to $17 million by 2021.

If an upper bound rate of $5 per day was used, it is estimated that the tool would still only generate approximately $30 million annually. This upper bound is based on a rough estimate of the applicable range for the estimated elasticity of demand for car rentals. It is expected that at a rate greater than $5 per rental per day, the demand response may diverge significantly from that implied by the point estimate used in the dynamic revenue calculation.

The implementation of this fee would impact all people renting cars within the GTHA. While this is not a large segment of the population, this tool is considered to be a fairly sustainable form of revenue, because demand for rentals rises with economic growth. However, there is potential for car rental revenues to vary somewhat over the business cycle, because tourist and business demand for car rentals varies with economic activity.

Developing a revenue estimate for this tool proved to be challenging as there was not much information available surrounding the number of rental car days. As such, an estimate for this variable was developed based on the annual operating revenue of the automotive equipment rental and leasing industry in Canada (approximately $5.1 billion). The passenger car rental portion of these operating revenues is 44% according to Statistics Canada. Then, the operating revenue attributable to Ontario was estimated based on the portion of Canada’s tourism that occurs in Ontario (approximately 40%) as reported by the Ontario Ministry of Tourism, Culture and Sport. To determine the portion of the operating revenues attributable to the GTHA, tourism data was once again used to determine the GTHA’s portion of Ontario’s tourism (approximately 30%). Finally, an average daily rental fee of $50 was assumed to estimate the number of rental car days in the GTHA based on the GTHA’s portion of the industry’s operating revenues.
C.2.2 Incremental Costs

Incremental costs associated with implementing a car rental fee would be minimal as payment and collection mechanisms already exist in the car rental industry. These fees could simply be an additional fee or tax added to the daily rate charged to consumers. There may be some incremental administrative costs associated with processing the collection of the new tax and remitting to Metrolinx; however, these costs are not expected to be significant.

C.2.3 Impact on Behaviour and Transportation Network Performance

The implementation of a car rental fee is not expected to have a significant impact on the overall performance of the transportation network. While there may be a marginal reduction in the number of rental vehicles on the road in the region due to the increased cost of car rentals, the reduction is unlikely to have a discernible impact on network performance.

The higher the fee charged on car rentals, the greater the reduction in the demand for car rentals (or the duration of car rentals) based on a typical inelastic consumer response.

C.2.4 Scheme Design

Various fees and taxes are already included in the daily charge rate for rental cars. This additional charge should be able to be added to the daily charge rate relatively easily using the existing administrative infrastructure in place at car rental companies.

The trade-off between making the fee commercially viable and worthwhile without leading to adverse rental behaviour is an important factor to consider when determining the pricing of the fee. There is the potential for some frequent rental car users within the region (residents, not visitors) to either change modes of transportation or purchase a vehicle if the fee is perceived to be too high.

Although a flat fee per day is being assumed for this analysis, the use of a variable pricing model or smart charges could produce additional benefits. The variable pricing model could be as simple as charging a percentage rather than a fixed dollar amount to ensure that larger vehicle classes are paying a higher amount (e.g., the fee charged on compact cars would be less than the fee charged on sports utility vehicles). This pricing scheme could be taken a step further by having set car
rental fees that are linked to the fuel efficiency of the vehicle or the pollutants emitted, meaning that vehicles that are less fuel efficient or are heavy GHG emitters will have a higher car rental fee associated with them when compared to a hybrid option. Using this type of pricing scheme may encourage consumers to rent more fuel efficient / eco-friendly vehicles, which in turn will generate positive environmental benefits in the region.

C.2.5 **Technical Implementation Considerations**

The new fee/tax can be implemented almost immediately after receiving the necessary approvals and costs should be minimal as collection will be through payment mechanisms that already exist.

The initial implementation of this tool would likely be made easier if a flat fee were applied to all daily rates; however, once the tool has been in place and a process for collecting and remitting the transportation portion of the revenues has been established, it may be beneficial to shift to a more dynamic pricing model.

C.2.6 **Governance Considerations**

The introduction of a new tax will require Provincial legislation and regulatory approval.

Implementing this tool will require Metrolinx, or another intermediary governmental entity, to develop a partnership with car rental companies to assist in the transfer of funds between the two parties. Using a flat fee scheme initially, could help make this interfacing easier to track and manage. A flat fee scheme would also be easily understood publicly and would make tracking the revenues that are earmarked for transportation easier.

A dynamic pricing scheme would be a more equitable way of charging users, but it would also add additional layers of complexity and make it more difficult to track the revenues dedicated to transportation funding. This is because with a flat fee, Metrolinx would simply need to know the number of car rental days by provider and would know the revenues generated by the tool; with a variable fee scheme, Metrolinx would need to know the number of car rental days by each class of vehicle (or by fuel efficiency / GHG emissions) which would increase the administrative burden of tracking these revenues.

If a car rental fee is introduced as a direct source of revenue for improving public transit within the region, users should have a fairly good understanding of where their money is going and be
satisfied that a portion of their car rental fee will be going toward improving the transportation network that they are using. The use of a fixed fee structure and public education campaigns could help improve the transparency of the scheme.

The use of a dynamic pricing model may reduce the transparency of the scheme slightly, even though it would still be a clearly stated fee that is dependent upon the type of vehicle rented.

**C.2.7 Equity and Distributional Impacts**

There are alternatives available to users in the form of other modes of transportation or purchasing a vehicle rather than renting; however, these alternatives may not be viable for visitors in the region that are travelling to areas that are not well-connected to the public transit system.

The implementation of this tool would have the biggest impact on frequent rental car users within the region and on tourists, but the cost will be borne by all rental car users within the GTHA. The use of a flat daily fee means that all users pay the same amount regardless of the distance travelled or vehicle type, but the tool only targets rental car customers. From a vertical equity standpoint, it is not likely that many low income earners will be actively renting vehicles and therefore, the tool inherently places the majority of the funding burden on higher income groups.

This may cause some rental car users who are located at the edges of the GTHA to go outside the region to rent a vehicle and avoid paying the fee. This is not expected to be a material amount of users.

Implementation of the car rental fee without an auto insurance tax (or some other car ownership related tool) and vice versa may lead to a migration from one mode to the other for some road users and may be seen as punitive on one group more than the other. This is because if the cost of renting a vehicle is increased while the cost of owning a vehicle remains the same, some frequent car renters may view car ownership as a more cost efficient option.
C.2.8 Overall Efficiency Impact

Car rental fees are expected to have a small adverse effect on the productivity and competitiveness of the GTHA region to the extent that higher-cost car rentals can make the region marginally less attractive as a destination for tourism and investment. This tool may have a negative effect on car rental companies within the GTHA region through a reduction in demand for car rentals due to the increased price, with some consumers moving to rental companies outside of the region.

Car rental charges may have a marginal positive impact on travel behaviour by reducing the duration of car rentals. However, these small positive impacts are likely to be more than offset by the combination of (1) incremental administrative and compliance costs borne by the public sector and the car rental companies respectively and (2) additional costs arising from the economic distortions. The economic distortions refer to any changes in consumption patterns arising from the charge. These distortions consist of two effects: (1) any reduction in the demand for car rentals in the GTHA compared to other destinations; and (2) any shift in demand for car rentals from the GTHA to areas just outside the region which would not be subject to the charge. The costs associated with these economic distortions could be significant if a relatively high fee is charged (e.g. $5+/day per car rental).

As a result, the overall efficiency impacts of this revenue tool are likely to be negative, because any marginal changes in travel behaviour would not be sufficient to offset the negative impacts from the costs of economic distortions and any incremental administrative costs. However, the magnitude of these negative impacts is likely to be small if the charge is set at a modest level (e.g. $2-3/day).

C.3 Case Study – Allegheny County Rental Vehicle Tax

C.3.1 How the Tool Works

The case study most relevant to this revenue tool is the overview of excise and other sales taxes and particularly our review of the Rental Vehicle Tax (RVT) in Allegheny County, Pennsylvania. A car rental tax is one example of a sales and excise tax and like most of these taxes, applies to a very narrow tax base as compared to general sales taxes. The RVT is a US$2 per day charge on the majority of vehicle rentals in the Pittsburgh metropolitan area.
C.3.2 Policy Objectives / Motivation

Most car rental fees in the US have been used to fund the construction of sports and cultural facilities. Only in a minority of cases have the resulting revenues been dedicated to specific or general transportation needs. The Allegheny County Rental Vehicle Taxation (RVT) in this case fully funds the operating subsidy of the Port Authority transit operations and provides local match funding for capital projects.

C.3.3 Revenue Potential and Pricing

Car rental taxes are typically marginal revenue generators. In the case of the RVT, it only US$6.2M in revenue was forecast for 2012.

C.3.4 Impact on Travel Behaviour and Network Performance

The most likely behavioural effects for excise taxes such as car rental fees are largely unintended (from a policy perspective) and would involve shifting purchases to lower-value items, such as lower-value rental vehicles (in the case of ad valorem tax rates), which may not mean lower-emission vehicles. Yet, the largest inefficiency costs are associated with shifting purchases to non-taxed or lower-taxed jurisdictions. In addition, car rental fees affect tourism and business travel and as such, these taxes could make the taxed region less attractive as a travel destination. This effect may be material for relatively price-sensitive segments of the tourist market, such as convention business.

C.3.5 Technical Implementation Considerations

A car rental fee is relatively easy to implement and this can usually be achieved within a year following legislative approval. It is usually collected by car rental outlets at the point of sale. Remittances to county tax authorities are made monthly or quarterly, depending on the level of sales.

C.3.6 Governance Considerations

Car rental fees such as that introduced by Allegheny County are usually characterized by limited transparency. This is because buyers do not typically receive a detailed breakdown of costs at the time they book their hotel room or order their car rental although they may well receive a more detailed breakdown on their final bill. Nor are buyers typically aware of the use made of the funds.

C.3.7 Equity and Distributional Considerations

Excise taxes such as car rental fees typically rate poorly in terms of horizontal equity, which amounts to the application of the user/beneficiary pays principle, because the revenue generated is not destined to benefit the users in any direct way.
In terms of vertical equity, these taxes appear to rank relatively well, because the goods and services subject to these taxes are not essential goods. To ensure the best vertical equity ratings, users should be charged on the basis of ad valorem rather than flat charges, thereby ensuring that users pay more when they purchase higher end car rentals.

C.3.8 Overall Efficiency Impact

Car rental fees are likely to entail much higher efficiency costs than broad-based and country- or province-wide consumer sales taxes, because they are applied to a narrow consumption base (i.e. to very small parts of overall consumer spending) and are often to restricted geographic areas. Hence, consumers are likely to be fairly sensitive to changing their consumption patterns in response to these excise taxes, including the value and types of goods and services purchased as well as the locations where they are purchased. These inefficiency costs are likely to lie at the top end of the following range: from $0.12 to $0.38 per dollar of revenue generated. In addition, we would need to add the costs of administering each tax, which are not included in the above estimates and could be significant.

C.4 Lessons for Metrolinx

C.4.1 Lessons from Revenue Tool Evaluation

Through the evaluation of car rental fees as a potential tool for implementation in the GTHA, some key points were identified for consideration by Metrolinx:

- A flat fee structure may be more appropriate when introducing the tool to allow users to become familiar with the process.
- A dynamic pricing scheme would be more equitable across income groups and help influence positive consumer behaviour (i.e., renting smaller, more eco-friendly vehicles because the car rental fees associated with these types of vehicles are less).
- The fee will only generate minimal revenues for Metrolinx as car rentals are a very small proportion of vehicles in the region.
- Rental companies on the periphery of the GTHA may move operations to outside the affected region.
- Introduction of the fee will require Metrolinx to partner with the car rental companies; or the fee could be collected by the Province as part of its management of other excise taxes and then remitted to Metrolinx.
C.4.2 Lessons from Case Study

The overview of excise and other sales taxes and car rental fees in particular provides several lessons:

• Car rental fees are modest revenue generators, but they can be a sustainable revenue tool, because the tax base tends to rise in the long-term.
• This revenue tool is also very sensitive to the business cycle. The tax base tends to contract sharply during recessions, as trade and investment activity subsides, and rise sharply during the recovery.
• Avoid high excise tax rates, which can lead to large distortions in consumption patterns when the charge is applied to a circumscribed geographic area like the GTHA and there is some room to avoid the tax by “shopping” at other locations that are not subject to the tax.
• Mitigate consumer sensitivity to the rental charge, and thereby minimize economic distortions, by applying the charge to a broad geographic area. Ideally this would be Ontario-wide, but should that not be feasible, consideration should be given to including municipalities outside the GTHA. Alternatively, one could also consider a graduated reduction in the rental car fee in the outer “905” municipalities within the GTHA.
• Car rental fees have often been perceived as an easy way of charging people from outside the area for funding transportation or other infrastructure projects. However, any negative efficiency impacts from such revenue tools are borne by local businesses and residents, because the local area can become a less attractive destination for tourists and business travel.
D. Tool Profile: Carbon Tax

D.1 Overview of Tool

D.1.1 How the Tool Works and Where it is Being Used

A carbon tax is a tax levied on the emissions of carbon dioxide created from the use of gasoline and other fossil fuels. These taxes are typically charged based on a price per tonne of emitted carbon dioxide. Since these emissions are closely related to the carbon content of fuels, the charge can be levied as a fixed tax per litre of fuel, where the rate varies depending on the carbon content each type of fuel. The charge can be levied either at the production or consumption stage.

A carbon tax is currently in place in British Columbia. It was set on July 1, 2008 at a price of $10/tonne of carbon dioxide and the rate was legislated to rise by $5 each year until it reached $30/tonne in 2012. The tax rate schedule beyond 2012 has not yet been determined. It applies to the purchase of fossil fuels in the province, including gasoline, diesel, jet fuel, natural gas, propane and coal. The tax is revenue-neutral meaning that revenues are returned to individuals and businesses in the form of reductions in the personal and corporate income tax rates.

D.1.2 How the Tool is Being Considered for Evaluation

For the purposes of this analysis, the tool is being considered as a tax on all greenhouse gas emissions in the region. The tool will target all businesses and residences in the GTHA and not just transportation network users. A charge per tonne of GHG emissions will be levied on all emitters.
D.2 Tool Evaluation Results

D.2.1 Revenue Potential

A carbon tax has the potential to generate significant revenues within the region, potentially generating over $900 million annually in the early years of implementation. For the purposes of generating a revenue estimate from the implementation of a carbon tax, a fixed charge per tonne of GHG emissions has been assumed on all businesses and residences within the GTHA.

Based on the assumption that approximately 97 million tonnes of greenhouse gases are emitted in the GTHA annually, a charge of $10 per tonne of GHG emissions could generate between $950 million and $1.5 billion in 2014. GHG emissions within Ontario have decreased from 199 million tonnes in 2004 to 190 million tonnes in 2008. If GHG emissions continue to decrease at a rate of 1.00% per year, a carbon tax would generate $910 million to $1.1 billion by 2021.

As indicated previously, the carbon tax charged in British Columbia has reached $30 per tonne of GHG emissions. Using $30 per tonne as an upper bound rate in the GTHA, a carbon tax has the potential to generate up to $3.0 billion.

The implementation of this tax would impact all carbon emitters within the GTHA. While this structure of a carbon tax would have the broadest tax base, it may be difficult to sustain these revenues or at least continue to have the revenues dedicated to transportation. This is because the federal government has established emission reduction targets in the country for 2020 (20% below 2006 levels) and 2050 (65% below 2006 levels). Currently, there is no carbon pricing policy in place in Ontario; however, it is possible that a carbon pricing policy may be instituted to help meet the federal government’s emission reduction targets. This could have an impact on the sustainability of the

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3 Annual GHG emissions of 97 million tonnes in GTHA derived based on the GTHA as a percentage of Ontario’s population and 190 million tonnes of GHG emissions in Ontario (2008).
5 $30/tonne is also the maximum carbon tax rate differential between Canada and the US entertained in the NRTEE study “Achieving 2050: A Carbon Pricing Policy for Canada”.
carbon tax revenues. In addition, it is possible that these revenues would be allocated to other areas with only a portion being directed to transportation funding. Sustainability of this revenue tool is also impacted by the behavioural reaction to the pricing. Users are incented to find efficiencies to reduce emissions, thereby decreasing the revenue potential over time.

Carbon tax revenues are also expected to vary over the business cycle, particularly due to the cyclical nature business activity in manufacturing and other related industries. During high growth periods, these businesses will tend to have more work and in turn are likely to generate higher levels of GHG emissions. Conversely during recessions, production levels are likely to be cut back, reducing the amount of GHG emissions.

Revenue estimates for this tool were developed based on an estimate of the GHG emissions in the GTHA. The estimate of GHG emissions in the GTHA was approximated using the total GHG emissions in Ontario (190 million tonnes in 2008) and the GTHA’s portion of Ontario’s population (approximately 51%). A flat rate per tonne was then applied to the estimated GHG emissions in the GTHA to determine the revenue potential.

D.2.2 Incremental Costs

Incremental costs associated with implementing a carbon tax would be fairly significant as payment and collection mechanisms do not currently exist for the taxation of GHG emissions. In addition, the monitoring of GHG emissions could have fairly substantial costs associated with it as well.

Other incremental costs would be administrative costs associated with processing the collection of the new tax and remitting to Metrolinx. Setting up an agency responsible for tracking and collecting these revenues could be costly.
D.2.3 Impact on Behaviour and Transportation Network Performance

Instituting this form of a carbon tax may have a small positive effect on the overall performance of the transportation network through reduced vehicle kilometres travelled on highways and local/arterial roads.

The implementation of the tool could also have other positive effects on travel behaviour by encouraging modal shifts and the suppressing / regrouping of low value trips due to the increased costs associated with driving.

The most important behavioural impact is likely to be reduced fuel consumption and the associated reduction in air pollution and GHG emissions, because the carbon tax will encourage a shift to more fuel-efficient vehicles. The reduction in carbon-intensive activities in the industrial sector will also make an important contribution to reduced air pollution and emissions savings.

D.2.4 Scheme Design

A fixed charge per tonne of GHG emissions is expected to be the simplest way to implement the carbon tax. Since the tax targets GHG emissions directly, it is expected that the tool will help reduce total GHG emissions in the region. However, it may be challenging to differentiate between emission sources in order to implement differential tax rates aimed at further reducing pollutants or changing user behaviour. There may be some value in charging different rates for households and businesses, but this would need to be explored after analyzing the price sensitivity of different sources of GHG emissions and the efficiency implications of differential tax rates.

D.2.5 Technical Implementation Considerations

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There is currently no carbon pricing policy in place in Ontario and as a result, there are no systems or collection methods that can be leveraged once the tool is implemented. Measuring GHG emissions within the GTHA would be a relatively straightforward process, but is also expected to be costly. A number of businesses within the Region already monitor their GHG emissions, which could be subsequently used for determining the amount of GHG emissions applicable under the tax. Monitoring the GHG emissions of residences is likely to be more costly and difficult to implement.
D.2.6  Governance Considerations

Provincial approval will be required to impose a new tax on GHG emissions within the region. Further, the implementation of this tool may be better served through the roll-out of a province-wide carbon pricing policy. This would allow the Province to establish mechanisms for monitoring GHG emissions, collecting revenues and reporting emissions. The Province could then transfer the transportation related portion of the revenues to Metrolinx. As noted previously, it may be difficult to build a case for all of the revenues collected under this scheme to be dedicated to transportation and an arrangement may need to be worked out between Metrolinx and the Province.

A flat charge per tonne of GHG emissions is a relatively straightforward concept. However, different types of fuels would have different carbon tax rates and the public would likely benefit from education campaigns that could help demonstrate how the charges will be applied / monitored in order to improve the transparency of the scheme.

D.2.7  Equity and Distributional Impacts

The implementation of a carbon tax could potentially increase the cost of fuel and goods and services produced within the GTHA relative to the rest of Ontario. This may lead to increased numbers of hybrid / electric cars within the region as drivers seek to reduce their carbon tax exposure. It could also lead to a modal shift for some individuals from automobiles to public transit. For individuals who rely heavily on driving or reside in communities where public transit is less accessible, there may be few alternatives.

The impact of the tool will be spread across all businesses and households in the region. This could lead to some businesses and households moving (or locating some of their activities) outside of the region to avoid paying the tax if it is not implemented on a Province-wide basis.

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<td>Municipal Role?</td>
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<td>Availability of Alternatives</td>
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D.2.8 Overall Efficiency Impact

An economy-wide carbon tax may generate some changes in travel behaviour, notably reduced driving and a more fuel-efficient vehicle fleet, as well as economy-wide emissions savings. However, the costs of the economic distortions associated with a significant carbon tax (i.e. $30 or more per tonne) may be significant, due to unintended changes in consumer and firm behaviour designed to avoid the GTHA carbon tax. This would affect not only the transportation sector (i.e. commuter travel and goods movement), but also industrial production and other sectors of the GTHA economy that rely on carbon-intensive activities as part of their production process. Firms would have an incentive to locate such carbon-intensive activities outside the GTHA in order to gain a price advantage and consumers would have an incentive to shop for any carbon-intensive goods or services outside the GTHA. The reduction in GHG emissions and local air pollution would offset some of the efficiency costs of the carbon tax, but the overall costs of the economic distortions would be remain negative.

The incremental implementation and administration costs for monitoring and collecting revenues for carbon tax would also be significant, as discussed above.

As a result, the overall efficiency impacts of a carbon tax are likely to be negative, because the positive behavioural impacts (i.e. both travel behaviour and emissions reductions in the rest of the economy) may be more than offset by the economic distortions and the incremental implementation costs. An Ontario-wide application of the carbon-tax would reduce economic distortions significantly, because it would reduce the scope for firms and consumers to avoid the tax by shifting the location of economic activity. However, firms exporting carbon-intensive goods and services outside Ontario would continue to be penalized compared to similar firms in other jurisdictions that don’t have a carbon tax, unless these export-oriented sectors are exempted from the tax (e.g. fuels for commercial airline and marine services are exempt from the BC Carbon Tax).

D.3 Case Study

No case study has been undertaken for carbon taxes for this paper.
D.4 Lessons for Metrolinx

D.4.1 Lessons from Revenue Tool Evaluation

Through the evaluation of carbon taxes as a potential tool for implementation in the GTHA, some key points were identified for consideration by Metrolinx:

- The primary objective of this tool is to reduce carbon emissions. Revenue generation is only a secondary objective.
- Metrolinx should consider a province-wide rather than a GTHA-specific application of this tool. In fact, there would also be considerable efficiency gains from a coordinated national carbon tax, as compared to only a province-wide implementation of this tool.
- Any changes to carbon pricing policy in the province to meet the federal government’s emission reduction targets should be considered. It is likely that not all of the revenue estimated in this analysis will be dedicated to transportation if implemented through the provincial government.
- If the tool is implemented only within the GTHA, it could lead to a relocation of some carbon-intensive economic activities outside the GTHA.
- A carbon tax will affect businesses and households directly, but is also likely to impact a broader base of consumers and firms as the increased cost of production within the GTHA passes though into higher prices for both consumer and producer goods and services.
E. Tool Profile: Cordon Charge

E.1 Overview of Tool

E.1.1 How the Tool Works and Where it is Being Used

Drivers are charged a toll for entering and/or exiting certain cordons (or zones). Multiple cordons can be established with tolls set and collected for each. Charges can be levied at all times, but recent best practices suggest it can be an effective tool for reducing congestion through targeted peak time charges. In this way, cordon charging is seen more as a transportation demand management tool rather than an explicit revenue generating tool (as revenues typically plateau at a certain level in order to maintain the efficiency of the cordon).

Cordon charging is currently used in London, Stockholm, Singapore, and in the Norwegian cities of Bergen, Oslo and Trondheim.

E.1.2 How the Tool is Being Considered for Evaluation

For the purposes of this analysis, it has been assumed that drivers commuting into Downtown Toronto through Congestion Zones would be charged. Overhead gantries would be used to identify vehicles and initiate the transaction. Other charging systems are available such as the dedicated short-range communication (“DSRC”) system being used in Singapore.

The boundaries for this Downtown Toronto cordon area were taken from the Central Area Cordon Zone in Toronto (as used for the 2006 City of Toronto Cordon Count) and provide the best assessment of a cordon zone for Toronto with which to generate projections for this revenue tool (most importantly a traffic count for the cordon area during the morning commute):

- Bathurst Street to the west;
- CP Rail North Toronto Subdivision to the north; and
- Bayview Avenue/Don River to the east.

It is assumed that cordon charges will be levied once per day on all traffic which crosses the cordon boundary (i.e. either inbound or outbound) between 7:00a.m. – 10:00a.m. daily. It would also be desirable to charge vehicles circulating within the zone (including residents travelling within the zone) but not crossing the cordon boundary. However, the latter vehicle traffic has not been taken into account in the revenue estimates provided below.
E.2 Tool Evaluation Results

E.2.1 Revenue Potential

A cordon charge has the potential to generate a modest amount of revenues within the region depending on the amount of the charge. For the purposes of generating a revenue estimate from the implementation of a cordon charge, a fixed fee charged per vehicle entering the cordon charge area has been assumed. This congestion fee is assumed to be charged once per day upon entry into the zone.

Using traffic count data from the 2006 City of Toronto Cordon Count, for cars entering the Central Area Cordon Zone in Toronto between 7:00am and 10:00am (approximately 109,000 vehicles daily), a fee of $4.00 per day could generate between $110 million and $170 million in 2014. This estimate assumes this type of traffic volume for 310 days per annum (Saturday and Sunday assumed to be 1 full day equivalent). Assuming a traffic growth factor of 1.50%, revenues could rise to $125 million to $185 million annually by 2021.

The upper bound charge assessed for this scheme has been estimated at $8/entry, yielding approximately $300 million. This upper bound was determined based on a rough estimate of the applicable range for the estimated elasticity of travel demand. It is expected that at a rate greater than $8/entry, the demand response of users may diverge significantly from that implied by the point estimate used in the dynamic revenue calculation.

As a cordon charge is in effect a demand management tool, revenues cannot be expected to increase significantly when the cordon is in effect if the efficiency of the system is to be maintained. For example, if the charge is low, congestion will increase, reducing desirability of travel within the zone, while if the charge is high, few vehicles will enter the zone. Either way, revenue should not be expected to rise significantly.

Cordon charging has only been analyzed for the City of Toronto centre because volume-capacity plots for the GTHA road network for the 2031 RTP scenario indicates that

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<td>Sustainability</td>
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7 Net revenues estimated based on costs reported from the London Congestion Charge (pp. 172): http://www.tfl.gov.uk/assets/downloads/FourthAnnualReportFinal.pdf
congestion is limited to highways and major arterials, suggesting that there may not be obvious candidates for cordon charging other than Toronto.

The implementation of this charge would impact all drivers entering the Cordon Zone. The revenue would be sustainable over long-term. Traffic to downtown areas is likely to remain relatively stable because economic growth drives vehicle usage which is expected to be offset by diversion rates. Behavioural adjustments are likely to reduce revenue in initial period, depending on the speed of adjustment.

### E.2.2 Incremental Costs

Incremental costs associated with cordon charging would be significant as the initial construction of gantry infrastructure at all entries to all cordon zones will require significant capital investment.

Each transaction will also entail a small administrative cost borne by the operator associated with each transaction. Since the Province does not currently operate any tolled highways, all of these costs will be incremental. This does however present the option of involving a private sector toll operator who could potentially perform the toll collection activities on behalf of Metrolinx or the Province for a lower cost.

### E.2.3 Impact on Behaviour and Transportation Network Performance

Instituting cordon charges could have a significant effect on travel behaviour and the overall performance of the transportation network, but this would be limited to the area within the cordon and at peak times. The main behavioural change is likely to be a substantial drop in the number of trips through the cordon. This can be attributed to several types of changes in behaviour:

- Mode shift of a segment (or whole) trips to public transit and even to active modes (e.g. cycling and walking) of transportation, depending on the availability and frequency of public transit services that meet the requirements of affected commuters. (There...
may also be a significant shift to motorbikes and electric/motorized scooters, depending on if and how these vehicles are charged under the scheme).

- It should be noted that the current public transit system may not have the capacity to accommodate the increased demand in the short term. As in the case of the London Congestion Charge, there would likely be a need to increase bus services significantly within and near the cordon area when implementing the cordon charge.
- Re-scheduling of trips to times outside the peak charging period (or to times with lower charge rates, in the case of variable charging schedules).
- Re-organization and aggregation of trips.
- Diversion of through-trips crossing the cordon to outside the cordon. Trip diversions are also likely around the boundaries of the cordon charging area (e.g. shoppers deciding to change their destination to one just outside the boundary rather than inside the boundary of the charging zone).
- Outright trip suppression, which is possible if the net value that users attach to the trip (after accounting for the variable costs incurred – e.g. fuel, vehicle depreciation) is less than the charge imposed by the scheme.

Implementing cordon charges could have potentially significant community impacts, particularly in the areas just outside of the cordoned areas, as some drivers may choose to drive around the area to avoid paying the fee.

Analyses of cordon charging schemes already in place, such as for Central London and Stockholm, suggest that time savings represent the bulk of the value created by the changes in behaviour resulting from cordon pricing (rather than savings in auto usage costs, fewer collisions and fewer emissions). This is the primary reason why the behavioural changes also lead to improvements in the performance of the road network in the affected area. While there is also the risk of some trip diversions outside the cordon diminishing network performance just outside the cordon area, a well-designed cordon should be able to minimize such effects.

**E.2.4 Scheme Design**

Cordon charges are a good way to manage congestion and if the initial cordon area in Toronto proves to be successful in reducing traffic during peak periods, it may provide an opportunity for establishing multiple cordons throughout the region or expanding the Toronto cordon area.

A review of the modelled volume-capacity plots for the GTHA road network for the 2031 Regional Transportation Plan (“RTP”) scenario indicated that congestion is concentrated on highways and major arterials. This suggests that there may not be obvious local areas as candidates for congestion zones other than possibly downtown Toronto. As there are significant costs associated with implementing cordon charging, it may be beneficial to select a portion of downtown Toronto to use as a pilot area.
Charges can be levied at all times, but recent best practices suggest it can be an effective tool for reducing congestion through targeted peak time charges.

The tool as it is currently contemplated assumes that cordon charges will only be imposed during morning peak periods.

Another possible scheme is to levy charges throughout the day, as in London, and possibly to increase those charges during peak periods to reduce congestion, as in Stockholm. This type of dynamic scheme would likely generate more revenue but may reduce the transparency of the scheme. However, pricing variations that depend only on the time of day, as in the case of Stockholm, may be just as transparent as a single charge if properly communicated. This contrasts with dynamic pricing schemes, where the price varies to ensure that free-flow traffic conditions, as in the case of the Capital Beltway HOT Lanes in Washington, DC.

Another important design feature is to ensure that all drivers within the cordon area are subject to the charge, rather than only those drivers who cross the cordon, as is the practice in London.

Exemptions could also be provided for car pooling or high occupancy vehicles in an effort to alter driver behaviour.

There may also be a geographic dimension to the impacts of a cordon charge in the GTHA. Depending on the size of the cordon, the scheme could be viewed as impacting 905 drivers disproportionately. This could be the case in a very large cordon, if residents within the cordon (e.g., Toronto residents) were much less likely to cross the cordon than those in the 905 municipalities.

E.2.5 Technical Implementation Considerations

Due to the significant costs associated with establishing cordon zones, it may be beneficial to introduce this tool on a pilot basis to test its ability to generate revenues. The most obvious pilot scheme would involve a highly congested portion of the designated Central Area Cordon Zone in Toronto, such as the financial district in downtown Toronto.

If the pilot proves to be successful, the zone boundaries can be expanded in Toronto and the tool can potentially be implemented in other city centres in the region (e.g., Markham, Mississauga, etc.)

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E.2.6 Governance Considerations

Implementing cordon charging in the region will require additional authority from the Province. There is likely to also be a lengthy policy review and approval process for proposing and establishing zone boundaries as well as overcoming perceived security concerns.

Regulations would need to be put in place to allow Metrolinx (or municipalities) to impose and collect the cordon charges. Alternatively, the Province could collect the tolls and remit the revenue to Metrolinx.

If it is determined that cordon charges should be implemented across the GTHA, it may be beneficial for a single authority (e.g., Metrolinx) to monitor and collect the revenues; this could also reduce the administrative costs associated with collection.

If cordon charging is introduced as a direct source of revenue for improving public transit within the region, users should have a fairly good understanding of where their money is going.

The concept of cordon charging is straightforward; if you enter a cordon area during a peak time you will be charged a fee. Users will be able to understand the concept which will facilitate acceptance.

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E.2.7 Equity and Distributional Impacts

Any vehicle entering the cordon areas during the peak times will be charged a toll. Drivers can also choose to shift their travel into cordon areas to off-peak times to avoid the charge or can choose to use public transit. The public transit system is unlikely to be able to absorb the additional demand in the short-term, potentially leaving some commuters with few other alternatives.

Commuters without easy access to public transit are particularly impacted and may not have many viable alternatives. The cost is borne by drivers who regularly access the cordon area during peak periods.

As noted earlier, depending on the size of the cordon area, the scheme could be viewed as impacting 905 drivers disproportionately as many residents within the cordon will not have to cross the cordon line and receive the charge.

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<td>Availability of Alternatives</td>
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E.2.8 Overall Efficiency Impact

Cordon charging is a viable option for local areas that have exhausted other measures for managing congestion (e.g., road expansions and travel demand management measures). In these areas, it would be expected to have a significant positive impact on the productivity, competitiveness and well-being of workers, residents and businesses within the cordon areas by facilitating high-value trips and by mode-shifting, time-shifting and even suppressing lower-value trips.

In the short-term, positive efficiency impacts would require that the value of travel time savings (including for local goods shipment and deliveries), emissions reductions, reductions in collisions and any resource savings from reduced vehicle use exceed capital expenditures and operating expenditures. This should be feasible, based on the results of charging schemes that have already been implemented elsewhere. Downward trending technology costs may also continue to reduce operating costs relative to cordon charging schemes which are already in place. Moreover, the costs of any unintended behavioural changes, such as traffic diversions outside the zone, or any economic distortions from displacing retail and other economic activity to locations outside the charging zone, should be small or minimal based on the results of the Central London and Stockholm cordon charging schemes.

Over the long-term, the tool could provide additional positive impacts by influencing location decisions around work, residences and amenities, such as to reduce the travel distances required for commuting and other purposes, especially at peak times of day.

Hence, a cordon charge under protracted periods of road congestion could generate efficiency gains even after taking into account the incremental capital and operating costs of the scheme and modest costs from distortions in the location of economic activity. However, it is not clear whether these conditions would be widely applicable to Toronto and other municipalities in the GTHA.

E.3 Case Study – Central London Congestion Charge

E.3.1 How the Tool Works

Introduced in 2003, drivers are now charged £10 (C$ 16.2) for entering the central cordon area during weekdays between 7am and 6pm. Residents of the charging zone have a 90% discount, but must pay the charge even when circulating within the zone.

E.3.2 Policy Objectives / Motivation

The primary objective of the scheme was to reduce road congestion within the charging zone.
E.3.3 **Revenue Potential and Pricing**

Gross revenue from the scheme has started at £190 million (C$ 308 million) in 2004/05 and reached £268 million (C$ 434 million) in 2007/08, when the charge was increased to £8 (C$ 13). Net revenues (after operating costs) are even more modest, because these costs have varied between 42% and 49% of revenue, depending on the year.

The charge has proved to be a limited but sustainable source of revenue for funding public transit and road improvement for London. It is also fairly sensitive to the business cycle, not only because trip numbers in general vary with economic activity, but also because the drivers’ willingness to pay will also vary over the cycle.

E.3.4 **Impact on Travel Behaviour and Network Performance**

The scheme has had large impacts on travel behaviour, which in turn have translated into significant improvements in the performance of the transportation network. The bulk of the positive impacts have been travel-time savings, due to reduced congestion and higher travel speeds within the zone. In the early years, congestion levels dropped by 20-30% relative to pre-scheme conditions, supported in part through a substantial increase in the frequency of bus services in and around the zone. However, these gains have dissipated in part as a result of reductions in road capacity due to various factors such as road works and redesigned lanes. Air quality has also improved.

E.3.5 **Technical Implementation Considerations**

The charging zone was implemented through the installation of 650 Automatic Number Plate Recognition (ANPR) cameras at entrances / exits around and within the zone capturing vehicle number plates and checking them against a database to determine if payment has been made or if the vehicle is exempt.

E.3.6 **Governance Considerations**

The introduction of the scheme was made possible by the devolution of certain central government powers to London-area government in 2000, one of which is surface transportation, including road and rail. The congestion scheme was championed by one of the mayoral candidates in the 2000 elections and was subsequently implemented within that candidate’s first term of office (in 2003). The mayor was re-elected for a second term in office. The scheme was also supported by the business community in Central London.
E.3.7 Equity and Distributional Considerations
The scheme ranks well in terms of horizontal equity because it is consistent with those users paying also benefitting from the scheme. However, zone residents enjoy the benefits of decongestion even though they pay only 10% of the charge.

In terms of vertical equity, there is some evidence that the charge is a higher burden on lower-income users, since they were more likely to report that their travel by car had either increased (to take full advantage of paying the charge) or decreased rather than remaining unchanged.

E.3.8 Overall Efficiency Impact
The scheme has improved overall economic efficiency despite the significant capital investment and ongoing operating costs. The scheme enjoys a benefit-cost ratio of 1.7:1 based on the £8 prevailing in 2007. This takes account of all operating and capital costs.

In addition, the scheme appears not to have created significant economic distortions by discouraging retail or other business within the charging zone. Profitability trends (pre- and post scheme) do not appear to be significantly different for retail and other businesses within the zone and those London-based businesses outside. Nor do business sales tax registrations suggest any lower rate of business start-ups within the zone compared to outside.

E.4 Case Study – Central Stockholm Congestion Charge

E.4.1 How the Tool Works
Introduced in 2007, the drivers are charged a variable price (depending on time of day) for entering or exiting the central cordon area (i.e. vehicle is only charged once in a 24-hour period) during weekdays between 6:30am and 6:30pm. The variable price follows a fixed rate schedule, where the peak charge is at most twice the off-peak rates. Trips within the zone are not charged and alternative fuel vehicles are exempt.

E.4.2 Policy Objectives / Motivation
The primary objective of the scheme was to reduce road congestion within the charging zone, which covers about 30 square kilometres and double the size of the London charging zone.

E.4.3 Revenue Potential and Pricing
Gross revenue from the scheme has been approximately CAD $130 million, with net revenues rising by almost 50% in 2 years (from CAD $70 million to CAD $100 million) due to large reductions in operating costs.
The charge has proved to be a limited but sustainable source of revenue for funding new road construction in and around Stockholm.

**E.4.4 Impact on Travel Behaviour and Network Performance**

The scheme has had large impacts on travel behaviour, resulting in traffic reductions of 18% in 2008 (compared to 2005), although there was some offsetting increase (5-10%) in traffic on the orbital roads outside the zone.

Most of the impacts have taken the form of travel-time savings, due to reduced congestion. Air quality has improved and carbon emissions from vehicles have fallen by close to 20%.

**E.4.5 Technical Implementation Considerations**

The charging system consists of 18 control points around the zone, where vehicle movements are through a laser detector and ANPR cameras.

The original system was installed to include both ANPR and short range communications (DSRC) antennas in conjunction with in-vehicle transponders. The system was subsequently reviewed and it was determined that the ANPR system was sufficiently accurate. Hence, the transponder-based system was discarded and operating costs were reduced significantly. Other measures have also facilitated compliance by users, who pay a single monthly bill in arrears (as compared to the London system that requires either pre-payment for each trip or post-payment at a higher rate).

**E.4.6 Governance Considerations**

The scheme was preceded by a trial in the first half of 2006, which was then followed by a referendum. The trial consisted of expanded public transit services and additional park & ride facilities. Public opinion was on balance unfavourable prior to the trial, but it changed favourably thereafter and the referendum passed with 53% support.

**E.4.7 Equity and Distributional Considerations**

The scheme ranks well in terms of horizontal equity because it is consistent with users who pay also benefiting from the scheme (revenues are also now directed to local road works). The evidence on vertical equity indicates that high-income groups pay three times more charges than low-income groups. This is a positive feature in terms of vertical equity, because lower-income groups are not forced to pay the charge. They can choose to pay the charge in circumstances where the value of their trip exceeds the charge. However, mobility benefits may be skewed to higher income groups to the extent that such groups have a higher value time than lower-income groups.

In terms of geographic considerations, frequent users tend to be inner-city residents who enjoy higher average incomes and also have higher rates of car ownership.
E.4.8  Overall Efficiency Impact

The scheme has improved overall economic efficiency significantly despite the capital investment and ongoing operating costs. The scheme enjoys a benefit-cost ratio of 4.3:1, which is more than twice as high as the London benefit-cost ratio. This is likely due to lower operating costs and to the variable time-of-day pricing, which likely optimizes traffic throughput and results in higher time savings.

In addition, the scheme appears not to have created significant economic distortions by discouraging retail or other business within the charging zone.8

E.5  Case Study – Greater Manchester Congestion Charge

E.5.1  How the Tool Works

This case study looks at the Manchester Congestion Charge proposal in 2008 which the local authorities did not succeed in implementing. The scheme consisted of a two-ring cordon charging zone covering an area of approximately 80 square miles (i.e. several times larger than either the London or Stockholm central zones, or the Toronto cordon charging area considered here, which is approximately 20 square km).

E.5.2  Policy Objectives / Motivation

The primary objective of the scheme, which included major public transportation improvements around Manchester, was to secure a grant of over $2 billion from a central government Transport Innovation Fund (TIF) which sought to elicit anti-congestion strategies for major urban areas. Reducing road congestion appeared to be a secondary objective at best.

E.5.3  Revenue Potential and Pricing

Revenue yields are not available, although there is little doubt that the revenue stream from charging traffic in such a large area would have been substantial and sustainable over the long run. In fact, we know that the scheme was designed to generate sufficient revenue to secure a loan for just under CAD $2 billion from private sources.9

E.5.4  Impact on Travel Behaviour and Network Performance

Traffic levels within the two charging zones were expected to drop by 10-15% as a result of the scheme.

8 Detailed Case Studies of Selected Revenue Tools, report for Metrolinx by AECOM, September 2012
9 Detailed Case Studies of Selected Revenue Tools, report for Metrolinx by AECOM, September 2012
E.5.5  Technical Implementation Considerations
The charging technology was based on a GPS "tag and beacon" system.

E.5.6  Governance Considerations
The package of transportation improvements, including the charging zone, was developed by the Greater Manchester Passenger Transport Authority (GMPTA) and the Association of Greater Manchester Authorities (AGMA), which consisted of 10 district councils. The package did not obtain unanimous support among the councils and as a result was submitted for a referendum. The charging scheme was not championed by Manchester’s political or business leadership and the original parties that prepared the scheme appeared unable or unwilling to divulge sufficient information about the potential impacts of the scheme. The referendum was lost at the end of 2008 and the original TIF improvements package was scaled down substantially.

E.5.7  Equity and Distributional Considerations
Equity and distributional impacts have not been explored.

E.5.8  Overall Efficiency Impact
It is not clear whether or not this two-zone charging scheme was well designed from an overall economic efficiency perspective. However, a feasible charging scheme covering an 80 square-mile zone could have generated efficiency gains which would most likely have dwarfed gains from the Central London and Stockholm schemes – and this in an urban area fraught with congestion.

E.6  Case Study – Sao Paulo Road Space Rationing

E.6.1  How the Tool Works
This case study looks at common form of road space rationing in Latin America and other cities around the world, whereby certain vehicles are restricted from travelling into a cordon area most days of the week, based on the last digit of their license plate. This scheme is a travel demand management (TDM) practice that rations road capacity by imposing direct restrictions on the number of vehicles permitted in the designated zone.

The scheme is not intended to generate revenue.

E.6.2  Policy Objectives / Motivation
The road space rationing system was introduced in 1997, initially as a tool by which to improve air quality, with the focus since shifting towards reducing congestion. In Sao Paulo, traffic congestion is a major issue, largely attributable to rapid economic growth and urbanization. Combined with
insufficient infrastructure, a large population and low fuel prices, this means that Sao Paulo is one of the most polluted and congested cities in the southern hemisphere.

E.6.3 Revenue Potential and Pricing

The road space rationing program is not designed to be a revenue generating tool. Nevertheless, it is worth noting that 1.46 million trips are made into the Expanded Center every day by private vehicles.

E.6.4 Impact on Travel Behaviour and Network Performance

This type of road space rationing may have had some initial success in Sao Paulo in reducing road trips and congestion. However, these benefits have been offset over time in part through important adverse and unintended behavioural effects, the most important of which is higher-income households purchasing second cars with a different last digit for the license plate number so as to circumvent the travel restrictions on their first vehicle. These additional cars are often older, more polluting vehicles, and therefore serve to contribute increased levels of emissions. In addition, they have the effect of reverting towards the original levels of congestion.

E.6.5 Technical Implementation Considerations

The implementation of the Sao Paulo road space rationing scheme involved significant costs associated with the enforcement of the scheme (i.e. roadside cameras and use of traffic enforcement officers). The charging technology was based on a GPS "tag and beacon" system. The scheme was implemented relatively quickly, but without any local consultations.

E.6.6 Governance Considerations

The system was established by municipal law in October 1997. This followed a similar strategy implemented by the state in 1996 which was focused on reducing air pollution and external costs to public health in the winter, and which applied to the city of Sao Paulo and nine other municipalities in the metropolitan region.

E.6.7 Equity and Distributional Considerations

From a horizontal equity perspective, the road space rationing is generally equitable because it applies to all private vehicles over the course of a week. However, from a vertical equity perspective it is less equitable because it is open to avoidance by higher-income motorists who can afford to buy an additional car and therefore circumvent the travel restrictions.
E.6.8 5.8 Overall Efficiency Impact

In terms of efficiency, there is a fundamental difference between a road space rationing scheme that depends on arbitrary restrictions on vehicle travel (e.g. based on license plate numbers) and one that depends on pricing. The latter allows users to sort through their trips and continue to travel to the restricted zone when the value attached to the trips is high enough (i.e. when the trip continues to be justified even after taking account of the charge) and to suppress or re-assign the trip to another time if the value of the trip is relatively low and no longer worth undertaking in light of the new charge. Arbitrary restrictions on travel, such as through license plate number restrictions, suppress all types of trips without regard to their value to the user. The additional benefit of pricing schemes is that the travel time savings from the traffic reduction goes to users who have decided to pay the charge, which means that higher-value trips tend to benefit as compared to arbitrary restrictions not based on price.

While the Sao Paulo road space rationing system has probably succeeded in reducing traffic into the charged area (even after taking into account the offsetting behavioural response of users purchasing additional cars), it is far from clear that the travel time, emissions and other savings from the reduced traffic would be high enough to justify the capital and operating expenses of the scheme (and the compliance costs borne by users, which include the incremental costs of purchasing additional vehicles). Economic theory suggests that a superior outcome could be achieved in terms of benefit-cost ratio by converting the scheme to one based on cordon pricing.

E.7 Lessons for Metrolinx

E.7.1 Lessons from Revenue Tool Evaluation

Through the evaluation of cordon charges as a potential tool for implementation in the GTHA, some key points were identified for consideration by Metrolinx:

- A pilot cordon area should be considered prior to any full implementation.
- One charge for entering the cordon during peak times may be the most easily implemented charge structure and will allow for users to become familiar with the cordon charging process and paying the fee. The fee structure could eventually graduate to a more dynamic model including different charges for entering the cordon at different times.
- There are significant capital costs associated with this tool and these costs should be carefully analyzed prior to implementation.
- In addition, there are a number of different technologies that can be employed that will need to be assessed.
• Scalability of a cordon charge scheme across the GTHA may be uneconomical, as Downtown Toronto is currently the only area with the congestion levels to make the charge a viable revenue generating tool.
• The tool will not address congestion along major arterial routes into the Cordon area, for example, highway 401.

E.7.2 Lessons from Case Studies
Several lessons emerge from the four case studies summarized above:

• The Central London scheme shows first and foremost how a major urban area can be innovative in developing a road charging scheme which had not been attempted before on a commercial scale in similar CBD conditions. The scheme was championed by the incoming mayor at the time and was also supported by the business community.
• A rapid implementation (within the mayor’s first term) was ensured by the choice of a tried and tested technology, albeit one which entailed higher operating costs than newer technologies.
• Studies have found no adverse effect on retail commerce or business conditions in general within the Central London charging zone. (A similar result holds for the Stockholm scheme). This somewhat counterintuitive result may be explained by the fact that:
  1) The vast majority of workers entering the charging zone were already doing so by public transport prior to the scheme; and
  2) Bus services in the zone were increased substantially at the time of the introduction of the scheme in order to accommodate additional mode shifts to public transit (the frequency of bus services in and around the Toronto cordon charging area would also need to be increased to support mode shifts to public transit).
• The Stockholm charging scheme provides some notable improvements on the London charging system, including (1) time-of-day pricing with a higher rate at peak times of day, which makes the scheme more effective in terms of reducing congestion and creating travel time savings and (2) lower operating costs, which take up only 30% of the gross revenue generated by the scheme as compared to London where 40-50% of the gross revenue goes to operating costs. Both these improvements make cordon charging schemes more viable in economic terms (i.e. more likely to generate net positive economic impacts in terms of productivity and economic well-being).
• We learned from the implementation of the Stockholm and London schemes that public opposition to these schemes tends to dissipate once users experience the scheme in
practice and can even shift to an overall favourable balance of opinion. This suggests that a trial period may be desirable to ensure a meaningful public debate on these schemes, as it did in the case of Stockholm, resulting in a 53% approval rating during the referendum.

• The major lesson from the failed attempt to implement the Greater Manchester Congestion Charge is that any proposed scheme must gain public acceptance to succeed. This means that the scheme needs one or more political champions and it should be clearly communicated to the public, including all likely impacts. The Manchester scheme was the by-product of a political attempt to secure senior-level government funding for a broader transportation infrastructure package. It was not developed with the primary objective of addressing congestion.

• The Sao Paulo road space rationing case study shows that not all traffic reduction schemes are beneficial in economic terms. Travel restrictions which have no regard to the potential value of the affected trips to respective users will fail to realize the full potential productivity and welfare gains available under price-based schemes.
F. Tool Profile: Corporate Income Tax

F.1 Overview of Tool

F.1.1 How the Tool Works and Where it is Being Used

A corporate income tax is a tax that is applied to the income base of all companies that file corporate income tax returns within a designated region. The tax can be designated to a transportation related initiative. As such, the tax is in addition to the corporate income taxes already collected and the proceeds are dedicated to funding transportation initiatives.

Currently, the Canada Revenue Agency collects corporate income taxes for Ontario. Funds collected are allocated to the Consolidated Revenue Fund (CRF) which are then allocated to all government programs including transportation funding.

F.1.2 How the Tool is Being Considered for Evaluation

For the purposes of the analysis, it is being assumed that a transportation-dedicated corporate income tax will be implemented for all businesses registered and/or having operations within the GTHA. It is assumed that the tax will be initiated and collected by the provincial (or federal) government with the transportation portion of the tax revenues being distributed to Metrolinx. The tax will be a fraction of a percentage and will be charged in addition to the current federal and provincial corporate income tax rates.
F.2 Tool Evaluation Results

F.2.1 Revenue Potential

A corporate income tax has the potential to generate a significant amount of revenues within the region. For the purposes of generating a revenue estimate from the implementation of a corporate income tax, a half of one percentage point increase in the current corporate tax rate has been assumed.

Based on the assumption of approximately $4.2 billion in corporate income tax attributable to the GTHA annually, a 0.50% increase in the tax rate could generate between $170 million and $255 million in 2014. Using a growth rate of 3.50% per annum for the corporate income tax collected in the region, revenues rise to between $210 million and $310 million annually by 2021.¹⁰

We have not assessed an upper bound rate for the corporate income tax, because there is only a limited literature on the revenue effects of changes in corporate tax rates and this literature is not easily adapted to small jurisdictions such as the GTHA.

The implementation of this tax would impact all corporations operating within the GTHA. Revenue should be sustainable in the short run as companies will not be able to alter work and profit recognition practices immediately. Over the long-term, profit leakage to lower tax regions is likely, though it is also likely to be offset by economic growth in the GTHA. Revenue is highly sensitive to the business cycle, because corporate profits tend to drop sharply during recessions, thereby reducing tax revenue collected through this tool.

Revenue estimates for this tool are based on the GTHA portion (as a percentage of Ontario’s gross domestic product) of the projected corporate income tax revenues in Ontario in 2014 as per the provincial budget. Using the effective corporate tax rate for Ontario as of July 1, 2013 (10%) an estimate of the revenues generated per percentage point of the corporate tax rate was developed. To account for this methodology used to estimate the GTHA portion of corporate income tax revenues, a revenue band has been provided.

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<th>Criteria</th>
<th>Assessment (1 to 5)</th>
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<tr>
<td>Revenue Potential</td>
<td>4</td>
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<tr>
<td>Sustainability</td>
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<tr>
<td>Cyclical Variability</td>
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¹⁰ A 3.5% nominal growth rate in corporate tax revenues is slightly lower, and hence more conservative, than the GDP nominal growth assumptions of 4.1% for 2014 and 4.2% for 2015 in the Fall 2012 Ontario Economic Outlook (p. 38).
F.2.2 Incremental Costs

Incremental costs associated with implementing a corporate income tax would be minimal as payment and collection mechanisms already exist within the provincial government. The transportation-related portion of the tax could be introduced through an increase in the provincial tax rate.

There may be some incremental administrative costs associated with processing the collection of the new tax and remitting to Metrolinx; however, these costs are not expected to be significant.

F.2.3 Impact on Behaviour and Transportation Network Performance

Instituting a corporate income tax rate hike will have no impact on travel behaviour or the performance of the transportation network.

F.2.4 Scheme Design

As of July 1, 2012, the Ontario corporate income tax rate is set at 11%. It is assumed that if this tool were to be implemented, the rate can be increased through the Provincial budget. Ontario businesses are also currently subject to corporate income tax at the federal level; a net tax rate of 15%.11

An increase in the corporate income tax rate will create greater incentives for companies to alter their profit recognition methods and shift profits out of the taxed region. The increase in tax rate wouldn’t have to be very large to increase such incentives, because large corporations regularly undertake a review of their profit recognition strategies for tax planning purposes. In addition, if all companies in Ontario are charged the new tax rate, it is highly unlikely that all of the proceeds will be dedicated to the GTHA.

Although corporations benefit from the availability of the regional transportation system, there is no strict user benefit rationale for this tool (i.e. those who pay more income taxes do not necessarily derive greater benefit from the transportation system).

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**F.2.5 Technical Implementation Considerations**

The Ontario corporate income tax rate is currently set at 11%. Increases to this rate could be made through the Provincial budget; however, the Provincial corporate income tax rates have been announced through 2013 and it may be difficult to get the Province to adjust those rates upward.

It may be difficult to charge a different Provincial tax rate within the GTHA versus the rest of the province and as a result, this tool may need to be implemented Province-wide. Notwithstanding political considerations, from a revenue collection standpoint this should not be a significant hurdle; however, from a business and economic competitiveness perspective this tool would penalize businesses located in the GTHA if it was not implemented across the province.

The administration and collection of the transportation-related tax revenues can utilize the current mechanisms being employed by the Province for administering and collecting general corporate tax revenues.

**F.2.6 Governance Considerations**

An increase in the corporate income tax rate will require Provincial approval and dedicating a portion of those revenues to transportation funding will likely require new legislation or may be implemented as a matter of policy.

A corporate income tax rate increase could be implemented without formal pegging for infrastructure; however, this would likely reduce the transparency of the tool even further.

If implemented by the Provincial government, the Province could collect the provincial portion of the corporate income tax revenues and then direct the portion of revenues allocated to transportation funding to Metrolinx.

It may be difficult to draw the connection between a corporate tax rate increase and a new tax category dedicated to improvements in particular infrastructure.

Segregation of the tax from other corporate tax income could also dilute the transparency of the scheme. Further, if the tax is implemented Province-wide, it is unlikely that all of the proceeds will be dedicated to funding transportation infrastructure within the GTHA. This could cause additional issues in tracking and reporting where the revenues are being used.

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<tr>
<th>Criteria</th>
<th>Assessment (1 to 5)</th>
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<tr>
<td>Ease of Implementation</td>
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<td>Time to Implementation</td>
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<table>
<thead>
<tr>
<th>Criteria</th>
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<tr>
<td>Transparency of Scheme</td>
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<tr>
<td>New Revenue Tool?</td>
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</tr>
<tr>
<td>Municipal Role?</td>
<td>N</td>
</tr>
</tbody>
</table>
F.2.7 Equity and Distributional Impacts

All businesses must pay their corporate income taxes, so there is no particular segment of the population that is impacted disproportionately; each business will contribute funding to the tool based on a percentage of their net income for the year. It ranks much better in terms of vertical equity, because businesses with higher recorded profits pay higher corporate income taxes.

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<tr>
<th>Criteria</th>
<th>Assessment (1 to 5)</th>
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<tbody>
<tr>
<td>Horizontal Equity</td>
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<tr>
<td>Vertical Equity</td>
<td>5</td>
</tr>
<tr>
<td>Availability of Alternatives</td>
<td>1</td>
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</tbody>
</table>

F.2.8 Overall Efficiency Impact

Implementing a corporate income tax rate increase or new tax category is expected to have significant negative impacts on the productivity and competitiveness of the GTHA region or the Province as companies consider alternative regions for operations and the recognition of their profits. In one simulation using a computable general equilibrium model, an increase in corporate income taxes equivalent to 1% of GDP in revenue terms would entail a 1.94% drop in steady state GDP for Canada as a whole.¹² When applied to the GTHA or even to the province of Ontario, this would imply an even larger negative impact on GDP, because the jurisdiction is smaller and hence, there is more room for firms to reduce their corporate tax exposure by changing the location of economic activity.

There is the potential for high leakages and economic distortions, given the ease with which corporate entities can shift income out of a particular region. As a result, this revenue tool is likely to generate substantial efficiency losses, even if it entails no incremental capital, operating or administrative costs for implementation.

F.3 Case Study

No case study has been undertaken for this paper of a corporate income tax alone, although we have reviewed the inefficiency costs of corporate income taxes, as discussed above in section F.2.8.

F.4 Lessons for Metrolinx

F.4.1 Lessons from Revenue Tool Evaluation

Through the evaluation of corporate income tax as a potential tool for implementation in the GTHA, some key points were identified for consideration by Metrolinx:

- While implementing the tax will be relatively easy, a new tax or dedication of the tax to a particular infrastructure fund will likely require provincial and legislative approval.
- The tax would likely have to be implemented province-wide to mitigate avoidance and distortions and as such the funds raised would likely have to be allocated province-wide, which has the potential to reduce the scheme’s transparency. The implementation of a robust formula or matrix for the allocation of the tax to transportation projects could improve transparency and is typically already done by the Ministry of Finance for similar tax initiatives.
- There is scope for significant revenue leakage and substantial inefficiency costs in the long term as companies change their revenue recognition practices in favour of lower tax jurisdictions.
- An increase in corporate income tax rates would also go against the recent trend in tax reform which has brought down corporate income tax rates for federal and several provincial jurisdictions.
G. Tool Profile: Development Charges

G.1 Overview of Tool

G.1.1 How the Tool Works and Where it is Being Used

Development charges are used to pay for infrastructure associated with new developments and are one-time charges levied on new developments and eligible redevelopments (the difference between the amount chargeable for the existing use and the new use). They are charged primarily to new developments to help recover growth-related public service costs, but differ in that impact fees can be levied for off-site services such as local roads, schools or parks. Development charges are typically determined through a formulaic process, rather than through negotiations as done for developer contributions.

Transport dedicated development charges are used by numerous public entities throughout the US including TCA Toll Roads in California and the Anne Arundel County Development Impact Fees project in Maryland.

Development charges are currently charged by municipalities across the GTHA; however, few have increased development charges to generate revenues dedicated to transportation funding. The City of Toronto recently increased their city-wide development charges to help fund the Toronto-York Spadina Subway Extension (“TYSSE”).

G.1.2 How the Tool is Being Considered for Evaluation

For the purposes of this evaluation, it has been assumed that the tool will be implemented on a project-by-project basis. This means that development charges incurred on the construction of all new residential developments within the municipality of the identified project will be increased to cover a portion of the capital costs of the project.
G.2 Tool Evaluation Results

G.2.1 Revenue Potential

The revenue potential of development charges on a project specific basis can be moderate depending on how much the charges are increased. Development charges are typically increased formulaically by municipalities to fund specific projects. The amount of the development charge increase will depend on the capital cost of the identified project.

To provide a general understanding of the magnitude of Development Charge revenues, a revenue estimate based on a percentage increase in GTHA DCs has been generated. This alternate scope is further discussed in the scheme design section and would operate in a similar way to a region-wide charge per development scope, described below.

A charge per development revenue estimate has also been generated, matching with the scope described in section G.1.2.

The revenue estimate for an increase in city-wide development charges of approximately $2,000 to $3,000 per unit associated with a major capital project (with a capital cost of approximately $3.5 billion) could generate between $25M and $50M per year in revenues depending on the size of the municipality. If implemented on multiple major projects across the region, development charges could potentially generate annual revenues in excess of $100M. However, the evaluation of the tool assumes an increase in development charges for a single project. The revenue stream is linked to the real estate market and new developments in the region; these have been trending upward for an extended period of time and are likely to continue to do so.

It is worth noting as well that increases in development charges are not necessarily a permanent measure. While it is likely that they will be maintained, there is still the potential for the municipalities to reduce the development charges in future.

### Static Revenue (2014) (before adjustments)

<table>
<thead>
<tr>
<th>Yield for a 1% average increase in development charges</th>
<th>Rate for $100M yield</th>
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<tbody>
<tr>
<td>$6M</td>
<td>17.5% increase</td>
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<table>
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<tr>
<th>Static Revenue – 15% increase in Development Charges (before behavioural adjustments)</th>
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<tbody>
<tr>
<td>2014</td>
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<tr>
<td>$75M - $100M</td>
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<table>
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<tr>
<th>Static Revenue (2014) (after behavioural adjustments)</th>
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<tr>
<td>Yield for $500 average increase in development charges</td>
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<tr>
<td>-------------------------------------------------------</td>
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<tr>
<td>$5M</td>
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<tr>
<th>Dynamic Revenue – $2,000 - $3,000 increase in Development Charges (after behavioural adjustments)</th>
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<tr>
<td>2014</td>
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<tr>
<td>$25M - $50M</td>
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<tr>
<th>Criteria</th>
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<tbody>
<tr>
<td>Revenue Potential</td>
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<td>Sustainability</td>
<td>3</td>
</tr>
<tr>
<td>Cyclical Variability</td>
<td>2</td>
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</table>
G.2.2 Incremental Costs

Incremental costs associated with increasing development charges would be minimal as payment and collection mechanisms already exist within the municipalities. There may be some incremental administrative costs associated with tracking the portion of development charges attributable to the funding of transportation related projects being coordinated in the region by Metrolinx.

G.2.3 Impact on Behaviour and Transportation Network Performance

Increasing development charges within the GTHA will have no impact on the performance of the transportation network. If the increase is too high, it could lead to reduced real estate development in the region.

G.2.4 Scheme Design

Municipalities have the authority to implement additional development charges in an effort to help fund the costs of capital infrastructure required to service growth.

The increase in development charges must be reasonable to ensure that it does not provide developers with an incentive to move outside of the region. The benefit with this tool is that the GTHA is an attractive region for developers due to its steady economic growth and if development charges are increasing throughout the region, there are not many alternative development locations for developers.

Development charge increases are currently calculated using a formulaic process based on the amount of capital expenditure need to be funded. This is done in compliance with the Development Charges Act and applies the development charge increases based on the type of dwelling (e.g., single detached or semi-detached dwelling, multiple dwelling unit, etc.). If the process for increasing development charges was to be modified to incorporate some form of smart charging, such as varying the development charges based on proximity to transit, it would require additional administrative costs as there would be multiple criteria for determining the development charge rates rather than simply the type of dwelling unit. This type of smart charging could provide some benefit since increasing development charges purely for dedication to transportation funding would mean that developments in closer proximity to transit would be receiving a greater benefit than those in remote areas. However, this could also lead to

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<td>Overall Incremental Costs</td>
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<td>Overall Impact on Behaviour and Network Performance (simple average)</td>
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<tr>
<td>Impact on Network Performance</td>
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<td>Time Savings</td>
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<tr>
<td>Savings Due to Decreased Auto Use / Fuel Savings</td>
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<tr>
<td>Reduction in Traffic Collisions</td>
<td>2</td>
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<tr>
<td>Air Pollution and Emissions Savings</td>
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developers locating sites for development further away from transit to avoid the higher development charges.

Another option for this scheme would be for the Province to mandate an increase in development charges across the region, with the increase being dedicated to transportation funding. This type of scheme design would likely be implemented on a percentage basis across all municipalities in the region; moving away from the formulaic approach currently used by municipalities for determining the amount of the increase as development charge rates differ across municipalities and dwelling types.

The City of Toronto’s recent study on funding options for the Sheppard Subway Extension contemplated development charge increases of over 20%. If a 20% increase on development charges was implemented across the region, it could potentially generate $115M in 2014. A scheme design like this would require amendments to the current legislation surrounding development charges and would require provincial participation.

G.2.5 Technical Implementation Considerations

Typically, if a municipality is going to increase development charges for a particular capital project, they determine the amount of the increase through a formulaic process in compliance with various provisions of the Development Charges Act. When imposing DCs against land to pay for the capital costs of public infrastructure, the following must be considered:

- Contributions from other levels of government cannot be recovered;
- Any benefit to existing residents cannot be recovered; and

The allocation of development charges should be based on the ratio of expected residential and non-residential development.

Increases in development charges can be implemented almost immediately after being passed and the collection of the charges will simply be lumped in with the collection of current development charges.

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</table>
G.2.6 Governance Considerations

The Development Charges Act provides that money in a development charge reserve fund can only be spent for capital costs as defined in the Act. If the proceeds from the increased development charges were to be used to issue bonds to increase the amount of upfront funding available, it is expected that the municipalities or Metrolinx would need to make a request to the Province to specifically provide for the desired financing model (monetizing future development charge revenues).

The revenues received through the increased development charges must only be spent on capital costs. In addition, the municipalities would need the Province to grant an exemption from the historical service cap and the 10% statutory reduction for transit projects (this was done for the TYSSE).

Since the level of development charges is under the control of the municipalities, if the tool were to be implemented on a project by project basis, municipalities will have to be engaged to determine if development charge revenues would be made available for the project.

Tracking the revenues collected from the fee and where the money is going should be relatively straight-forward as the municipalities already perform these functions. Since the amount of the increase in development charges is directly attributable to the capital costs of the project, it provides the municipalities with a good communication tool for justifying the increased development charges.

G.2.7 Equity and Distributional Impacts

Any developer looking to build within the GTHA will be subject to the development charges. The costs incurred by the developer tend be passed on to the ultimate buyers of the units, unless there is decline in market demand for the units.

Development charges should rank relatively well in horizontal equity terms, because developers and end buyers who bear the charges are also the beneficiaries of the infrastructure services. However, these charges apply only on new developments and do not have an impact on houses / developments that have already been constructed. With respect to vertical equity, given the assumed scheme, development charges do not differentiate between the location of developments and their proximity to transit. Instead a single development charge is levied on new developments or redevelopments purely based on the type of dwelling and municipality. The development charge is not an ad valorem tax and does not take account of the value of the
property or development affected, but it is likely that higher income groups will be the individuals purchasing the majority of new homes/units.

The implementation of the tool is not expected to have a significant effect on the location of economic activity within the GTHA as the location is too desirable for developers to move outside of the region; however, it may also further burden home buyers in an already high cost market area.

**G.2.8 Overall Efficiency Impact**

Increasing development charges will have no effect on travel behaviour, nor will it improve the performance of the transportation network.

Furthermore, these additional development charges would not entail any incremental capital, operating or compliance costs.

The only efficiency impacts arising from additional development charges are the costs of economic distortions to the extent that the level of development charges overestimate (or underestimate) the true cost of the infrastructure provided to the users (or to the extent that the charges levied across different municipalities of the GTHA distort the pattern of demand for commercial or residential ownership). However, these economic distortions are expected to be modest.

Hence, the efficiency impacts of this revenue tool are likely to be only marginally negative, provided that the revenues raised through this tool are done on the basis of cost recovery of local transportation-related infrastructure costs.

**G.3 Case Study**

*No case study has been undertaken for development charges for this paper.*

**G.4 Lessons for Metrolinx**

**G.4.1 Lessons from Revenue Tool Evaluation**

Through the evaluation of development charges as a potential tool for implementation in the GTHA, some key points were identified for consideration by Metrolinx:
• The calculation for development charges is currently formulaic so that it reflects the characteristics and costs of each project individually. If this approach is used to implement this tool, a review will have to be undertaken for individual projects within the GTHA to determine if they are eligible for the charge. This is because a specific capital cost amount needs to be identified along with other factors including any contributions from other levels of government, the benefit to existing residents and the expected ratio of residential and non-residential development.

• The implementation of development charges and the use of the funds are dictated by the current legislation (Development Charges Act). There are significant legislative barriers to the generation and use of the funds that will require special consideration from the Province, and engagement of municipalities.

• Additional review is necessary to determine if future development charges could be bonded / monetized as a source of upfront funding for Metrolinx.

• Charges can be levied on all new developments and eligible redevelopments being undertaken in the GTHA. It is not expected that the charges would lead to a relocation of economic activity.
H. Tool Profile: Driver’s License Tax

H.1 Overview of Tool

H.1.1 How the Tool Works and Where it is Being Used

A driver’s license tax is a fee charged to drivers upon issuance or renewal of their driver’s license. This strategy can generate modest revenues for transportation and in some instances is used to cover administrative costs, rather than providing a net source of revenue for capital projects or maintenance.

This fee is currently implemented in the state of New York and was recently increased by the New York Metropolitan Transit Authority by 25%. Seattle and California also implemented a driver’s license tax in April 2011.

H.1.2 How the Tool is Being Considered for Evaluation

For the purposes of this analysis, it is assumed that a flat driver’s license tax would be charged to residents of the GTHA either at issuance or upon renewal of their driver’s licenses. Currently, driver’s licenses are renewed every 5 years. The driver’s license tax would be an additional charge that could be combined with existing driver’s license renewal fees.
H.2 Tool Evaluation Results

H.2.1 Revenue Potential

A driver’s license tax has the potential to generate a moderate amount of revenue within the region depending on the amount of the tax. For the purposes of developing a revenue estimate for the implementation of a driver’s license tax within the GTHA, a fixed renewal fee has been assumed for each driver’s license issued in the GTHA. The fee will be charged each time the license term expires and renewal is required, which occurs every 5 years. The fee charged can be linked to inflation or stepped up over time to meet funding needs.

Based on the assumption of approximately 4.2 million licensed drivers in the GTHA in 2014, an increase of the renewal fee by $50 could generate additional revenue between $30 million and $50 million annually in 2014. This would push the cost of license renewal to $125 (i.e. $50 additional fee plus $75 fee already in place). Assuming an annual growth factor in the number of licensed drivers in the region of 1.35%, the tool could generate revenues of $35 million and $55 million by 2021.

The upper bound charge assessed for the additional driver’s license renewal fee has been set at $100/license (full price of a license at $175) yielding approximately $84 million in additional revenue for transportation funding. This upper bound was set based on a rough estimate of the applicable range for the estimated price elasticity of demand applicable to drivers’ licenses.\(^\text{13}\) It is expected that at a cost greater than $175, the demand response of current and potential drivers may diverge significantly from that implied by the point estimate used in the dynamic revenue calculation.

The implementation of this tax would impact all drivers living within the GTHA. Since having a valid driver’s license is a legal requirement for operating a vehicle, it is likely that revenues generated by a driver’s license tax would be sustainable in the long-run. Additionally, it can be expected that the number of people with a driver’s license will continue to increase as the population of the region increases. Since driver’s licenses are typically renewed every 5 years, the revenues generated by the tool should be relatively unaffected by changes in the economic cycle. It is expected that some individuals may try to renew their licenses outside of the GTHA to avoid paying the additional fee,

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\(^{13}\) There are no elasticities available for drivers’ license costs. As a proxy, we have used an estimated elasticity for the cost of auto ownership, because drivers’ license costs are fixed costs (as opposed to variable costs) similar to auto ownership costs.
but this number is not expected to be material. This is because drivers are expected to have the same address on their driver’s license, auto insurance and vehicle registration, which makes using an address that is not their residence (outside of the region) much less convenient.

On its own, revenues from a driver’s license tax would be expected to remain relatively flat and perhaps increase slightly as the tax is increased over time. However, if implemented with other tools that increase the cost to drivers, this could reduce the number of drivers in the GTHA, thus potentially reducing revenues over time.

The main variable in determining a revenue estimate for this tool is the number of Ontario licensed drivers living in the GTHA. Using the actual number of licensed drivers in Ontario (Statistics Canada), an estimate of the licensed drivers in the GTHA was developed based on the portion of Ontario’s population living in the GTHA (approximately 48.5%). There is likely a small margin of error associated with this methodology, but that is reflected in the revenue range that has been provided.

### H.2.2 Incremental Costs

Incremental costs associated with implementing and collecting a driver’s license tax is expected to be minimal as payment and collection mechanisms for license renewal already exist. This new tool could simply be included as part of existing driver’s license renewal fees. There may be a small incremental cost associated with breaking out revenues from renewal vs. the new tool, but additional costs associated with collection are unlikely.

### H.2.3 Impact on Behaviour and Transportation Network Performance

The implementation of a driver’s license tax is not expected to have a significant impact on travel behaviour or the overall performance of the transportation network.

Instituting a driver’s license tax might result in a slight reduction in the number of licensed drivers in the GTHA region; however, the impact of this would likely be insignificant and would not lead to time savings or declines in traffic collisions. The impact of this tool on automobile use would be minimal.
**H.2.4 Scheme Design**

A driver’s license tax is an additional fee charged to drivers upon issuance or renewal of their driver’s license. The additional charge could be added to renewal fees that are already paid when renewing a driver’s license (usually every 5 years).

The new tax would need to be priced at a level that is acceptable to the majority of drivers; too high of a price may have a negative impact on some segments of the population within the region. In addition, pricing should be uniform across the entire region to ensure that no particular area or municipality is receiving special treatment.

To avoid potential displacement issues further, the license tax could be extended to the entire province. If the tax is collected from the entire province, funds received for transportation are likely going to have to be applied to the province as a whole to avoid a poor public reception from the areas outside of the GTHA.

**H.2.5 Technical Implementation Considerations**

Collection of a new driver’s license tax can be combined with the collection of current renewal fees using the payment mechanisms that already exist within the Province resulting in minimal collection costs. While regulatory approval is likely required to impose an additional fee, it is likely that the tool can be implemented almost immediately after approval.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Assessment (1 to 5)</th>
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<tbody>
<tr>
<td>Ease of Implementation</td>
<td>5</td>
</tr>
<tr>
<td>Time to Implementation</td>
<td>5</td>
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</tbody>
</table>

**H.2.6 Governance Considerations**

If the ultimate collection of the revenues continues to rest with the Province through Service Ontario, upon collection, the revenues associated with the increase in renewal fees would have to be identified and transferred to Metrolinx for use in funding transportation initiatives.

This revenue tool would require the introduction of a new tax which will require Provincial legislation and regulatory approval.

Tracking the revenues collected from the driver’s license renewal tax and where these revenues are going should be relatively straight-forward given the mechanisms and processes for collection that are currently in place.

If the revenues collected from this tool are immediately allocated to Metrolinx, it would likely provide taxpayers with a transparent understanding that these funds will be used to improve
public transit in the region. Public education campaigns could also help improve the transparency of the scheme.

**H.2.7 Equity and Distributional Impacts**

All licensed drivers would have to pay the additional tax at the time of license renewal meaning that road users are directly contributing to the funding of transportation initiatives in the region.

While the additional fee associated with renewing a driver’s license may be minimal compared to a number of tools being analyzed (e.g., an additional $100 for another 5 years of being licensed), there may be a small portion of the population that may not be able to accommodate this increase in price and may choose public transit as an alternative. Since the fee would be a flat fee charged at renewal, it does not differentiate between demographics or users.

This revenue tool is also not expected to have a significant effect on the location of economic activity, since the fee will be based on where the driver resides and not the location in which the license is issued.

**H.2.8 Overall Efficiency Impact**

A driver’s license tax may have modest negative impacts on the overall efficiency of the region due to the resulting increase in licensing costs. However, it is not expected to be substantial. The inefficiency costs are likely to be associated with drivers seeking to relocate their residential address in order to avoid the tax (or potential drivers postponing acquisition of a drivers’ license).

Furthermore, instituting this tool is not expected to have an impact on travel behaviour or transportation network performance, nor will it entail any incremental capital, administrative or compliance costs.

Therefore, the overall impacts on efficiency are expected to be only moderately negative due to the costs associated with the economic distortions. There are no other incremental costs or any travel behaviour impacts.
H.3  Case Study – Minnesota Motor Vehicle Sales Tax (MVST)

The case study most relevant to this revenue tool is the vehicle sales tax examined as part of the overview of excise and other sales taxes. The rationale is that a drivers’ license tax adds to the fixed cost of vehicle ownership, as does a vehicle sales tax. This is in contrast to fuel taxes, tolls and parking charges, which add to the variable costs of auto usage – the charges are incurred only if the vehicle is used.

H.3.1  How the Tool Works

We examined the Motor Vehicle Sales Tax (MVST) in Minnesota as part our case study on sales and excise taxes. The MVST is a 6.5% tax on sales of the majority of new and used vehicles in Minnesota.

H.3.2  Policy Objectives / Motivation

Twelve states have vehicle sales tax revenues dedicated to transportation, of which Minnesota is one. The Minnesota Motor Vehicle Sales Tax (MVST) was not originally intended for transportation funding but has evolved to become a key source of funding for the sector.

H.3.3  Revenue Potential and Pricing

Vehicle sales taxes can be important revenue generators, as in the case of the MVST, which was expect to generate US$252M in 2012. However, the revenue yield has been declining since 2006, suggesting that it is sensitive to the business cycle.

H.3.4  Impact on Travel Behaviour and Network Performance

The most likely behavioural effects for sales and excise taxes on a narrow consumption base are largely unintended (from a policy perspective) and involve shifting purchases to lower-value items, such as lower-value vehicles, which may not mean lower-emission vehicles. Yet, the largest inefficiency costs are associated with shifting purchases to non-taxed or lower-taxed jurisdictions.

H.3.5  Technical Implementation Considerations

Vehicle sales taxes are relatively easy to implement, which can usually be achieved within a year following legislative approval. These sales taxes are collected by dealerships or when the (used) vehicle is registered. The remittances to tax authorities are made monthly or quarterly, depending on the level of sales.
H.3.6  Governance Considerations
The MVST was enacted by the Minnesota legislature and will be dedicated entirely to transportation uses as of fiscal year 2012, with the revenues split 60/40 between the highway fund and public transit.

A sales tax such as the MVST is characterized by some degree of transparency if it is visible to buyers. (Note that not all sales taxes are equally visible). However, the buyers may not be fully aware of the use made of the funds.

H.3.7  Equity and Distributional Considerations
Sales taxes such as the MVST usually rate poorly in terms of horizontal equity, which refers to the application of the user/beneficiary pays principle. However, the MVST is an exception in that the revenue generated is destined to the transportation sector.

In terms of vertical equity, these taxes appear to rank relatively well, because the goods and services subject to these taxes are not essential goods. To ensure the best vertical equity ratings, users should be charged on the basis of ad valorem, as in the case of the MVST, thereby ensuring that users pay more when they purchase higher end goods and services.

H.3.8  Overall Efficiency Impact
Sales taxes such as the MVST are likely to entail much higher efficiency costs than broad-based and country- or province-wide consumer sales taxes, because they are typically applied to a narrow consumption base (i.e. to very small parts of overall consumer spending) and often to restricted geographic areas. Hence, consumers are likely to be fairly sensitive to changing their consumption patterns in response to these excise taxes, including the value and types of goods and services purchased as well as the locations where they are purchased. These inefficiency costs are likely to lie at the top end of the following range: from $0.12 to $0.38 per dollar of revenue generated. In addition, we would need to add the costs of administering each tax, which are not included in the above estimates and could be significant.

H.4  Lessons for Metrolinx

H.4.1  Lessons from Revenue Tool Evaluation
Through the evaluation of driver license taxes as a potential tool for implementation in the GTHA, some key points were identified for consideration by Metrolinx:

- The tax will be sustainable as a license renewal is currently required every 5 years. This tool is unlikely to lead to any driver behaviour changes or relocation of economic activity.
A driver license tax does not strictly adhere to the premise that those who use public transport should pay for it.

The tax can be levied explicitly for transportation expenditure.

Its implementation will require legislative approval but will be relatively easy to administer through the current license renewal infrastructure.

H.4.2 Lessons from Case Study

The overview of excise and other sales taxes (i.e. taxes on specific goods and services rather than broad-based sales taxes) provides some relevant lessons:

- In terms of revenue potential, these tools tend to make only marginal revenue, although there are some exceptions such as the MVST.
- Apply the tax to as broad a geographic area as feasible in order to mitigate the economic distortions discussed above. Ideally this would mean an Ontario-wide tax base. However, should that not be feasible, Metrolinx should envisage including municipalities adjacent to but outside the GTHA (even if the tax is applied at a lower rate in those municipalities). These measures would mitigate the costs associated with the economic distortions.
I. Tool Profile: Employer Payroll Tax

I.1 Overview of Tool

I.1.1 How the Tool Works and Where it is Being Used

A payroll tax is a tax withheld by employers and remitted to the government. It can be structured either as a flat tax per pay period or as a percentage of gross pay in a given period. In payroll taxes used across Canada, one portion is usually paid by the employer and another portion is paid by employees, but withheld and remitted by employers.

A payroll tax would function similar to employer or employee deductions for Federal and Provincial payroll taxes (e.g., Employment Insurance, Canada Pension Plan contributions, etc.), where the tax is automatically withheld from an employee’s pay.

A transportation dedicated payroll tax is currently being used in Portland, Oregon where a rate of approximately 0.69% is being charged to employers on the amount of gross payroll. The tax provides Portland with 49% of their transit operating budget ($210M in 2010). A similar scheme is in effect in Paris, France, and is outlined in the case study in section I.3.

I.1.2 How the Tool is Being Considered for Evaluation

For the purposes of this analysis, it is assumed that the payroll tax would be implemented as a percentage of gross pay and applied uniformly to employers in the GTHA. It is also assumed that the application of the tax would not be dependent on proximity to the transit network. The levy would be treated similar to other Federal and Provincial payroll deductions; however, it would be charged on all employment income within the Region (i.e., without a cap on the taxable portion of earnings).
I.2 Tool Evaluation Results

I.2.1 Revenue Potential

An employer payroll tax has the potential to generate significant revenues within the region. For the purposes of generating a revenue estimate for the implementation of a payroll tax, a percentage tax was assumed to be applied uniformly to all employment income (without a cap on taxable earnings), regardless of proximity to transit.

In 2009, there was approximately $290 billion of employment and work related income in Ontario. Using the assumption that approximately $131 billion of that income is generated by residents of the GTHA and that approximately 11.1% of that income is claimed as a deduction from taxable income, a 0.50% employer payroll tax could generate between $630 million and $730 million in 2014. Assuming that the amount of taxable income in the GTHA grows at 3.50% annually, the tool could potentially generate $810 million to $920 million by 2021.

We have not assessed an upper bound rate for payroll taxes, because there is only a limited literature on the revenue and behavioural effects of changes in payroll tax rates and this literature is not easily adapted to small jurisdictions such as the GTHA.

The implementation of this tax would impact all employers with employees working within the GTHA. The payroll tax proceeds are expected to be sustainable as these would rise directly with the growth of employment and wages. In addition, gross pay figures should be relatively stable and easy to forecast for extended periods. It should be noted that most Canadian payroll taxes are capped at a certain level for each employee and employer (i.e., the tax rates do not apply to employment incomes above certain thresholds). However, for the purposes of estimating the revenue potential of this tool, revenues have not been capped, which is similar to the treatment of the employer payroll tax in New York and Portland, Oregon.

### Static Revenue (2014) (before adjustments)

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<tr>
<th>Yield for 1% tax</th>
<th>Rate for $500M yield</th>
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<table>
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<tr>
<th>Upper Bound Rate</th>
<th>Annual Yield from Upper Bound Rate</th>
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<table>
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<tr>
<th>Dynamic Revenue – 0.50% (after behavioural adjustments)</th>
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<tbody>
<tr>
<td>2014                                      2021</td>
</tr>
<tr>
<td>$630M - $730M     $810M - $920M</td>
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### Criteria Assessment (1 to 5)

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<th>Criteria</th>
<th>Assessment</th>
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<td>Revenue Potential</td>
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<tr>
<td>Sustainability</td>
<td>5</td>
</tr>
<tr>
<td>Cyclical Variability</td>
<td>4</td>
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15 $131 billion in employment and work related income from the GTHA estimated using the GTHA’s approximate percentage of Ontario’s gross domestic product (45%).

16 11.1% deduction rate interpreted from Canada Revenue Agency table at: [http://www.cra-arc.gc.ca/gncy/stts/gb09/pst/fnl/html/t02on-eng.html](http://www.cra-arc.gc.ca/gncy/stts/gb09/pst/fnl/html/t02on-eng.html). This is based on total deductions before adjustments and total deductions from net income divided by the total income assessed.

17 A 3.5% nominal growth rate in employment earnings is slightly lower, and hence more conservative, than the GDP nominal growth assumptions of 4.1% for 2014 and 4.2% for 2015 in the Fall 2012 Ontario Economic Outlook (p. 38).
Revenues from this tool may vary somewhat over the business cycle as revenues are directly linked to employment incomes. This means that revenues will be lower in recessions and greater in periods of relatively high economic growth.

The revenue estimates for this tool are subject to a significant margin of error, because income data for residents of the GTHA was not available and the taxable income base for the GTHA was determined based on its percentage of Ontario’s GDP. Due to this crude estimate, a margin of error has been built into the revenue estimates provided.

### I.2.2 Incremental Costs

Incremental costs associated with the payroll tax would be minimal as the current payroll taxation infrastructure should be able to accommodate the rate increase or the creation of a new tax category. The additional payroll tax can be lumped together with the current social insurance plan contributors that are already collected from gross pay. However, there may be some incremental administration costs from implementing this payroll tax at the GTHA level, particularly in the start-up stage. Incremental administrative costs should be minimal.

### I.2.3 Impact on Behaviour and Transportation Network Performance

A payroll tax will have no definitive impact on the overall performance of the transportation network if the tax is implemented on companies in the GTHA regardless of proximity to the transportation network. Employers will be taxed regardless of the mode of transport that their employees use. Therefore, a payroll tax will provide no incentive to alter commuter habits or travel behaviour and is unlikely to result in any modal shifts.

As such, there are no time savings benefits or savings from reduced fuel use anticipated from the implementation of a payroll tax.

### I.2.4 Scheme Design

This is a payroll tax that an employer remits to the government. It can either be a flat tax per pay period or a percentage of gross pay in a given period. In payroll taxes used across Canada, one portion is usually paid by the employer (i.e. it adds to employer labour costs) and another portion
is paid by employees (i.e. it reduces take-home pay, but does not add to employer labour costs), but withheld and remitted by employers.

A new payroll tax, as scoped here, would function similar to employer deductions for Federal and Provincial payroll taxes (e.g., Employment Insurance, Canada Pension Plan contributions, etc.), where the tax is automatically withheld from an employee’s pay, likely as a fixed rate of tax. Application of the tax would not be dependent on proximity to the transportation network.

Other options for the implementation of the tax include providing an exemption for the first few thousand dollars of earnings or instituting an overall cap on total contributions (i.e. the tax would not be paid on earnings above a certain threshold).

We have also considered a payroll tax where the tax rate depends on the proximity of the employer location to transit facilities, although this is not the version of the payroll tax we have evaluated. In principle, a payroll tax where employers close to transit facilities paid a higher tax rate would mean that employers who benefit from such facilities would bear a higher share of the payroll tax burden. However, such a scheme may have some adverse and unintended effects. For example, this type of payroll tax would penalize employers who chose higher density office configurations in transit-proximate locations (i.e. more employees per sq. ft. would attract a higher payroll tax liability, ceteris paribus), making such transit-accessible locations more attractive instead of firms with lower-density office configurations.

Establishing a scheme where the tax rate depends on the proximity of the employer’s location to transit would also entail significant incremental administration and compliance costs and could be open to manipulation by employers with more than one office location in the GTHA. Currently, such employers are subject to the same payroll taxes regardless of the employee location. A location-specific payroll tax would require an additional layer of administration and enforcement to ensure that employers are not registering employees at a low-tax location and having them work primarily at high-tax locations. Moreover, employees can now change office locations either temporarily or permanently within the GTHA without having their employer incur additional administrative costs. That would no longer apply with a location-based employer payroll tax.

### I.2.5 Technical Implementation Considerations

The scheme infrastructure is already in place as employers already withhold income taxes and social insurance plan contributions from an employee’s gross pay. As such, notwithstanding political considerations, implementation of the new tax can be achieved with minimal administrative adjustment necessary after the tax legislation is approved by the Province.

The current administrative infrastructure will also allow the tax to be implemented fairly according to the employee’s total employment earnings.
I.2.6 Governance Considerations

Legislative approval may be required to introduce a new tax on payrolls, for instance, through the Provincial budget. The legislative process for payroll taxes can be a significant and costly endeavour and it can take a significant degree of time to frame the legislative scope.

Since this tool would be an additional contribution paid by employers, it is not considered a new tool. However, it would be the first payroll tax dedicated to transportation funding. It could also potentially “piggyback” on one of the current payroll deductions, provided that it is structured in a similar manner (i.e. with similar exemptions and taxable earnings).

Important characteristics that will require definition in the proposed payroll tax will be, for example, who are the exempted parties (if any) and what constitutes being employed (and self-employed) or being an employer in the GTHA. For instance, if an employee works in Ottawa for an employer based in Toronto, should this individual be exempt from the tax? While it is typical that an employee will pay the taxes applicable in the region in which they work, these items are not always clear and no “one size fits all” rule is always appropriate, making the legislative framing of a new tax very important. It will also need to be determined if the payroll tax would be imposed on employers (i.e. adding to labour costs but not reducing take-home pay) or on employees (i.e. reducing take-home pay) or on both.

The flow of funds will also be an important issue. It is envisaged that employers will collect the tax and remit it to the Province as is the current practice. The Province will then pass along the revenues collected from the new payroll tax in full to Metrolinx for the funding of transportation initiatives.

If a payroll tax is introduced as a direct source of revenue for improving public transit within the region, payees should have a fairly good understanding of where their money is going. It is expected that a new line item would be added to the pay stubs of individuals that would show the dollar amount of the contribution to transportation funding (similar to EI and CPP).

The legislative requirement for the introduction of the tax will add clarity to the definition of the tax, including who is liable for the tax and who (or what) is the direct beneficiary of the tax.

Tracking the revenues collected from the tax and where the money is going could be more challenging to the government and Metrolinx, as the amount of the contribution will vary based on the employer’s wage bill and possibly other tax attributes.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Assessment (1 to 5)</th>
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<tbody>
<tr>
<td>Transparency of Scheme</td>
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<tr>
<td>Institutional Features</td>
<td>Y / N</td>
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<tr>
<td>New Revenue Tool?</td>
<td>N</td>
</tr>
<tr>
<td>Municipal Role?</td>
<td>N</td>
</tr>
</tbody>
</table>
I.2.7 Equity and Distributional Impacts

There are potential distributional impacts that could arise from the implementation of the tax. For example, employers in the affected region may choose to relocate operations or employ less people if the tax creates excessive additional costs. In addition, employees may choose to be employed outside of the GTHA. However, this is considered unlikely for a low tax rate (e.g. 1 per cent or less) as it is generally not very practical for most people.

The tax will affect only employers and those employed in the GTHA regardless of use of the transportation network. A fixed tax rate is seen as more equitable than a flat rate tax as it will take account of varying employment income levels, particularly if structured similar to other statutory contributions. However, most payroll taxes have a ceiling on taxable payrolls, in which case the proposed tax could represent a higher share of the payroll for workers with lower pay.

The tax has the potential to reduce the competitiveness of businesses in the GTHA with potential costs resulting from reduced employment or relocation of businesses. It may also reduce the attractiveness of the GTHA as a location for new investments.

I.2.8 Overall Efficiency Impact

An employer payroll tax is payable by employers in a statutory sense, but the economic incidence of the tax bill is borne by employers (through higher labour costs) and employees (through lower employment and possibly lower wages, after factoring in behavioural adjustments). The efficiency costs of payroll taxes are significant – in the range of 15-25 cents per dollar of additional revenue for the GTHA. This is borne out by the potential for reduced economic activity in the GTHA due to comparatively higher labour costs and lower net-of-tax wages relative to areas without such a tax. It is well-known that the economic distortions which arise from higher payroll taxes include reductions in hours worked and lower labour force participation, because the return to working declines with the net-of-tax wage. In addition, Feldstein (2008) points to other changes in economic behaviour which also entail inefficiency costs, including reduced work effort (independently of hours worked), reduced investment in human capital and changes in the mix of compensation received, since labour income subject to payroll taxes becomes less attractive relative to other forms of compensation, including both monetary and non-monetary forms of compensation.
In a simulation using a computable general equilibrium model, an increase in payroll taxes equivalent to 1% of GDP in revenue terms would entail a 0.66% drop in steady state GDP for Canada as a whole. When applied to the GTHA or even to the province of Ontario, this would imply a larger negative impact on GDP, because the jurisdiction is smaller and hence, there is more room for firms and workers to reduce their payroll tax exposure by changing the location of economic activity.

In addition, the tax is not expected to produce any impacts on travel behaviour if it is implemented independent of proximity to transit.

Higher payroll taxes could also lead to the relocation of economic activity outside the GTHA and increased unemployment in the GTHA. The resulting reduction in economic activity could represent a significant cost to the GTHA community.

We have also considered a payroll tax where the tax rate would be higher for areas with more transit services and lower for areas that are not as well served by public transit, as in the case of the Versement de Transport (VT) in Paris. To the extent that such a payroll tax regime would lead to significant differences in payroll tax rates across the GTHA, it would lead to even greater economic distortions, as firms and workers seek to relocate to reduce their payroll tax exposure. It would also entail significant additional compliance costs borne by employers with plants or offices in different parts of the GTHA, because shifting employees between offices in areas subject to different payroll tax rates would entail additional administrative costs and red tape relative to the current regime. Moreover, in the GTHA context, a higher payroll tax rate in the core of Toronto which is better served by public transit, could increase the incentives for firms to locate in the outer municipalities, where transit services are less competitive relative to cars. However, if businesses were to re-locate to the outer municipalities, they would be disadvantaged by limiting their access to a larger share of the labour in the region, as well as losing other positive externalities of co-locating in a higher-density businesses environment in transit-accessible locations (e.g. agglomeration economies).

All of the above effects indicate that payroll taxes could lead to negative overall efficiency impacts for the GTHA region and the province. In a payroll tax variant structured by proximity to transit, the overall negative efficiency impacts could be substantial if the spatial variation in tax rates were significant.

I.3 Case Study - Versement de Transport (VT) in Paris, France

I.3.1 How the Tool Works

The tax is payable by all public and private companies with 10+ employees situated in any one jurisdiction or area governed by a Transport Authority (TOA). It is levied against employers through

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the social security system –based on a percentage of the gross salary. Companies are liable to the
tax in TOAs where they are located – not based on payroll figures at a national level. The VT tax
rate varies by location, with tax rates tending to be higher in areas better served by public transit
(e.g. central Paris has a higher VT tax rate than outlying suburbs).

I.3.2  Policy Objectives / Motivation
The Versement de Transport (VT) is used to fund public transit in urban areas (capital and
operational funding).

I.3.3  Revenue Potential and Pricing
Tax rates under the VT vary by municipality according to population and whether or not the
municipality is investing in transit: from 0.55% of salaries for municipalities with a population
between 10,000-100,000; and up to 1.75% if the municipality has over 100,000 people and is
investing in transit.
In addition, basic payroll tax rates are higher in Ile-de-France: 1.4% in outer suburbs and up to
2.6% in Paris and the La Defense business district. Some TOAs can also impose a supplementary
tax of 0.2%.
VT revenues in 2009 amounted to C$4.1billion in Ile-de-France, representing 39% of transit
funding and second in magnitude after transit fares at 42%).

I.3.4  Impact on Travel Behaviour and Network Performance
There is no direct impact on travel behaviour, because employee reliance on transit does not
depend on whether or not or how much payroll taxes they pay. Indirect effects on transit use are
difficult to gauge, because these depend on whether the payroll tax causes employers to change
office locations and whether or not the new office locations are more conducive to transit use.

I.3.5  Technical Implementation Considerations
The VT is collected by an external public body responsible for collection of social security
contributions and remitted to TOAs (this body retains 1% of revenues to cover administrative
costs).

The VT scheme also allows for refunds to companies if they provide free transport for employees,
accommodation or the jobs are located in new towns (refunds comprise 2% of revenue).
I.3.6 Governance Considerations

TOAs have the authority to impose the VT tax under legislation from the 1970s. TOAs can set the tax rate within certain limits—75% of TOAs are already at the maximum allowable rates.

Any proposed tax increase to fund a transit project must be supported with a business case. However, there are also cases of abandoned projects due to determined opposition from employers.

I.3.7 Equity and Distributional Considerations

This revenue tool ranks fairly in terms of horizontal equity, since inner city areas pay a higher payroll tax rate (and have better quality transit services). However, there is only a very tenuous link between contributors and beneficiaries. The revenue tool also ranks well in terms of vertical equity, because workers with higher labour income are subject to a higher VT.

I.3.8 Overall Efficiency Impact

This tool likely entails relatively high inefficiency costs as compared to fixed-rate payroll tax schemes, because the different payroll tax rates apply to very circumscribed geographic areas, thereby allowing for changes in employer location decision-making in order to minimize tax exposure. While we are not aware of any analysis pointing to the magnitude of these inefficiency costs in France, economic theory suggests that this particular form of payroll tax scheme leads to greater distortions in the labour market behaviour of firms and workers (and higher compliance costs) as compared to payroll taxes with uniform rates across similar geographic areas.

I.4 Lessons for Metrolinx

I.4.1 Lessons from Revenue Tool Evaluation

Through the evaluation of an employer/employee payroll tax as a potential tool for implementation in the GTHA, some key points were identified for consideration by Metrolinx:

- The tax will affect only employers and those employed in the GTHA regardless of use of the transportation network. It could potentially be viewed as a contribution to transportation funding from businesses, as businesses also receive benefits from improving transportation infrastructure within the Region.
- Implementation can be undertaken through the current system of tax remittances at source though legislative approval will be required for implementing a new tax.
• The tax has the potential to reduce the competitiveness of businesses in the GTHA with potential knock-on costs associated with reduced employment or relocation of businesses. It may also reduce the attractiveness of the GTHA for potential new investment.

I.4.2 Lessons from Case Studies

Lessons from the French payroll tax funding case include:

• This revenue tool can be a major source of revenue dedicated to transportation funding, but it is sensitive to the business cycle and recent revenue yields in France suggest that the tool may not be as sustainable as it is believed to be.
• Avoid high payroll tax rates (in excess of 1%), which can lead to large distortions in employment patterns when the tax is applied to a circumscribed geographic area like the GTHA and there is ample room for avoiding the tax by locating employees at other office locations that are not subject to the tax (or are subject to a lower tax rate).
• Apply the tax to as broad a geographic area as feasible in order to mitigate the economic distortions mentioned above. Ideally this would mean an Ontario-wide payroll tax base. However, should that not be feasible, Metrolinx could envisage including municipalities adjacent to but outside the GTHA (even if the payroll tax is applied at a lower rate in those municipalities).
• This revenue tool generates relatively high inefficiency costs – up to $0.40 to $0.75 cents per dollar of additional revenue.
• Introducing payroll tax rates designed to provide employers with incentives to locate near transit facilities would be challenging in terms of creating additional administrative complexity and inefficiency costs. The French payroll tax rates in the wider Paris area are higher in the transit-intensive inner city areas and lower in the outer city areas which have been targeted for redevelopment – a tax rate structure which is more equitable, but appears to discourage employer proximity to transit.
J. Tool Profile: Fare Increases

J.1 Overview of Tool

J.1.1 How the Tool Works and Where it is Being Used

Fares are a user charge for public transit exclusively collected at the local level. As a revenue source, they are primarily used to fund the ongoing operations and maintenance of the transit system. Increases in fares typically drive down ridership and it is therefore important to ensure that any increase in fares does not negatively affect net revenues. Increasing fares will lead to more people driving and in turn can negatively impact the GTHA economy through increased congestion and auto use.

In Baltimore, Maryland an increase in public transit fares was proposed in early October 2011 as one of the ways to finance Maryland's growing backlog of transportation costs affecting bus, light rail, MARC and metro service.

J.1.2 How the Tool is Being Considered for Evaluation

For the purposes of this analysis, it is assumed that an increase in fares could be implemented as a percentage of the current fare paid or as a fixed value increase on all fares. This would require coordination amongst all of the transit authorities in the GTHA and Metrolinx as fare increases are dealt with at the municipal level. It is assumed that the revenues generated by the fare increase would be directed to Metrolinx for use in funding transportation initiatives across the region.

This tool has been evaluated on the basis that a percentage increase in fares is implemented across the municipalities; however, due to the difficulty in developing a revenue estimate under this approach (due to differing transit fares and structures across the municipal transit agencies) a fixed price increase was assumed for developing the revenue estimate.
J.2 Tool Evaluation Results

J.2.1 Revenue Potential

A fare increase has the potential to generate modest revenues; however, it is also likely to result in a reduction of transit commuters which will have a negative effect on revenues. It is important to consider both the revenue potential and the subsequent effect on ridership when determining the amount to increase fares. For the purposes of generating a revenue estimate from the implementation of a fare increase within the GTHA, a fixed rate increase has been assumed.

Based on the assumption that there are approximately 618 million transit trips taken annually in the GTHA\textsuperscript{19}, implementing a $0.10 fare increase has the potential to generate an additional $30 million to $40 million in 2014 after accounting for behavioural adjustments. Assuming an average growth rate in the number of public transit trips taken per year of 1.50%, these revenues can increase to $35 million to $45 million by 2021. These dynamic revenue estimates include a preliminary demand elasticity estimate for the region of -0.45 (which suggests that a 10% fare increase results in a 4.5% decrease in ridership). Accounting for this behavioural reaction, a $0.15 fare increase is estimated to generate $50M-$60M in 2021.

While each transit authority within the region may be willing to entertain different fare increases, applying an upper bound fare increase of $0.30 across the region would generate approximately $200 million in revenues (before behavioural adjustments are considered) or approximately $100 after behavioural adjustments. This estimate assumes that revenues from the fare increase are used to compensate municipal agencies for lost revenues from a reduction in ridership due to the fare increase.

The implementation of this tool would impact all transit users within the GTHA. This method is moderately sustainable in the long-run; ridership numbers will decrease, but the majority of people will continue to use public transit. Detailed elasticity analysis should be performed to maximize the trade-off of ridership decrease with increased revenues. Considering the ridership decrease, this tool may have the impact of encouraging driving.

\textsuperscript{19} Transit trips taken annually in the GTHA based on a detailed breakdown of 2008 ridership data for each transit system within the region, provided to Metrolinx by the Canadian Urban Transit Association.
J.2.2 **Incremental Costs**

Incremental costs associated with a fare increase would be minimal as the increase would be processed using the existing charge mechanism. No alternative collection or processing methods are necessary.

The main costs associated with the fare increase would be in recalibrating token machines and changes to signage through-out the transit system.

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<tr>
<th>Criteria</th>
<th>Assessment (1 to 5)</th>
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<tr>
<td>Overall Incremental Costs</td>
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J.2.3 **Impact on Behaviour and Transportation Network Performance**

Instituting a fare increase could have a significant negative effect on the overall performance of the transportation network through increased auto usage for individuals who can afford to drive, and could consequently increase congestion. It is likely that the cost of this increased congestion will outweigh the incremental revenue generated by the fare increase.

Increased fares are likely to lead to reduced public transit ridership. If the frequency of service remains the same, there will be no additional benefits associated with fuel savings or reductions in air pollution, due to the fact that there are fewer people using public transit. In fact, it is likely to have significant negative consequences in terms of time savings and emission through the expected increase in auto use.

Should transit fare increases be introduced as part of a broader program, including road user pricing, the negative behavioural impacts may balance out with the positive benefits of road pricing.

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<th>Assessment (1 to 5)</th>
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<tr>
<td>Overall Impact on Behaviour and Network Performance (simple average)</td>
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<tr>
<td>Impact on Network Performance</td>
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<tr>
<td>Time Savings</td>
<td>1</td>
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<tr>
<td>Savings Due to Decreased Auto Use / Fuel Savings</td>
<td>1</td>
</tr>
<tr>
<td>Reduction in Traffic Collisions</td>
<td>1</td>
</tr>
<tr>
<td>Air Pollution and Emissions Savings</td>
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J.2.4 **Scheme Design**

Transit fares are the revenue tool of choice for aligning user payments with user benefits. However, an increase in fares for this revenue tool profile is based on the assumption that the current fare structure remains in place.

The fare increase can be implemented as a fixed amount per token/trip or as a percentage of the base fare. A fixed fare increase, across all fare types, is likely to alter the pricing relationship between different fare classes. For example, a $0.10 increase across all fares would be a higher percentage increase from users who receive discounted fares (such as students, children and
seniors) as compared to a standard adult fare. Similarly, it could make buying a monthly pass less cost-effective as buying single trip tokens for frequent users of the system.

In pricing the increase for different fare types (e.g. monthly pass versus single tokens) there should not be any arbitrary change to the structure of fare classes and the incentives contained therein, unless it is introduced as part of a carefully restructured set of fares. There is a need to maintain the current pricing structure, with the incentives which have been embedded in the pricing over the years (e.g. rewarding purchases of monthly passes versus one off purchases). This would suggest implementing a percentage price change across the fare structure rather than a flat rate increase. This is not to suggest that a review of the structure of fares is not desirable, but rather that such a review is a significantly bigger challenge that should be addressed in its own right rather than as a by product of any fare increase.

J.2.5 Technical Implementation Considerations

The fare increase can be implemented almost immediately after being passed by the transit authorities, with minimal administration necessary. It would be beneficial for Metrolinx to coordinate a fare increase across the region as there are a number of transit authorities operating in the GTHA, but it may take some time to receive sign-off from all of the authorities.

J.2.6 Governance Considerations

Tracking and identifying the related fare element may be difficult as all fares are collected centrally. In addition, it is unlikely that the fare increase will be distinguished from the increases that may be necessary for the everyday operations and maintenance of the system or from inflationary based increases. In this respect, it may be challenging to govern the implementation of this tool.

Following their approval of the fare increase, the municipal transit authorities will collect the fares and then remit the designated increase portion to Metrolinx. It will be difficult from Metrolinx’s position to calculate and/or audit amounts due from the transit authority as it may be difficult to isolate the fare increase portion of the total fare revenues. However, if assumptions can be made on ridership loses due to the transit fare increase, the transit authorities should have sufficient information on the number of passengers and fare revenues to assist in this allocation.

Users have experienced several fare increases in recent time and there may be significant push-back to another fare increase. However, if transit authorities can demonstrate and advertise that

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<th>Criteria</th>
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<tr>
<td>Ease of Implementation</td>
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<tr>
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<tr>
<td>New Revenue Tool?</td>
<td>N</td>
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<tr>
<td>Municipal Role?</td>
<td>Y</td>
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this fare increase is going toward funding specific capital projects, it could provide transparency to transit users and help them understand where the funds are being allocated.

**J.2.7 Equity and Distributional Impacts**

Fare increases are equitable in terms of horizontal equity (i.e. those who pay also benefit from the additional services) but are generally inequitable across income groups, because lower-income groups tend to bear the burden of the fare increases.

Riders who rely on public transit may or may not have other travel alternatives available, but these are likely to be at a higher cost either in terms of out-of-pocket costs or time costs or both. Lower-income earners who rely on transit would be hardest hit by a fare increase. In terms of horizontal equity, all users of the transit system are targeted by the tool (i.e., all users of the transit system receive benefits and share the cost burden; not just a specific line or specific mode such as bus, LRT or subway).

Fare increases affect all users of the transit system equally, particularly if the increase is structured as a percentage of the current fare. To the extent that fares are differentiated by fare type (e.g., adult, child, student, senior, etc.), the higher-priced fares would likely bear a higher proportion of the funding burden than the lower-priced fares.

While a transit increase is unlikely to have an impact on the location of economic activity, it may reduce the degree of discretionary travel on the system by users who do not rely on monthly passes. This may lead to a marginal reduction in local economic activity in the more transit accessible areas of the GTHA.

**J.2.8 Overall Efficiency Impact**

Transit fares are the first and most effective user pricing mechanism for recovering the cost of building and operating transit services in the region. However, fare increases can have a negative impact on the productivity and competitiveness of the GTHA region to the extent that these discourage transit ridership, increase road congestion and thereby reduce the effective operation of the labour market in the GTHA (i.e. employers having less effective access to employees across the region and job seekers have less effective access to jobs across the region).

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<th>Criteria</th>
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<td>Horizontal Equity</td>
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<tr>
<td>Vertical Equity</td>
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<tr>
<td>Availability of Alternatives</td>
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<td>Overall Efficiency Impacts (simple average)</td>
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<tr>
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<td>1</td>
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<tr>
<td>Costs of Economic Distortions</td>
<td>4</td>
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<tr>
<td>Overall Incremental Costs</td>
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The additional costs associated with more vehicle kilometres travelled by road, including increased congestion, higher GHG emissions, lower local air quality and greater road collisions suggest that there could be significant adverse economic impacts, depending on the magnitude of the fare increase. There are not any incremental capital or operating costs associated with fare increases. Nor are there significant economic distortions, unless the rate of recovery of capital and operating costs exceeds the optimal level dictated by the externalities discussed above. Hence, fare increases could well lead to adverse overall efficiency impacts.

However, it is important to recognize that this view of fare increases is taken in the context of the current fare structure, which does not allow for such smart fare attributes such as peak/off-peak pricing, or distance-based fares. A review of the legacy fare structure and the introduction of smart pricing features such as those noted above would provide considerably more room to increase fares while mitigating the undesirable side effects such as shifting trips from transit to roads. For example, an increase in peak time fares alone, while leaving off-peak fares unchanged, would mitigate the perverse mode shift behaviour noted earlier, because the fare increase coincides with times of day when highways and roads are also at their most congested, thereby mitigating the tendency to shift to auto usage. It may also help shift some transit users to off-peak times, when the transit network is less congested.

J.3 Case Study

No case study has been undertaken of a transit fare increase for this paper.

J.4 Lessons for Metrolinx

J.4.1 Lessons from Revenue Tool Evaluation

Through the evaluation of fare increases as a potential tool for implementation in the GTHA, some key points were identified for consideration by Metrolinx:

- A fare increase can be very easily implemented but may generate modest revenues.
- The overall efficiency impact of fare increases is negative, due to the adverse impacts on the performance of the road network, GHG and local air emissions and collisions.
- However, the adverse side effects from fare increases may be mitigated if these are considered as part of a revamped fare structure that allows for smart features such as peak/off-peak pricing.
K. Tool Profile: Fuel Tax

K.1 Overview of Tool

K.1.1 How the Tool Works and Where it is Being Used

A fuel tax is an excise tax levied on the sale of transportation fuels. The tax typically takes the form of either a flat rate per litre of fuel purchased or an ad valorem tax (i.e. a percentage of the base price).

Regional gas taxes are currently dedicated to transportation in the provinces of British Columbia, Alberta, and Quebec. In Quebec there is currently a $0.03/litre surcharge in the Greater Montreal area which was implemented to fund the public transit operators in the region. Similarly, in the Metro Vancouver Area there is currently a $0.17/L surcharge on fuel which is dedicated to TransLink for operating and capital investments.

K.1.2 How the Tool is Being Considered for Evaluation

Unless otherwise stated, we assume a flat rate per litre of fuel sold is imposed on the sale of all gasoline and diesel fuels in the GTHA for the purposes of funding transportation initiatives in the region. The tax is assumed to be collected by fuel retailers and remitted to the provincial government along with other sales taxes. It is assumed that the funds would then be transferred to Metrolinx by the Province.

However, we also briefly analyze the revenue potential of an ad valorem tax in section L.2.1 below. Since an ad valorem tax is a percentage tax applied to the base price, this type of tax tends to exacerbate any market-driven price fluctuations. By contrast, the tax take from a flat rate tax per litre gas tax does not fluctuate with the fuel price.
K.2 Tool Evaluation Results

K.2.1 Revenue Potential

A fuel tax has the potential to generate significant revenues within the region. For the purposes of generating a revenue estimate from the implementation of a fuel tax within the GTHA, a flat rate per litre was assumed to be imposed on the sale of all gasoline and diesel fuel in the GTHA.

Based on the assumption that approximately 7.7 billion litres of fuel/diesel is currently sold in the GTHA, a $0.05 per litre tax could generate between $320 million and $420 million in 2014 and approximately $300 million to $400 million by 2021. This reduction in revenues is due to two factors: (i) an underlying trend reduction in fuel consumption and (ii) the additional impact on fuel consumption due to the tax-induced increase in fuel prices. The latter factor is measured by the price elasticity of demand for fuel, which captures two changes in behaviour: (i) fewer vehicle kilometres driven and (ii) a switch to more fuel-efficient vehicles.

The upper bound for the assessed rate is $0.20/litre yielding over $1.5 billion. This upper bound was determined based on a rough estimate of the applicable range for the estimated price elasticity. It is expected that at a rate greater than $0.20/litre, the demand response of users may diverge significantly from that implied by the point elasticity estimate used in the dynamic revenue calculation.

To demonstrate how the use of an ad valorem tax on fuel would differ from the flat rate per litre, a dynamic revenue estimate has been provided. The calculation of the ad valorem tax uses the same assumptions for fuel consumption as the fixed rate. Where the revenue calculations differ is that the ad valorem tax applies a 5.50% tax to the base price of the fuel (net of other taxes).

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20 Statistics Canada consumption data for Ontario provided for 2005.
21 Light vehicle fuel consumption in Ontario declined from 12.5 billion litres in 2004 to 12.5 billion litres in 2009, implying an average rate of decline of 0.3% per year. Sources: Transportation in Canada, Annual Reports, 2005 and 2010.
22 In the short-run, the price elasticity of demand for gasoline is very inelastic, whereas over the longer-run the price elasticity tends to approach unity (e.g. a 10% increase in fuel prices tends to reduce fuel consumption by 10%), as indicated in Agras and Chapman (1999).
charged on the price of fuel). A rate of 5.50% was used because it generates almost an identical amount of revenue in 2014 as the fixed rate calculation, which will allow us to demonstrate how the revenue potential of an ad valorem tax differs in the long-term.

As indicated in the comparison table, an ad valorem tax has the potential to provide greater revenues in the longer term (all else remaining equal). It is important to note, however, that this revenue estimate assumes that the price of gasoline continues to rise in the future. A flat rate would provide greater revenues under a scenario where the price of fuel is declining.

The implementation of this tax would impact all drivers travelling within the GTHA and is a reasonable way to directly charge users of the road network. The sustainability of this tool is heavily dependent on the availability and price of oil. This could lead to decreasing revenues as oil becomes more scarce. There may also be some variation in fuel demand as prices fluctuate and efficiency of vehicles increases, which will directly affect the demand for fuel and the sustainability of fuel tax revenues, as indicated in the table above. The variability of fuel tax revenues over the business cycle is expected to be relatively limited, because most auto usage is not discretionary in the short-term.

Revenue estimates for this tool were developed based on an estimate of the fuel consumed in the GTHA. The estimate of fuel consumed in the GTHA was approximated using the number of litres of fuel consumed in Ontario and the GTHA’s portion of Ontario’s gross domestic product (approximately 45%). A flat fee was then applied to the estimated GTHA fuel consumption to determine the revenue potential.

### K.2.2 Incremental Costs

Incremental costs associated with implementing a fuel tax would be minimal. The administrative structure for charging and collecting the tax is already in place with municipalities and the Province already in receipt of tariffs on fuel. The new tax could be easily added to the current charging regime.

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<th>Criteria</th>
<th>Assessment (1 to 5)</th>
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<td>Overall Costs</td>
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23 According to Natural Resources Canada, the average price of regular gasoline in Toronto/Hamilton between March 15, 2011 and March 13, 2012 was $1.26/L ($0.87/L net of taxes) and the average price of diesel for the same time period was $1.28/L ($0.95/L net of taxes).
K.2.3 Impact on Behaviour and Transportation Network Performance

Instituting a fuel tax could have a positive effect on the overall performance of the transportation network in the long-term through reduced congestion on all major highways and arterial roads.

The extensive literature on the micro-economic adjustments in behaviour arising from fuel taxes indicates that drivers reduce their demand for fuel (in response to higher prices) by driving less and by switching to more fuel-efficient vehicles (e.g. in multi-vehicle households). In the short-term, both these effects are inelastic (e.g. the percentage reduction in vehicle kilometres driven resulting from the tax-induced fuel price increase is much smaller than the original percentage increase in fuel prices), because drivers have relatively limited discretion to alter their behaviour.\(^{24}\) The ability to re-organize and postpone their trips (incl. car-pooling), to switch to public transit or active modes of travel, to cancel their trips altogether and to purchase more fuel-efficient vehicles is very limited. Over the longer-term (typically 2-5 or more years), drivers have much more discretion to re-organize their travel commitments and they also have opportunities to change their vehicle purchases in order to manage their fuel consumption. As a result, the response in demand for fuel and for vehicle kilometres driven is greater than in the short-term.

Over the long-term, the reduction in vehicle kilometres travelled can account for anywhere between one-third of the total reduction in fuel consumption (e.g. Agras and Chapman 1999) up to 95% of the total reduction in fuel consumption (e.g. Bento et. al. 2009), with the remainder accounted for by a shift to more fuel-efficient vehicles. This reduction in vehicle kilometres travelled can be due to:

- Changing travel modes, including shifting to public transit, if appropriate services are available (e.g. see CBO 2008\(^{25}\))
- Postponement and re-organization of trips;

\(^{24}\) This means that short-run elasticity values are between 0 and -1. For example, see Tae Hoon Oum, W.G. Waters II, and Jong-Say Yong (1992), “Concepts of Price Elasticities of Transport Demand and Recent Empirical Estimates” in Journal of Transport Economics, May, pp. 139-154; or the Victoria Transport Policy Institute “Transportation Elasticities: How Prices and Other Factors Affect Travel Behaviour” 21 July 2011.

\(^{25}\) This study of a dozen highway locations in California found that in the short-run, every 50 cent increase in the price per gallon (in a period from 2003 to 2007, when prices rose from US$1.50 to US$3.00 per gallon) led to a 0.7% reduction in weekday trips in areas where rail transit was a nearby substitute for driving. Moreover, transit ridership rose by the same number as the reduction in auto trips, suggesting there was little or no trip suppression in the short-term. See Congressional Budget Office Effects of Gasoline Prices on Driving Behaviour and Vehicle Markets, 2008 accessed at http://www.cbo.gov/sites/default/files/cbofiles/ftpdocs/88xx/doc8893/01-14-gasolineprices.pdf.

Criteria Assessment

| Overall Impact on Behaviour and Network Performance (simple average) | 3.9 |
| Impact on Network Performance | 3.5 |
| Time Savings | 3.5 |
| Savings Due to Decreased Auto Use / Fuel Savings | 4.5 |
| Reduction in Traffic Collisions | 3.5 |
| Air Pollution and Emissions Savings | 4.5 |
• Suppression of trips; and/or
• Changes in the location of residences, workplaces and amenities intended to reduce trip lengths

In the longer-term, a reduction in vehicle kilometres travelled could lead to some travel time savings for road users and hence, some improvement in the performance of the highway and road network. However, cost savings due to reduced fuel consumption combined with the associated reductions in local air pollution and GHG emissions are likely to be the most important behavioural effects from fuel taxes. This is because they include the combined effects of reduced vehicle kilometres driven, the switch to more fuel-efficient vehicles and driving at slower speeds. The reduction in vehicle collisions is expected to be of a similar order of magnitude as the reduction in vehicle kilometres and the time savings.

The fuel tax is also expected to increase the cost of moving goods within the GTHA. This could have a marginal negative impact on the competitive position of companies within the GTHA and could also lead to a one-time price adjustment. However, transportation costs represent only a very small share of retail or consumer prices for goods and services and as such, the impact on consumer prices may not be discernible even if the full cost of the fuel price increase is passed onto final prices.

**K.2.4 Scheme Design**

A flat rate per litre tax is not likely to exacerbate the impact of any increase (or decrease) in fuel prices and as a result would provide a more stable forecast cash flow stream. While a flat rate will not change with consumption levels or price, it can always be increased or decreased to compensate for changes in fuel consumption or price.

Fuel tax pricing must be particularly sensitive to the dynamic supply and demand economics of fuel pricing. A fixed price per litre has less of an unintended impact on the price dynamic of fuel. It should be noted that demand for fuel is relatively inelastic to changes in price in the short-term and most users will not be able to avoid the tax.

As such, in the short term, user behaviour may not alter greatly. Over the medium- to long-term, user behaviour may change and is likely to take many forms such as, reduced/consolidation of short trips, purchase of more fuel efficient vehicles, reduced speeds and a re-evaluation of the attractiveness of public transport relative to auto usage.

Legislative consideration would also be necessary for the definition of the fuel type and fuel user to be taxed. For example, will hybrid fuels be taxed (e.g. ethanol, bio-fuel, natural gas, electricity) and will special interest groups be exempt such as haulers, farmers, postal services/couriers etc.
**K.2.5 Technical Implementation Considerations**

The tax could be collected by fuel retailers and remitted to the provincial government along with other sales taxes using the existing sales tax collection system. The funds could then be transferred from the Province to Metrolinx for use in funding transportation initiatives.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Assessment (1 to 5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ease of Implementation</td>
<td>5</td>
</tr>
<tr>
<td>Time to Implementation</td>
<td>5</td>
</tr>
</tbody>
</table>

**K.2.6 Governance Considerations**

If a fuel tax is implemented, there should be an authority that is responsible for the collection and allocation of the funds (e.g., Metrolinx) similar to what is done in Vancouver with TransLink. Legislative approval will be required to introduce a new tax on fuel that is collected by a transit authority. No additional legislation would be required if the tax was collected by the Province and then transferred to Metrolinx (as is done in Quebec). This arrangement, however, has the potential to reduce the transparency of the scheme for users.

It is also not clear how the Province could introduce a fuel tax that only affects the GTHA. If legislation were introduced to allow municipalities to collect the tax on behalf of Metrolinx, there will be additional administrative burden associated with collecting the tax from multiple parties.

If a gas tax is introduced as a direct source of revenue for improving public transit within the region, users should have a fairly good understanding of where their money is going.

If the tax is lumped in with other sales taxes, it could reduce the transparency of the scheme. In addition, if the tax is collected by multiple municipalities, this could further reduce the transparency of cash flows and the reporting of fuel tax revenues. Having a single authority responsible for the collection of the revenues from this new tax is likely the most transparent and effective way to govern this tool.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Assessment (1 to 5)</th>
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<tbody>
<tr>
<td>Transparency of Scheme</td>
<td>2</td>
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<tr>
<td>Institutional Features</td>
<td>Y / N</td>
</tr>
<tr>
<td>New Revenue Tool?</td>
<td>N</td>
</tr>
<tr>
<td>Municipal Role?</td>
<td>N</td>
</tr>
</tbody>
</table>

**K.2.7 Equity and Distributional Impacts**

Drivers must pay the fuel tax when purchasing fuel inside the GTHA. It will affect regular users as well as passing trade. If the tax leads to sustained fuel prices that are higher than in the surrounding areas outside the GTHA, users may plan trips that incorporate opportunities to purchase fuel outside the GTHA. This effect may not be significant at a 5 cent per litre price differential, but it would likely be significant at 10 cents / litre and higher. Moreover, this effect would be more pronounced for passing trade.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Assessment (1 to 5)</th>
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</thead>
<tbody>
<tr>
<td>Horizontal Equity</td>
<td>4</td>
</tr>
<tr>
<td>Vertical Equity</td>
<td>3</td>
</tr>
<tr>
<td>Availability of Alternatives</td>
<td>3</td>
</tr>
</tbody>
</table>
In the case of a substantial rise in fuel taxes (e.g., 10 cents or more per litre), regular users may also reconsider their consumption patterns and carry out more of the economic activity outside the GTHA (primarily filling up outside the region). This could have significant negative distributional consequences for the GTHA economy. Such displacement is less likely in the short-term, and could become considerable in the long-term if the tax is set too high and creates the incentive for longer trips to save on the purchase price of fuel. The tax will affect all petrol and diesel drivers. It could add a significant cost to the transportation of goods within the GTHA, having an impact on the GTHA’s business competitiveness and cost of goods, thus carrying the potential impact to a broader consumer base than just drivers.

With respect to distributional issues, fuel taxes may be borne disproportionately by households which are more reliant on personal vehicle travel, such as those in rural areas and suburban areas with fewer transit services.

K.2.8 Overall Efficiency Impact

A fuel tax is likely to entail significant changes in travel and vehicle purchase behaviour over the long-term, notably reduced driving and a more fuel-efficient vehicle fleet. This should also entail some improvement in the performance of the transportation network.

The costs of economic distortions resulting from a fuel tax in the range considered here (i.e. in the 5-10 cents / litre range) would be significant. According to a recent study of the micro-economic effects of raising US gasoline taxes, efficiency costs would be in the range of $0.15 to $0.25 cents per dollar of revenue raised. This suggests efficiency costs tend to increase more than proportionately with the increase in fuel taxes. The efficiency costs for a GTHA fuel tax would likely be at the high end of this range, due to the considerably greater room for tax avoidance (i.e. re-fuelling in adjacent areas outside the GTHA) as compared to US fuel taxes applied at the national (federal) level and various taxes applied at the state level. In the GTHA context, fuel purchases would be partly diverted to outside the region, particularly by carriers (freight users), commuters who reside in the outer municipalities of the GTHA as well as by long-distance through-traffic. At the limit, a relatively high fuel tax rate in the GTHA may also lead to the relocation of some economic activity to areas outside the region, particularly for transportation-intensive businesses. An Ontario-wide application of a higher fuel tax would mitigate the economic distortions significantly.

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![Bento et al (2009) "Distributional and Efficiency Impacts of Increased US Gasoline Taxes" American Economic Review 99: 1-37. An inefficiency cost of 20 cents per dollar of fuel tax revenue raised would amount to one cent of every 5 cents per litre in incremental fuel tax lost to inefficiency costs.](image-url)

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We recognize that significant negative externalities arise from vehicle use and that these externalities alone would provide an efficiency rationale for a fuel tax. We also know from the full cost investigation analysis undertaken by Transport Canada that the average social costs associated with the use of light vehicles in Canada were estimated at $0.056 per km in 2006, which included the average accident, air pollution, GHG and congestion costs across Canada. Using the average fuel efficiency for light vehicles in Ontario in 2006 (approx 9.5L/100km), this suggests that average social costs amount to about $0.053/L. These average social costs do not take account of the cost of road infrastructure, which may or may not all be recovered by the fuel taxes and other vehicle user charges which are already in place. Moreover, the $0.056/km almost certainly underestimates the cost of congestion in the GTHA (about $0.012/km represents the congestion component of the $0.056 per km cost). The incremental costs of implementing and complying with the fuel tax would be negligible.

Based on our qualitative assessment criteria in the box above, the overall efficiency impact of a fuel tax increase is likely to be negative, but small or modest in magnitude. This appears to be broadly consistent with a bottom-up quantitative estimate of the overall efficiency impacts based on the travel behaviour benefits and the economic distortion costs of the fuel tax hikes. A first pass at calculating the value of the travel behaviour benefits of a $0.10 fuel tax hike suggests a value in excess of $200 million, based on the estimated reduction in fuel consumption, one-third of which we attribute to reduced vehicle kilometres driven as opposed to improved fleet fuel efficiency. However, if the reduction in vehicle kilometres occurs in highly congested driving conditions as is common on GTHA highways, the congestion relief may make highway driving more attractive, thereby offsetting some or even all of the reduction in vehicle kilometres from the fuel tax hike. This is known in the literature as the “congestion feedback” effect and could well mean that the value of the travel behaviour benefits are less than the $200 million noted above. On the other hand, the distortionary costs associated with the fuel tax could well approach $200 million (e.g. if the economic distortion costs are 30% of revenue collected (or 3 cents per litre). This would yield an inefficiency cost of $170 million, based on our estimate of the amount of gasoline we expect to be consumed in the GTHA in 2014 after behavioural adjustments). Therefore, it would not be unreasonable to see an overall efficiency impact from a fuel tax hike in a range from moderately negative to neutral (i.e. no impact) or slightly positive.

**K.3 Case Study – TransLink Motor Fuel Tax**

*K.3.1 How the Tool Works*

A motor fuel tax is one of the main revenue tools dedicated to fund TransLink’s capital and operating requirements. A $0.15/litre tax (rising to $0.17/litre in April 2012) is levied on all gasoline and diesel sales within the Metro Vancouver jurisdiction, an area of 2,900 km². In

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27 Bruno Jacques “Estimates of the Full Cost of Transportation in Canada: An Overview” Transport Canada, presented at the Mobility Pricing Conference, Feb. 3, 2011. Note that the estimates above are average rather than marginal costs. Marginal costs are likely to be higher than average costs for cost components such as congestion.
addition to the TransLink tax, fuel prices in Metro Vancouver include federal and provincial excise taxes as well as HST, leading to some of the highest retail fuel prices in major urban areas across Canada. Other revenue tools dedicated exclusively to fund TransLink include transit fares, parking sales taxes, property taxes and a hydro levy.

K.3.2 Policy Objectives / Motivation

The primary objective for this tax is revenue generation for TransLink. The dedicated fuel tax was TransLink’s most important revenue source shortly after the agency’s inception in 1999, when it accounted for about 40% of total revenue (excluding provincial and federal grants for capital projects). The tax is now TransLink’s second most important revenue source, representing about 27% of total revenue in 2010 (transit fares account for 34% TransLink revenue).

K.3.3 Revenue Potential and Pricing

In 2010, a $0.15/litre tax on fuel and diesel generated $323 million in revenue for TransLink. This is a major source of revenue (27% of TransLink’s 2010 revenue) and is second only to transit fares.

Translink’s fuel tax rate has grown steadily since its introduction, most recently, in a decision by the Mayor’s Council on Regional Transportation and the Province to increase the rate to $0.17/litre effective in April 2012.28 These rate increases were decided for a variety of reasons ranging from helping fund the operating deficit for the Millennium Line, to contributing to the capital funding gap for the Evergreen line as well as more esoteric reasons, such as replacing the revenue to TransLink from a vehicle registration fee – the latter revenue tool was approved in the TransLink enabling legislation in 1999, but was never implemented by the Province.

The revenue yield from the tax has increased significantly over this period, from $162 million in 2000 to $323 million in 2010. However, the yield has been flat or declining during the period from 2006 to 2009 (at approx $260 million/year), when the tax rate was at 12 cents/litre. This may be partly due to the impact of the 2008-09 recession, but it may also reflect the longer-term impact of changes in driver behaviour (fewer km driven and improved fuel economy) and the effects of tax avoidance as drivers divert their fuel purchases to neighbouring jurisdictions not subject to the tax. The revenue yield in 2010 rose to $323 million as a result of the 3 cent/litre increase to 15 cents. However, the revenue yield for 2011 is expected to drop to just under $300 million, even though the tax rate has remained unchanged (and TransLink had budgeted to receive $324.3 million). This record on revenue yields suggests that the sustainability of this revenue source may be quite limited in the medium-to-longer term. Moreover, this may indicate that TransLink may now be reaching the limits of the revenue potential for this tool, although this would need to be confirmed through appropriate modeling of the determinants of fuel demand in Metro Vancouver.

K.3.4 Impact on Travel Behaviour and Network Performance

The extensive literature on the micro-economic adjustments in behaviour arising from fuel taxes indicate that drivers reduce their demand for fuel (in response to higher prices) by driving less and by switching to more fuel-efficient vehicles (e.g. in multi-vehicle households and through purchases).

Based on average fuel prices in Vancouver in 2010, the $0.15/litre tax represented approximately a 15% price increase. Using elasticities suggested in a note by TransLink staff, this tax reduced fuel consumption by 3.75% in the short-term through a 1.5% reduction in vehicle kilometres driven and a switch to more fuel-efficient vehicles.\footnote{See TransLink “Motor Fuel Tax: Overview”, p. 2.} In the longer-term, the same tax is expected to reduce fuel consumption by 9%, partly through a 4.5% reduction in vehicle kilometres driven, with the remaining effect due to a more fuel-efficient fleet.\footnote{See TransLink “Motor Fuel Tax: Overview”, p. 2.} In the long-term, current and potential drivers may also alter the location decisions for their work, residence and other amenities, so as to minimize travel costs.

K.3.5 Technical Implementation Considerations

The TransLink fuel tax is collected by the Province on behalf of TransLink and then remitted to the agency. Since the Province already collects its own excise taxes on the very same tax base across the whole province of British Columbia, there are no significant incremental costs to implementing and collecting this revenue. Nor were there any obvious time delays required in implementing the changes in fuel tax rates, even though changes in the provincial enabling legislation for TransLink were required to increase the tax rate to $0.17 cents/litre.

It is important to note that the topography and natural boundaries of Metro Vancouver – ocean to the west and southwest and mountains to the North – are crucial in limiting tax avoidance by drivers in Metro Vancouver. Nevertheless, there appears to be some evidence of significant leakages of fuel tax revenue in the southeast part of Metro Vancouver, where it borders the Fraser Valley and Abbotsford in particular. There also appears to be some leakage to Washington State to the South and to the Squamish Lillooet Regional District to the North. TransLink is currently assessing the importance of these leakages and their impact on fuel tax revenues.

K.3.6 Governance Considerations

TransLink obtained the authority to introduce taxes under the South Coast British Columbia Transportation Authority Act (SCBCTAA), the enabling legislation for the agency. This legislation also set a cap to fuel tax rate to be used to fund TransLink – cap which was recently increased from $0.15 to $0.17 cents/litre.
The decision to draw on the tax room and revenue tools available under the SCBCTAA is made by the TransLink Board of Directors and confirmed by the Mayor’s Council on Regional Transportation.

K.3.7  Equity and Distributional Considerations

The TransLink Motor Fuel Tax ranks well in terms of horizontal equity, although a fuel tax is expected to impact households in suburban and rural areas due to their disproportionate reliance on personal vehicle use. The tool is neutral (or certainly not regressive) in terms of vertical equity, when impacts are considered on a lifetime income basis, because fuel consumption rises more than proportionately with affluence for most of the range from low- to high-expenditure households (see TransLink Motor Fuel Tax case study). Geographic considerations could lead to outlying municipalities being viewed as bearing the burden of higher taxes, due to no reasonable alternatives to driving.

K.3.8  Overall Efficiency Impact

The overall efficiency impacts of the tax for the Metro Vancouver region are likely to be negative. The inefficiency costs arising from the fuel tax are likely to be significantly higher than the $0.15-$0.25 per dollar of revenue raised which was estimated by Bento et. al. (2009) for the US, for several reasons (i) the combined rate of fuel taxes in Metro Vancouver is substantially higher than in the US; (ii) the Metro Vancouver is a smaller region; and (iii) it is adjacent to a low fuel tax jurisdiction (Washington state). All of these reasons would suggest considerably higher tax avoidance and economic distortions. On the other hand, the travel behaviour impacts are likely to be positive and substantial, yet these are likely to be offset in part by the congestion feedback effect discussed earlier in section L2.8. Hence, the net travel behavioural effect may not be large enough to offset the substantial inefficiency costs of the overall fuel tax surcharge.

K.4  Lessons for Metrolinx

K.4.1  Lessons from Revenue Tool Evaluation

Through the evaluation of fuel taxes as a potential tool for implementation in the GTHA, some key points were identified for consideration by Metrolinx:

- A fuel tax could easily be added to the cost of a litre of fuel, as the Province and Government already levy taxes on a per litre basis.
- A flat rate per litre rather than an ad valorem tax may be more beneficial by generating fewer revenue fluctuations for Metrolinx and less fuel price volatility for consumers.
- Implementing the tool is likely to reduce auto use, GHG emissions, local air pollution and particularly fuel consumption in the long-run, which in turn may reduce the revenue
potential of the tool. Any impact of reduced auto use on road congestion may be partly or even completely offset by the congestion feedback effect.

- If the tax is implemented only within the GTHA, it could lead to a relocation of some economic activity to outside the GTHA.
- A fuel tax would affect drivers directly but is also likely to impact a broader consumer base as the increased cost of freight deliveries within the GTHA is likely to lead to small increases in consumer good prices.

**K.4.2 Lessons from Case Study**

There are several lessons which Metrolinx can draw from this case study, while bearing in mind the geographic and other circumstances which are specific to Metro Vancouver and TransLink:

- Fuel taxes can be a major source of dedicated revenues for a regional transit agency, as it has been for TransLink since its inception in 1999.
- The sustainability of this revenue tool in the medium-to-long-term is compromised by the behavioural effects, notably the reduction in driving and the switch to more fuel-efficient vehicle fleets, including hybrids and electric vehicles.
- The poor sustainability features of this revenue stream is one of the main factors that has prompted TransLink to search for new and more diversified set of revenue sources – currently the subject of negotiations between mayors and the Province. Possible options include an annual vehicle levy or road pricing.
- Given the magnitude of traffic flows between the GTHA and the rest of the Greater Golden Horseshoe to the south, west, north and east, the GTHA is unlikely to support a 17 cent fuel tax without substantial leakages and economic distortions (e.g. commercial trucks avoiding refuelling within GTHA boundaries). A lower tax rate in the order of 10 cents per litre may be more feasible.
- Fuel price increases (whether driven by taxes or by market considerations) are seen to pose a triple challenge in the form of higher demand for public transit services, higher operating costs for transit operations, and lower tax revenues to fund the operating deficit for public transit.
- The difficulty of estimating net revenue from a major revenue source for a transit agency, including in the short-term, suggests that the development of an econometric model of the demand for fuel in the relevant region would be well advised.
L. **Tool Profile: High Occupancy Tolls**

L.1 **Overview of Tool**

**L.1.1 How the Tool Works and Where it is Being Used**

Under this scheme, single occupant vehicles can pay a toll for the use of otherwise restricted high occupancy lanes (typically on expressways). High occupancy vehicles use the lanes for free. The tool requires the existence, creation or designation of high occupancy lanes, which can be used free of charge by vehicles with a minimum number of passengers (i.e., high-occupancy vehicles with two or more people (HOV2+) or three or more people (HOV3+)).

HOT lanes have been successfully implemented in a growing number of US states including Colorado, Florida, Utah, Georgia, Minneapolis, Washington State, California, Virginia and Texas.

**L.1.2 How the Tool is Being Considered for Evaluation**

The Province has announced plans to implement approximately 450 kilometres of HOV lanes across the 400-series highways over the next several years. Some of these lanes are currently in operation while others are planned. For the purposes of this analysis, it is assumed that any existing / planned HOV lanes would be converted to HOT lanes and a toll would be charged on all low occupancy vehicles using the lanes. The stretches of highway being considered for HOT lane implementation are provided in the table below:

<table>
<thead>
<tr>
<th>Highway</th>
<th>Starting Location</th>
<th>Ending Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>QEW</td>
<td>Guelph Line</td>
<td>Trafalgar Road</td>
</tr>
<tr>
<td>404</td>
<td>Highway 401</td>
<td>Highway 7</td>
</tr>
<tr>
<td>403</td>
<td>Highway 401 / Highway 410</td>
<td>Highway 407</td>
</tr>
</tbody>
</table>

<table>
<thead>
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<th>Ending Location</th>
</tr>
</thead>
<tbody>
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<td>Highway 403</td>
</tr>
<tr>
<td>427</td>
<td>Highway 409</td>
<td>Highway 407</td>
</tr>
<tr>
<td>400</td>
<td>Major Mackenzie Drive West</td>
<td>Kirby Road / King Road</td>
</tr>
<tr>
<td>400</td>
<td>Kirby Road / King Road</td>
<td>Highway 9</td>
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</tbody>
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<table>
<thead>
<tr>
<th>Highway</th>
<th>Starting Location</th>
<th>Ending Location</th>
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<tbody>
<tr>
<td></td>
<td>Operational (2011)</td>
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</tr>
<tr>
<td></td>
<td>Mid-Term (2011 – 2017)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Road Names</td>
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<tr>
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<td>Highway 7</td>
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<td>Aurora Road</td>
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<td></td>
<td><strong>Long-Term (Post 2017)</strong></td>
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<td>QEW</td>
<td>Red Hill Valley Parkway</td>
<td></td>
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<tr>
<td>QEW</td>
<td>Highway 407 / Highway 403</td>
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</tr>
<tr>
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<td>Trafalgar Road</td>
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<td>Highway 9</td>
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</tr>
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<tr>
<td>410</td>
<td>Highway 401</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Revenue Tool Profiles</strong></td>
<td></td>
</tr>
</tbody>
</table>
L.2 Tool Evaluation Results

L.2.1 Revenue Potential

A high occupancy toll has the potential to generate significant revenues within the region depending on the congestion levels on the relevant highway segments, the type of tolling, toll prices and drivers’ value of time. For the purposes of generating a revenue estimate from the implementation of HOT lanes, a fixed toll for the use of all HOT lanes within the GTHA was assumed. A phased approach to the implementation of HOT lanes has been assumed based on the Province’s planned construction of HOV lanes.

A set of HOV lanes are already in operation and are assumed to be converted to HOT lanes by 2014. A second set of HOV lanes are expected to be completed by 2017 and a third set by 2020.

According to the Ontario Ministry of Transportation, in 2006 the hourly lane usage during peak times in the operational HOV lanes in the region was between 1,100 and 1,250 vehicles. The current vehicle capacity required for use of the HOV lanes is a minimum of two occupants per vehicle. In looking at the noted peak period hourly lane usage, there is not much capacity in the lanes for additional usage. As a result, if HOT lanes are implemented in the region, it may likely require an increase in the number of occupants per vehicle that use the lane for free from two to three. By doing this, it would increase the number of vehicles that are required to pay a fee to use the HOT lanes and may increase the revenue potential of the tool.

Based on the assumption of approximately 2.8 million vehicles per lane km per year in the HOT lanes (equivalent of 1,500 vehicles per lane km for 6 hours each day on weekdays and 3

<table>
<thead>
<tr>
<th>Static Revenue (2020) (before adjustments)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Yield for 1¢/km toll as of 2020 when all HOT lanes are open</td>
<td>Rate for $500M yield as of 2020 when all HOT lanes are open</td>
</tr>
<tr>
<td>$11M</td>
<td>$0.47/km</td>
</tr>
<tr>
<td>Upper Bound Rate</td>
<td>Annual Yield from Upper Bound Rate</td>
</tr>
<tr>
<td>N/A</td>
<td>N/A</td>
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<tr>
<td>Dynamic Revenue – 30¢/km (after behavioural adjustments)</td>
<td></td>
</tr>
<tr>
<td>2014</td>
<td>2020</td>
</tr>
<tr>
<td>$25M - $45M</td>
<td>$160M - $250M</td>
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<table>
<thead>
<tr>
<th>Net Revenue32 (including capital and operating costs)</th>
<th></th>
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<td>Rate</td>
<td>2021 Revenue</td>
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<tr>
<td>30¢/km</td>
<td>$0 - $100M</td>
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<table>
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<tr>
<td>Revenue Potential</td>
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<tr>
<td>Sustainability</td>
<td>5</td>
</tr>
<tr>
<td>Cyclical Variability</td>
<td>3</td>
</tr>
</tbody>
</table>

31 One can envisage three types of tolling (i) a fixed toll rate at peak times or throughout the day, (ii) pre-scheduled tolls, which vary throughout the day based on a pre-set timetable (e.g. SR91 Express in California), and (iii) dynamic tolls, where the toll rate adjusts based on live traffic conditions in order to ensure free-flow conditions and predictable travel times.

32 HOT costs estimated based on per kilometer costs for the Minnesota I-394 Program (pp. 33): http://www.cts.umn.edu/Publications/ResearchReports/pdfdownload.pl?id=1632&ei=kRJGUMS_FMT66QGCsoH4DQ&usg=AFQjCNE0j-DWucjLBAMe66i6DTEqWc4wUnw&sig2=KlRrRzaTbX4ChAykF60iA
hours per day on weekends), a $0.30/km toll could generate approximately $25 million to $45 million in 2014. It is assumed that only the current HOV lanes will be converted for HOT lanes use by 2014; however, using that same rate in 2020 when all lanes are assumed to be in operation, it is estimated that the tool could generate between $160 million and $250 million.

The implementation of this toll would not directly impact many users of the highway system as the option to use the HOT lanes and pay tolls is completely voluntary. Revenues are expected to be sustainable over the long-term since economic growth generates vehicle traffic, although it is difficult to predict the number of drivers who will choose the HOT lane option. Once commuters get accustomed to the system and realize the potential for time savings and improved trip time reliability, this will facilitate revenue projections. Another factor affecting the sustainability of the revenues is that over time, it can be expected that commuters may begin to carpool and meet the minimum occupancy requirements in order to use the lane for free. This would obviously reduce the revenues associated with this tool.

The cyclical variability of HOT lane revenues tends to be greater than that for road tolls in general, because users have a choice to opt out and use the general purpose lanes. For example, a recent report by Fitch Ratings on US HOT lanes found that total traffic (i.e. HOT and GP lanes) on the 91 Express in Orange County, California dropped by 5.5% between 2007 and 2011 due to the recession and rising fuel prices, but HOT “lane traffic dropped by 17.2%, or three times as much”.  

Revenues from HOT lanes are primarily predicated upon the congestion of the highway in the areas where HOT lanes are available as well as drivers’ implicit value of time. The more congestion on the highway, the more willing a user will be to pay for use of the HOT lanes. Second, the higher drivers’ value of time, the more willing they will be to pay for time savings and improved reliability under congested traffic conditions. As a result, an upper bound rate has not been considered for this analysis.

When toll rates are set dynamically to maintain certain speeds on the HOT lane, this also has the effect of enhancing revenues by better aligning toll rates and willingness to pay. Revenue generation will also depend on the type of pricing approach and algorithm used to set the dynamic tolls and whether it is based on revenue maximization, maximization of total throughput (incl. on general purpose lanes), maintaining free flow conditions on the HOT lanes, or a combination of these objectives.

Predicting traffic volumes is the most challenging aspect of projecting revenues from HOT lanes, particularly distinguishing between high occupancy vehicles and single or double rider vehicles. For the purpose of the estimate provided, it has been assumed that 1,500 vehicles will use the lanes

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33 FitchRatings “Paying for Predictability: US Managed Lane Projects”, p. 9. The report goes on to indicated that the drop in the HOT lane revenues for the 91 Express is only 12.6% (rather than 17.2%) “due in part to inflationary adjustments to nonpeak hour toll rates, the [HOT lane’s] ability to capture some general purpose lane traffic at a lower price and changes in the shoulder hour volume” (p.9).

34 An analysis of live traffic data for the 95 Express Lanes between Miami and Fort Lauderdale found a linear relationship between traffic density on HOT lanes and that on general purpose lanes, suggesting that the more the GP lanes become congested, the more drivers pay a toll and switch to the HOT lanes (L. Kong and M. Hallissey “Managed Lanes Traffic and Revenue Potential: 95 Express Case Study” Paper P12-5897 presented at the January 2012 TRB Meetings.
per hour for a period of 6 hours daily on weekdays and 3 hours daily on weekends (i.e., 2.8 million vehicles per year). Further, it has been assumed that 83% of these vehicles will be charged the toll (i.e., 17% of the vehicles will have 3 or more occupants). Due to the difficulty in estimating the number of toll paying vehicles that will use the HOT lanes, a revenue band has been provided.

L.2.2 Incremental Costs

The incremental costs associated with the implementation of HOT lanes would be significant. From a capital cost perspective, HOT lane tolling is still cheaper than full highway tolling due to smaller gantries and requirement for fewer cameras and other electronics. Capital investment would likely be required for the initial construction of tolling infrastructure and gantries along all portions of highway in the region in which HOT lanes are available. Significant infrastructure expenditure would also be required for lane barriers, vehicle monitoring systems and transaction processing systems. It is assumed that all of the planned HOV lanes will simply be converted to HOT lanes and that the cost of constructing or converting lanes into HOV has already been budgeted by the provincial government during the HOV planning stage.

Furthermore, in order to convert existing HOV lanes to HOT lanes, existing infrastructure may need to be upgraded. Not only will this require additional cost, but it is likely that this process would be time consuming.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Assessment (1 to 5)</th>
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</thead>
<tbody>
<tr>
<td>Overall Costs</td>
<td>2</td>
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</table>

Incremental Cost Estimates

<p>| | |</p>
<table>
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<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Capital Costs</td>
<td>$650,000/gantry</td>
</tr>
<tr>
<td></td>
<td>$715,000/km for guardrails / barriers</td>
</tr>
<tr>
<td>Operating / Compliance Costs</td>
<td>$0.08/tx</td>
</tr>
</tbody>
</table>

The Reason Foundation published a report in February 2011 entitled Automating HOT Lanes Enforcement, which looked at several different HOT Lane regimes in the US. A review of 5 different HOV 3+ regimes showed that approximately 83% of the traffic on those highways was tolled.
L.2.3 Impact on Behaviour and Transportation Network Performance

The primary behavioural rationale for the introduction of HOT lanes is that they provide drivers in congested highway conditions with an option to save travel time and to reach their destination on time (i.e. trip time reliability) in those instances (e.g. business trips, trips to airport or emergencies) when the value of trips exceeds the toll charge. Given that the value of time and reliability varies significantly across the population of drivers as well as across the trips taken by the same driver (depending on the purpose of their trip), HOT lanes can have substantial positive impacts on consumer welfare and productivity by facilitating the most valuable trips for personal emergencies as well as business purposes.

What is perhaps not as well understood is that the conversion of HOV lanes to HOT status can also improve the performance of the highway network (i.e. for both the priced lanes and the free general purpose (GP) lanes). Specifically, the use of dynamic pricing for a HOT lane can actually increase vehicle throughput relative to a HOV lane, because dynamic pricing leads to better traffic flow and highway capacity is maximized when free-flow conditions are maintained. As a result of the improvement in the usage of highway capacity usage, a conversion from HOV to HOT lanes can improve travel speeds on adjacent GP lanes and increase overall vehicle throughput on the combined HOT/GP lanes. This can represent a substantial improvement in the overall performance of the transportation network, including both the HOT lanes and the general purpose lanes. Associated with this network improvement will be some modest reductions in fuel savings, auto collisions, and related GHG emissions.

It is also possible that the implementation of HOT lanes may promote car pooling and increase the average passengers per vehicle, as drivers attempt to qualify for free travel on HOT lanes. However, in some cases, such as the I-95 in Miami, average vehicle occupancy has declined both on the HOT lanes (as compared to under HOV status) and the GP lanes.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Assessment (1 to 5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall Impact on Behaviour and Network Performance (simple average)</td>
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</tr>
<tr>
<td>Impact on Network Performance</td>
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</tr>
<tr>
<td>Time Savings</td>
<td>4</td>
</tr>
<tr>
<td>Savings Due to Decreased Auto Use / Fuel Savings</td>
<td>3</td>
</tr>
<tr>
<td>Reduction in Traffic Collisions</td>
<td>3</td>
</tr>
<tr>
<td>Air Pollution and Emissions Savings</td>
<td>3</td>
</tr>
</tbody>
</table>


37 One study of a proposed regional HOT network for the San Francisco Bay area predicted that the average peak-period speeds on the general purpose lanes would be 20% higher for a HOT network relative to a HOV network. See Metropolitan Transportation Commission (2007: 14) available at: http://www.vta.org/expresslanes/pdf/mtc_hot_lanes_study_final.pdf. In practice, the increase in travel speeds on the GP lanes may not fully materialize to the extent that the improved performance attracts additional or previously suppressed traffic back to the highway network.

38 See the case study on HOT lanes in Detailed Case Studies of Selected Revenue Tools, report for Metrolinx by AECOM, September 2012 for the full details.
While this report has not quantified the transportation user benefits of implementing HOT lanes, these benefits should be studied as they could be significant. The Metrolinx Benefits Case Analysis methodology is a good framework for quantifying these benefits and provides policy makers with a ready-made methodology that they are familiar with. One unique feature of evaluating HOT lane projects is that the value of time savings may be considerably higher than for the average highway user, because only users with relatively high time values, determined in part of trip circumstances (e.g. late for an appointment), will self-select to use the HOT lanes.

L.2.4 Scheme Design

In order to address Metrolinx’s revenue requirements and to generate positive behavioural change, we believe the best pricing option would be a dynamic pricing scheme designed to ensure maximum vehicle throughput on the combined HOT and GP lanes. This pricing scheme entails toll rates that vary with real-time traffic conditions and thereby ensure the most efficient use of the available highway capacity, as discussed earlier. Dynamic HOT lane pricing has already been implemented in a number of locations, beginning with the I-15 in San Diego as well as the I-95 in Miami and the I-394 in Minneapolis-St. Paul (toll rates also vary on the SR-91 in Orange County and Greater Los Angeles, but the variation is on a pre-scheduled basis). A time-of-day or peak/off-peak pricing (i.e. two rates only) scheme would be the next best pricing option.

L.2.5 Technical Implementation Considerations

In terms of implementation, current and planned HOV lanes can be converted to HOT lanes. However, this will require additional/upgraded infrastructure along all stretches of highway with HOV lanes. This would include tolling gantries to assist with vehicle monitoring and transactions processing as well as constructing lane barriers to isolate HOT lanes. These modifications of the HOV lanes will take time to implement. An automated collection system could be integrated with other toll programs.

The economic useful life of HOT Lane equipment is in the 10-15 year range, and hence could preclude other options such as highway tolling or VKT charges, unless the latter are designed as incremental additions to the HOT lane network.

HOT lanes expansion could also facilitate the effective development of a Bus Rapid Transit ("BRT") network. Currently, a portion of the Don Valley Parkway in Toronto is dedicated to GO bus transit use only. Developing a broader HOT lane network could make a BRT service more attractive current and potential transit users, particularly in sections of highway with high frequency of bus use.

The impact of snow on HOT lane operations is an issue that should be considered when implementing HOT lanes in a climate that experiences winter (e.g., the GTHA); both snow removal and maintaining traffic speeds in the presence of snow. In terms of snow removal, the HOT lanes
should be treated the same as the general purpose lanes. For safety reasons, the snow from the general purpose lanes should not be dumped into the HOT lanes and vice versa. Barrier-free lanes would allow snow removal to be completed as it is now, but may result in a higher violation rate and a safety risk. Adding barriers makes a more effective HOT lane, but would pose challenges with construction, requiring large shoulders in order to facilitate snow removal, making the capital cost higher, and some parts of the highway network that are already constrained may not be able to have HOT lanes at all. In Virginia, where the I-95 HOT lanes will be operated by a private operator under a public-private partnership (“PPP”) arrangement with the state’s department of transportation, snow removal from the HOT lanes will be the responsibility of the state’s contractor and the private sector partner will be charged for these services through the PPP agreement.

With respect to charging tolls in the HOT lanes, it is generally left up to the operator of the lanes to determine what the toll rate should be (if any). If there is snow on the road, it is likely that the HOT lanes will remain available for tolled use unless the lane is deemed to be too dangerous to drive, in which case it can be temporarily closed until the snow is removed. If snow is in the process of being removed from the HOT lanes (i.e., snow plows are using the HOT lane), tolls could be removed, making the HOT lane the equivalent of another general purpose lane. Tolls could also be left in place and drivers could simply avoid the HOT lanes. It is important to keep in mind that the use of HOT lanes is ultimately the choice of the drivers and if they are charged a toll for a sub-standard service (due to snow), they may choose not to use the HOT lanes in the future.

A final technical consideration, somewhat related to snow, is the size of the shoulders for HOT lanes. Particularly for single lane HOT lanes, it is important to have shoulders wide enough for emergency/law enforcement vehicles to get by or for vehicles that are having mechanical troubles. It would not be good for revenue generation if a single incident (e.g., car breakdown) forced all traffic in the HOT lane to come to a complete stand still until the issue was resolved. For this reason, private sector operators under PPP arrangements in the US prefer multiple HOT lane configurations in comparison to single lane configurations.

### L.2.6 Governance Considerations

Implementing HOT lanes in the region will require additional authority from the Province and municipalities in the case of municipally-owned highways (e.g., Section 41 and 116 of the City of Toronto Act require the City to file for regulations to allow them to impose road tolls). Additional regulations will need to be put in place to allow Metrolinx (or municipalities) to charge and collect tolls.

If HOT tolls are implemented in multiple jurisdictions across the GTHA, it may be preferable for a single authority (e.g., Metrolinx) to monitor and collect the toll revenues due to the resulting reduction in administrative costs associated with collection.

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<thead>
<tr>
<th>Criteria</th>
<th>Assessment (1 to 5)</th>
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<tr>
<td>Transparency of Scheme</td>
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<tr>
<td><strong>Institutional Features</strong></td>
<td><strong>Y / N</strong></td>
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<tr>
<td>New Revenue Tool?</td>
<td>Y</td>
</tr>
<tr>
<td>Municipal Role?</td>
<td>Y</td>
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This could be done either directly by Metrolinx or it can be outsourced to a private sector operator.\textsuperscript{39}

Revenue collection would be completely automated, with public education campaigns and clear signage to help improve the transparency of the scheme.

If HOT lanes are introduced as a direct source of revenue for improving public transit within the region, users should have a fairly good understanding of where their money is going.

The use of a dynamic pricing model may compromise the transparency of the scheme relative to the use of a fixed pricing model. This is because under a dynamic pricing model, drivers may not be familiar with the toll rates being charged at specific periods of time during the day. This can be mitigated by providing signage at all entry points along the HOT lanes that clearly displays the “live” toll rate (i.e., the posted toll rate changes automatically as the toll rate being charged changes).\textsuperscript{40} Additionally, clear and effective public education campaigns will need to be implemented to enhance the transparency of the scheme and help road users gain a better understanding of how the dynamic pricing model works.

\subsection*{L.2.7 Equity and Distributional Impacts}

Under this scheme, all pre-existing alternatives would remain open for drivers to use, since use of the HOT lanes would be completely optional. Drivers could choose to drive in the regular free lanes, whose performance should not be degraded in terms of congestion (see network performance section above). Only users who choose to use the HOT lanes (and do not meet the minimum occupancy threshold) are required to pay for the HOT. Hence, no user is forced to pay if they don’t want to.

In terms of vertical equity, HOT lanes have been criticized for providing benefits to higher income earners (known as the "Lexus Lanes" issue). The argument being that these individuals can afford to choose the HOT lanes option if warranted while individuals with less disposable income may not view the HOT lanes as a viable option. However, this argument does not appear to be supported by surveys of HOT lane users. For example, surveys of the SR 167 HOT Lanes pilot project found that less than 2% of trips were made by a Lexus (and even less by other luxury cars such as Infiniti or BMW). It found that drivers of Chevys and Fords use the HOT lanes more than anyone else.\textsuperscript{41} In terms of household income, 55% of trips were undertaken by users with household income under

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<th>Assessment (1 to 5)</th>
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<tr>
<td>Horizontal Equity</td>
<td>5</td>
</tr>
<tr>
<td>Vertical Equity</td>
<td>3</td>
</tr>
<tr>
<td>Availability of Alternatives</td>
<td>5</td>
</tr>
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\textsuperscript{39} The HOT lane implementation can also be delivered as a public-private partnership (or Alternative Finance and Procurement), with the private partner responsible for the construction as well as the operation and maintenance of the facility during its economic useful life.

\textsuperscript{40} In the case of the Capital Beltway HOT lanes, drivers will pass by two successive electronic message signs posting the active toll rates in order to give them time to decide whether or not to use the HOT lanes or to travel instead on the regular lanes. See \url{http://virginiahotlanes.com/beltway/how-hot-lanes-work/faqs.php#faqs3}.

$100,000 (with 35% of trips undertaken by users with household income under $75,000).\textsuperscript{42} The latter evidence is not counterintuitive, because there are potentially many situations when even relatively lower-income drivers may value the opportunity to bypass congested stretches of highway, because for those trips, the value of their time exceeds the toll price.

In terms of distributional impacts, it is also worth noting that the travel time and reliability benefits derived from HOT lane usage may not be available exclusively to those who opt to use the lanes, but some benefits may also spillover onto regular GP lane users, (e.g. through higher speeds on GP lanes as a result of more efficient use of lane capacity, as discussed above).

\textbf{L.2.8 Overall Efficiency Impact}

HOT lanes are expected to have a significant positive impact on the productivity and competitiveness of the GTHA region by facilitating high-value trips and without suppressing or diverting lower-value trips which use the same highway network. The conversion of all HOV lanes in the region to HOT lanes would almost certainly improve the speeds and utilization of the current HOV lanes as well as potentially improving speeds on the adjacent general purpose lanes. This means that while the travel time savings and reliability benefits will accrue primarily to those who are able to use the HOT lanes – either by paying for access or by qualifying as a high-occupancy vehicle – there are also likely to be some travel time savings for users of the adjacent general purpose lanes as a result of the higher utilization of the HOT lanes and GP lanes combined.

HOT lane schemes are not intended to discourage auto use. Instead, a HOT lane scheme can promote carpooling in order to achieve the occupancy thresholds to avoid paying the toll on the HOT lanes. However, this is unlikely to encourage any significant mode shift behaviour away from single-occupancy vehicles.

The overall efficiency impacts of HOT lanes also depend on the costs of any economic distortions associated with the conversion of HOV to HOT lanes and the incremental capital and operating costs for HOT lane conversion. First, we should emphasize that there are no additional distortions arising from HOT lane pricing, because drivers must opt in to use the HOT lane and they would not do so if the costs (the toll) exceed the expected benefits. The voluntary nature of the HOT lane usage decision also suggests that travel diversions are unlikely to the extent that congestion conditions on the GP lanes are not worst than they would have been under the original HOV network.

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\begin{tabular}{|l|c|}
\hline
\textbf{Criteria} & \textbf{Assessment (1 to 5)} \\
\hline
Overall Efficiency Impacts (simple average) & 3.5 \\
Impact on Travel Behaviour and Network Performance & 3.4 \\
Costs of Economic Distortion & 5 \\
Overall Incremental Costs & 2 \\
\hline
\end{tabular}
\end{table}

Incremental capital and operating costs can vary from project to project. However, one can point to several studies which have examined the societal costs and benefits of HOT lane pricing and found that the benefits exceeded the costs by a substantial margin. Burris and Sullivan (2006) examined the impact of two variable pricing HOT lane projects – the QuickRide program in Houston and the SR-91 Express in California – relative to a HOV-configuration base case and found that the societal benefits exceeded the costs by a factor between 1.5 and 1.7. The study took the capital (and operating) costs of the electronic toll collection (ETC) systems into account and it did so using a ten-year horizon for the cost-benefit analysis, which is a conservative estimate of the expected economic useful life of the ETC assets.

The extent to which these results would apply to a GTHA HOT lane scheme depends on several factors including (1) reliance on some form of variable HOT lane pricing, even if it is the prescheduled variety, as in the case of the SR-91 Express, and (2) ensuring that the HOT lanes are introduced in congested highway corridors, and (3) ensuring that the procurement of the ETC assets and the operation and maintenance services is executed efficiently. All of these are conditions which can be reasonably met in the GTHA context, particularly if a phased implementation gives priority to the most congested highway corridors first.

L.3 Case Study – High Occupancy Toll (HOT) Lanes (Houston, Texas)

L.3.1 How the Tool Works

The scheme involves the conversion of 83 miles (133 km) of existing Metro HOV lanes on regional freeways to METRO HOT lanes on five corridors along Houston’s freeways. The METRO HOT lanes will allow single-occupant vehicles to use the HOV lane for a toll. It will rely on a simple pricing system for users (a single toll per HOT lane, varied by time of day) to maintain free flow conditions with a declaration lane on the approach to the HOT lane to differentiate between toll and non tolled drivers. The toll will be collected automatically through a tag system and participation will be monitored and enforced by cameras and monitoring booths at entry and exit points.

L.3.2 Policy Objectives / Motivation

HOT lanes are a way to increase the amount of persons travelling on a given corridor without building or expanding existing freeways. HOT lanes are a further development of the High Occupancy Vehicle (HOV) lane concept in that single occupant vehicles are allowed access to existing HOV lanes in exchange for a charge when the HOV lane is underutilized at certain times of the day. Houston METRO is offering the HOT lanes program to:

- Reduce traffic congestion on Houston state highways without additional lanes; and
- Maximize the efficiency of the existing HOV lanes.

Revenue generation was not a primary objective of the Houston Metro HOT lanes program.
L.3.3 Revenue Potential and Pricing

Using the I-45 South example, the pricing will range from a fee of C$1-C$2.30 during the peak shoulder hours to C$4.70 during the peak hours.

Projected revenues for FY2012 (first year of operation for certain corridors) are C$1.03 million and the HOT lanes are to be operated as non-profit assets. Revenues are expected to be sustainable over the long-term, because continued population and economic growth in the Houston metropolitan area will support driver demand for access to HOT lanes.

L.3.4 Impact on Travel Behaviour and Network Performance

HOT lanes have the potential to create a variety of benefits to both motorists and transit users. Although HOT lanes are not expected to substantially eliminate congestion, HOT lanes provide an important management tool with the potential to improve travel conditions for a meaningful segment of the driving public with a range of potential benefits:

- Travel Time Reliability: Traffic volumes on HOT lanes are managed to ensure superior, consistent, and reliable travel times, particularly during peak travel periods.
- Travel Time Savings: HOT lanes allow HOV and paying non-HOV motorists to travel at higher speeds than vehicles on congested general-purpose lanes.
- Network Performance: Improved trip time reliability, higher speeds, travel time savings, and possible transit improvements all lead to greater mobility at the corridor level.
- Air Pollution and Emissions Savings: Compared to general-purpose lanes, HOT lanes may provide environmental advantages by eliminating greenhouse gases caused by stop-and-go traffic, and by encouraging people to use carpools and mass transit, thereby reducing the number of cars on the road.

L.3.5 Technical Implementation Considerations

The conversion of HOV lanes to HOT lanes involves significant costs and also time. The capital cost of the five projects in Houston METRO’s jurisdiction is estimated to be C$51.5 million. The time to implement the schemes from the authorization of the plan to the completion of construction ranges from approximately one to two years. Key considerations regarding implementation are:

- Requires a comprehensive monitoring system to include Electronic Toll Collection, Automatic Number Plate Recognition, Automated Reversible Gate Operation and surveillance cameras to capture toll violators and enforce the toll.

• Utilizing toll revenue for enforcement should be a fundamental element of any operating agreement. The cost of enforcement should also be recovered through fines and administrative fees for failure to pay a toll. Effective enforcement involves a continuum of elements including presence of law enforcement, public education penalties that serve as a deterrence and simple enforcement operations (i.e. single toll).

L.3.6 Governance Considerations

In 2006, METRO announced HOT lane projects were being developed to allow solo drivers to use the HOV lanes by paying a toll. In 2007, the Federal Transit Administration published its policy on HOV to HOT conversions. In 2011, METRO authorized a plan to convert 83 miles of HOV lanes into HOT lanes, on five of its existing HOV corridors. HOT lanes are operated by METRO in agreement with the Texas Department of Transport and remain a non-profit public asset.

Due to the non-profit status of the HOT lanes, revenues will be directed in the first instance to the operation and maintenance of the facility. It has also been stated that revenues may be used to fund future transit expansion.

L.3.7 Equity and Distributional Considerations

From a horizontal equity perspective the implementation of HOT lanes is equitable because it is a user-pay charge. Those who pay for the toll are also the beneficiary. In addition, even those who do not pay for the toll may benefit because of the extra capacity that could potentially be freed up on non-HOT lanes, as a result of greater HOT lane use, carpooling or mode shift to transit.

L.3.8 Overall Efficiency Impact

HOT lanes can generate substantial benefits in terms of travel time savings, reliability and overall network performance, even after accounting for the significant capital, operating and maintenance costs associated with these schemes.44

HOT lane schemes also entail compliance costs, but no material inefficiency costs are expected because users voluntarily opt to pay for avoiding congestion.

L.4 Lessons for Metrolinx

L.4.1 Lessons from Revenue Tool Evaluation

Through the evaluation of HOT lanes as a potential tool for implementation in the GTHA, some key points were identified for consideration by Metrolinx:

44 See earlier reference to cost-benefit studies by Burris and Sullivan (2006).
• HOT lanes are the only revenue tool which can practically guarantee trip time reliability and provide travel time savings for drivers willing to pay for these benefits, while leaving all road users the option not to pay and to travel on the free lanes instead. In other words, HOT lanes are the only revenue tool which improves the choices available to road users without imposing any charges – i.e. the charge is optional.
• There are significant capital costs associated with this tool (though not as much as road tolls) and these costs should be carefully analyzed prior to implementation.
• Planning and design are key elements to consider prior to implementing HOT lanes, as there are significant costs associated with constructing or converting HOT lanes.
• HOT lanes can be a great tool for managing congestion on highways and increasing time savings for road users.

L.4.2 Lessons from Case Study
Several lessons emerge from the case study of the proposed Houston Metro HOT lanes and related research we have conducted for the evaluation of this revenue tool:

• HOT lane projects in the US have been designed primarily to give travelers additional options to avoid congestion. Revenue generation is a secondary objective.
• There have been relatively few cost-benefit analyses of the many US HOT lane projects which are currently in place or underway. However, these benefit-cost studies all indicate that the benefits which accrue to users and society at large are well in excess of the combined social and financial costs of implementing and operating these schemes. These results indicate that HOT lane schemes have the potential to improve the well-being of GTHA residents and the productivity of GTHA firms.
• As in the case of many US HOT lane pilot projects, one or more HOT lane pilots can be introduced for at least a 6-12 month period on congested portions of the GTHA highway network. This could be a sensible course of action prior to determining whether or not to undertake a conversion of the full HOV network to HOT status.
M. **Tool Profile: Highway Tolls**

M.1 **Overview of Tool**

*M.1.1 How the Tool Works and Where it is Being Used*

Highway tolls are a common revenue tool used in a number of jurisdictions globally. Drivers pay a toll per kilometre travelled on a designated road or section of road or for the use of a particular asset such as a bridge crossing or tunnel. Toll rates can either be fixed throughout the day or vary based on the time of day to help reduce congestion.

Highway tolls are used in many jurisdictions globally, including Toronto where Highway 407 is an electronically tolled highway operated by a private concessionaire. Several cities in the United States and Europe also use highway tolls as a key revenue source for funding improvements to their transportation networks. Some examples include the SH 130 (Austin, Texas), the Indiana Toll Road, the Everglades Parkway (Florida), the M1 (Dublin, Ireland), and the M6 Toll Motorway (England).

*M.1.2 How the Tool is Being Considered for Evaluation*

For the purpose of this analysis, it is assumed that tolls would be charged on all 400-series highways and major municipal expressways in the GTHA. This would involve tolling over 450 km of centreline highway in the region. The highways that would be tolled include:

- Highway 400
- Highway 401
- Highway 403
- Highway 404
- Don Valley Parkway (Toronto)
- Highway 409
- Highway 410
- Highway 427
- Gardiner Expressway (Toronto)
- Queen Elizabeth Way
- Lincoln Alexander Parkway (Hamilton)
- Red Hill Valley Parkway (Hamilton)

For the purposes of this analysis, it has been assumed that all highways within the GTHA would be tolled using a fixed rate per kilometre. The 407 ETR is currently operating as a tolled highway. As such, revenues from the 407 are excluded from this analysis. Allen Road in Toronto has been
excluded due to the reduced speeds posted at the southern end of the corridor, but could be included if implemented. Allen Road is 8.3km from Eglinton Avenue to Finch Avenue.

Implementation of the tool would likely be phased as significant infrastructure would need to be put in place to help track vehicle movement prior to collecting any revenues. This can be done through the construction of overhead gantries at all highway interchanges or through the installation of GPS devices on all vehicles in the region. These costs are discussed in the incremental costs section.

M.2 Tool Evaluation Results

M.2.1 Revenue Potential

Highway tolls have the potential to generate significant revenues for Metrolinx and the Province. Preliminary revenue estimates show the potential to generate between $300 million and $500 million annually, rising to between $950 million and $1.5 billion annually in 2021 once the tool has been completely phased in. The reason for the significant increase in revenues between 2014 and 2021 is that there will not be enough time to fully implement highway tolls across the region by 2014. It is assumed that only a portion of the highways will have tolling technology in place by 2014. Then by 2021 all highways in the region will be tolled, maximizing the revenue potential of the scheme.

In addition, a $0.25 per kilometre toll is set as the upper bound rate. This upper bound was determined based on a rough estimate of the applicable range for the estimated demand elasticity for vehicle kilometres driven. It is expected that at a rate greater than $0.25 per kilometre, the demand response may diverge significantly from that implied by the elasticity point estimate used in the dynamic revenue calculation.

Accounting for the capital costs, it is estimated that a $0.10/km highway toll will produce $1.3B - $1.5B in net revenue in 2021.

As with the implementation of most user fees, behavioural adjustments are likely to reduce revenue in the initial period as users become familiar with the tool. Since the highway system within the region is so expansive, it is likely that the implementation of highway tolls will be phased with stretches of highway coming online as the

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<th>Static Revenue (2014) (before adjustments)</th>
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<td>Yield for 1¢ toll</td>
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<th>Upper Bound Rate</th>
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<td>$0.25 / km</td>
<td>$4.6B</td>
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<table>
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<th>Dynamic Revenue – 5¢/km (after behavioural adjustments)</th>
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<tr>
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<td>$300M - $500M</td>
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<th>Net Revenue – 10 ¢/km (including capital and operating costs)</th>
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<td>Rate</td>
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<td>5</td>
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<tr>
<td>Cyclical Variability</td>
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necessary infrastructure is completed. This will mean that revenues in the early years of implementation will likely be ramping up and will not achieve full potential until the medium- or long-term.

However, once the highway system is completely tolled, it is likely that highway tolls will provide a significant source of revenue to Metrolinx and the Province in the long-run. Revenues will vary somewhat over the business cycle to the extent that vehicle kilometres travelled vary with economic activity (assuming fixed toll rates over time).\footnote{Since employment and retail sales vary with the business cycle, this supports the hypothesis that both commuting trips and freight trips will vary over the economic cycle.}

Highway tolls would be a sustainable source of revenue over the long-term, because economic growth is a key driver of vehicle usage. If implemented on all major highways within the region, there are few alternatives for essential travel, which would mean that economic growth would also likely drive the growth of vehicle kilometres on the highway network.

Revenues from highway tolls would be fairly sheltered from changes in the economic cycle since there are few alternatives to highway travel in the region. Both cyclical and structural changes in employment in the region will likely affect the amount of vehicle kilometres travelled in the region. For the purposes of this evaluation, toll rates have been assumed to be fixed rather than dynamic.

The revenue estimates provided are based on the total number of vehicle kilometres travelled on highways within the GTHA. Since highway tolls would be a new tool for the highway network in the region, there is more uncertainty around how much the kilometres travelled on highways in the GTHA will be affected. As a result, a fairly broad revenue estimate has been provided for the tool.

\section*{Incremental Costs}

The incremental costs associated with the implementation of highway tolls would be significant. If it is determined that overhead gantries are the most effective way to track vehicles, the initial construction of tolling infrastructure along all highways in the region will require significant capital investment. Similarly, if GPS devices were used to track vehicle movement within the region, there would be considerable costs associated with the installation of those devices in all vehicles.

In addition to the start-up costs, there will also be a small administrative cost associated with each transaction. Since the Province does not currently operate any tolled highways, all of these costs will be incremental. This does however present the option of involving a private sector toll...
operator who could potentially perform the toll collection activities on behalf of Metrolinx or the Province for a lower cost.

**M.2.3 Impact on Behaviour and Transportation Network Performance**

Instituting highway tolls could significantly improve the overall performance of the transportation network within the region through reduced congestion on all major highways.

In the short term, changes in travel behaviour would lead to fewer vehicle kilometres travelled by encouraging a shifting to other modes (if convenient transit services are available; or car-sharing), regrouping and rescheduling trips as well as suppressing certain trips which users may value less than the toll charge and the auto usage costs associated with the trip. This would also result in associated savings in fuel and auto usage costs, fewer collisions, and less air pollution and carbon emissions. However, there would also be some diversion of shorter trips from the tolled highways to local and arterial roads.

The above changes in travel behaviour would reduce peak-time congestion, particularly at bottlenecks in the highway network, and would result in significant time savings and improved journey time reliability for remaining highway users. This is a particularly important outcome for the GTHA region, where congestion (expressed in terms of delay minutes relative to free-flow conditions) is largely concentrated on highways. Furthermore, reduced congestion on highways can have a positive impact on transit services that operate on highways. For example, the GO 407 service has been very successful and shows tremendous growth.

The improved highway network performance would translate into improved productivity and economic welfare for the GTHA, provided that the sum of the travel time and cost savings, safety benefits and emissions savings exceed the capital, operating and compliance costs arising from the tolling project over the economic useful life of the gantries and other assets used.

In terms of the land-use impact of the tool, it is not clear whether or not highway tolls will have a significant impact on intensification. To the extent that highway tolls make it more expensive to commute between jobs in the city core and suburban residences, this could make it less attractive for people to locate in the suburbs. Should employment shift out to the suburbs, the need for long commutes would be reduced for some employees who live nearby. However, this move may also cause much longer suburb to suburb commutes, or limit the opportunity to access jobs across the

<table>
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<td>Reduction in Traffic Collisions</td>
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<tr>
<td>Air Pollution and Emissions Savings</td>
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Region. As a result, highway tolls may make transit-accessible business locations more attractive (in terms of relative out-of-pocket costs) than those that are only highway-accessible.

We tested several of the above hypotheses with two simulations of the Greater Golden Horseshoe (GGH) network model for 2021: a reference case without the highway tolls which represents our best view of prevailing trip patterns in 2021 without any revenue tools in place; and a simulation with a $0.05/km toll on all provincial and municipal highways in the GTHA. The results of the two runs indicated that our hypotheses are directionally correct, but that the behavioural impacts of the $0.05/km toll may be modest.

The results of the GGH model runs suggest that there would be some significant mode shift to transit and associated decongestion benefits.

**M.2.4 Scheme Design**

The scheme is assumed to include implementing a toll on all 400-series highways and municipal highways within the GTHA (all lanes). Drivers will pay a toll per kilometre for every kilometre travelled on the highways. For evaluation purposes, tolls have been assumed to be charged at a fixed rate per kilometre.

Interoperability with current tolling regimes in the region (e.g., 407 ETR) should also be a consideration when implementing the tool, particularly with respect to the tolling technology.

Time-of-day or peak/off-peak pricing (i.e., two rates only) would help address congestion; more dynamic pricing could reduce the transparency of the scheme. Time-of-day charging can be considered a form of “smart tolling”, because it can address congestion if charges are higher during peak travel times. This has the potential for significant time savings due to congestion reduction on highways, and may lead to increased congestion on arterial roads.

It is likely that tolls would initially be implemented uniformly across the region; once the tool has been in place for an extended period of time, it may be beneficial to adjust tolls (up or down) depending on the traffic volumes observed in the early years. For example, if a particular stretch of highway is continually congested, it may be beneficial to increase the per kilometre toll rate on that stretch of highway to help reduce congestion.

**M.2.5 Technical Implementation Considerations**

Planning and building infrastructure for vehicle monitoring and transaction processing will be costly and take several years. As such it is likely that highway tolls would be implemented in a phased approach across the GTHA in order to facilitate installation of the required tolling technology and public understanding of the charging system.

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<th>Criteria</th>
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<tr>
<td>Ease of Implementation</td>
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<tr>
<td>Time to Implementation</td>
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If highway tolls are implemented across the GTHA, it may be beneficial for a single authority (e.g., Metrolinx) to monitor and collect the toll revenues; this could also reduce the administrative costs associated with collection. Another option is for the Province or Metrolinx to procure a private operator to assist in monitoring and collecting toll revenues as the public sector does not currently perform these functions within the province.

**M.2.6 Governance Considerations**

If highway tolls are introduced as a direct source of revenue for improving public transit within the region, users should have a fairly good understanding of where their money is going. Public education campaigns and clear signage could also help improve the transparency of the scheme.

The use of a dynamic pricing model may have a negative effect on the transparency of the scheme in that drivers may not be familiar with the toll rates being charged at specific periods of time during the day.

Implementing highway tolls in the region will require additional authority from the Province and municipalities in the case of municipally-owned highways (e.g., Section 41 and 116 of the City of Toronto Act require the City to file for regulations to allow them to impose highway tolls). Regulations would also need to be put in place to allow Metrolinx (or municipalities) to charge and collect tolls. Alternatively, the Province could collect the tolls and remit the toll revenues to Metrolinx.

**M.2.7 Equity and Distributional Impacts**

The 400-series highways and major municipal highways within the region are critical routes for trade, commuters and tourists. Few alternatives exist to drivers who are looking to travel long distances within or through the region.

The implementation of the tool is likely to have a broad impact among drivers in the Province that would extend beyond GTHA residents. All users of major highways within the region will be charged for use regardless of vehicle type or number of occupants. The increased cost of using the highways may lead to some drivers choosing alternative routes to avoid paying the tolls. This would likely increase their travel times significantly, particularly if they are travelling long distances.

In terms of equity, all users of the highway system will receive a benefit from the tool through reduced congestion on highways and will share the cost burden. Commuters travelling long
distances with few alternatives for public transit will likely bear a higher proportion of the funding burden, particularly those who rely on highway travel as part of their daily commute to and from work. While the use of the highway system is available to all car owners, tolling the highway system may preclude some low income users from using the highway system and diverting them to the arterial roads which may increase their commute times.

**M.2.8 Overall Efficiency Impact**

The introduction of highway tolls across the GTHA are expected to have a significant positive impact on the productivity and competitiveness of the GTHA region by generating substantial positive changes in travel behaviour and by improving the performance of the road network in the region. The value of these changes in behaviour and road network performance would be expected to exceed the additional capital, operating and compliance costs associated with the toll system, because congestion costs are very high in the GTHA compared to most other urban mega-regions in North America.

The improved performance of the highway network would improve the efficiency of GTHA labour markets (for both workers and employers) as well as that of the goods movement sector within the GTHA.

Over the long-term, additional positive behavioural impacts are likely in terms of encouraging those who live and/or work in the GTHA to adjust the location of their workplaces, residences and amenities in such a manner as to reduce vehicle travel.

As for economic distortions to labour markets and other markets resulting from the tolls, these are likely to be small. Some employers who rely extensively on the GTHA highway network (either for employee access or for goods movement) may relocate outside the region, but this would be at the expense of losing access to the large GTHA labour market. This type of distortion would be partly offset by the benefits of a more efficient and integrated GTHA labour market. By facilitating commuting to work, highway tolling can improve workers’ access to employment opportunities and also provide employers with access to a larger pool of qualified workers. This more integrated GTHA labour market would occur primarily for well-paid jobs. Firms offering relatively low-paid jobs may face greater difficulty attracting workers from distant locations if they cannot easily travel by public transit. However, the positive impacts for relatively well-paid jobs would be expected to outweigh the negative impacts for low-paid jobs. Tolls facilitate high-value trips and penalize low-value trips.

This analysis suggests that a tolling scheme for GTHA highways could generate substantial efficiency gains, provided the toll rate is set sufficiently high to activate the desired behavioural changes.

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M.3 Case Study – Heavy Goods Vehicle Toll (Germany)

M.3.1 How the Tool Works
The Heavy Goods Vehicle (HGV) toll in Germany is levied on all vehicles over 12 tonnes using motorways. The toll rate is based on emission class, number of axles and distance travelled (regardless of country of origin) and varies between € 0.141 (C$ 0.19) per km and € 0.288 (C$ 0.40) per km during 2009.

The vast majority of trips (90%) are captured electronically through On-Board Unit GPS, with 10% captured manually at toll station terminals.

M.3.2 Policy Objectives / Motivation
Revenue generation: supports investment in the national transport network, with funds distributed as follows: 50% road; 38% rail; 12% inland water.

Environmental objectives: to reduce emissions from HGVs and encourage a shift in freight movements to rail and water modes.

User-pay principle: recovering the road infrastructure usage costs imposed by HGVs, which tend to be much higher than for light commercial vehicles.

M.3.3 Revenue Potential and Pricing
Vehicles are rated by Categories A to D based on emissions and axles; toll ranges from C$0.19/km (lowest in Cat A) up to C$0.40/km (highest in Cat D).

Revenue has steadily increased from C$4 B in 2005 to C$6 B in 2010, partly due to an increase in toll rates in 2009.

M.3.4 Impact on Travel Behaviour and Network Performance
Resulted in more efficient use of highway network, with a significant shift to freight rail (7%), a reduction in the number of empty runs (11% below 2005), and a shift to lower emission vehicles.

Increased goods transportation costs have had minimal impacts on final goods prices, with final goods prices rising by less than 0.15% in all cases.\(^{46}\)

M.3.5 Technical Implementation Considerations
Over five years was required for planning and implementation, with enabling legislation passed in 2001 and the first phase of the scheme operational in 2005.

Operating costs have dropped to 12.5% of gross revenue (2010) from 20% in 2005.

Enforcement is based on gantries and stationary and mobile enforcement teams – violation rate is <2%.

**M.3.6 Governance Considerations**

The Federal Office for Goods Transport is responsible for enforcement.

The electronic tolling communications network was delivered by a private consortium (P3).

**M.3.7 Equity and Distributional Considerations**

The HGV toll rates well in terms of horizontal equity, because all highway freight traffic movements are captured. The only consideration with respect to vertical equity is that the HGV toll may apply to some lower-income owner-operators. However, a financial relief program for German truckers was put in place to mitigate the impact of the tolls.

**M.3.8 Overall Efficiency Impact**

The distance-based toll has led to significant efficiency gains for the German motorway network.

**M.4 Lessons for Metrolinx**

**M.4.1 Lessons from Revenue Tool Evaluation**

Through the evaluation of highway tolls as a potential tool for implementation in the GTHA, some key points were identified for consideration by Metrolinx:

- A fixed toll rate per kilometre may be beneficial when introducing the tool to allow users to become familiar with the process of using the toll roads and paying the fee and it may also help make the implementation easier. Phasing in dynamic tolling scheme could then help manage congestion more effectively.
- There are significant capital costs associated with this tool and these costs should be carefully analyzed prior to implementation.
- The results of the GGH model simulations for a $0.05/km toll indicate that the magnitude of the behavioural impacts is limited at this rate. A substantially higher toll rate is likely required to generate the desired magnitude of behavioural impacts and improvements in network performance.
• Implementing highway tolls will take time, and it is important that the strategy for implementation is well thought out prior to incurring significant costs in constructing tolling infrastructure.
• Highway tolls can be a great tool for managing congestion on highways and increasing time savings for road users.
• Some drivers may choose to no longer use highways in order to avoid paying tolls. The spillover of these highway users to arterial roads could have a significant impact on local traffic.

**M.4.2 Lessons from Case Study**

Despite the caution in drawing any lessons from a road toll for heavy goods vehicles, the case study of heavy goods vehicle tolling in Germany shows that:

• Distance-based highway tolls can generate substantial revenue and this revenue is sustainable over the medium term, because gross revenues have risen even before the toll increase was enacted in 2009.

• Germany’s location in the middle of continental Europe makes it a key trade bridge for trucks moving goods between eastern Europe to western Europe. A comparison can be made with Ontario and in particular the Highway 401, which serves as a mid-North American trade route that connects eastern Canada and the US northeast to the US midwest.

• Planning and implementation of such a toll system could easily take 5 years, as it did in this case.
• Satellite-based toll system is feasible on a commercial scale.
• Planning should allow for the tolled network to be modified after introduction in order to address traffic diversions.
• Consider potential for toll rates based on vehicle emissions class. This could be done for a second phase of the scheme, otherwise it may compromise transparency of pricing.
N. Tool Profile: Hotel & Accommodation Levy

N.1 Overview of Tool

N.1.1 How the Tool Works and Where it is Being Used
Dedicated hotel taxes can provide funding for transportation investments needed to improve accessibility and mobility in areas with high tourism and/or business activity. Visitors to the region where the hotel levy is in effect will be charged a fee per night stayed, which will help fund transportation in the region.

N.1.2 How the Tool is Being Considered for Evaluation
For the purpose of this analysis, it is assumed that a levy will be imposed on anyone staying at a hotel or other form of applicable accommodation within the GTHA in the form of a fixed charge per room per night. This levy will be dedicated to infrastructure funding within the region and will be charged per room per night stayed.
Tool Evaluation Results

N.2.1 Revenue Potential

A hotel and accommodation levy is not expected to generate significant revenues and it will be difficult to achieve annual revenues greater than $50 million. For the purposes of generating a revenue estimate from the implementation of a hotel and accommodation levy, a fixed transit fee charged per hotel night has been assumed.

Based on the assumption of 10.4 million hotel nights in the GTHA in 2009, a fee per night of $10.00 could generate approximately $100 million in revenues. A more conservative levy of $2.00 per night could generate between $15 million and $25 million in 2014. Assuming a reduction in the number of hotel nights stayed of -0.50% per year, revenues would remain similar to 2014 levels by 2021.

An estimated upper bound rate of $5 per room-night is expected to yield approximately $50 million. This rate was determined based on a rough estimate of the applicable range for the estimated elasticity of demand for hotel accommodation within the GTHA. It is expected that at a rate greater than $5 per room-night, the demand response of users may diverge significantly from that implied by the point estimate used in the dynamic revenue calculation.

The implementation of this levy would impact all leisure and business visitors to Toronto staying overnight in hotels. A hotel and accommodation levy is likely to be sustainable as a revenue source as it is dependent on the wider global tourism market. It is likely that the GTHA will continue to attract tourists from around the world. However, tourism numbers can be somewhat volatile and revenue amounts could fluctuate year-to-year depending on the economic cycle.

The revenue estimate for this tool is highly dependent on the number of hotel nights stayed in the GTHA. This number was estimated based on national statistics for the number of hotel rooms in Canada (approx. 457,000) and occupancy rates for 2011 (61%). An Ontario estimate was developed based on population and then a GTHA estimate was derived based on the GTHA’s proportion of Ontario’s GDP. As a result, a wide revenue estimate has been provided to account for the margin of error in this process.
N.2.2  Incremental Costs

Incremental costs associated with the implementation of a hotel levy are expected to be minimal as various fees and taxes are already charged per room night. There may be a small incremental cost associated with separating the hotel and accommodation levy from the other nightly charges and remitting the funds to Metrolinx or another provincial agency on a regular basis, but this is not expected to be material.

N.2.3  Impact on Behaviour and Transportation Network Performance

Instituting a hotel and accommodation levy will have no effect on the overall performance of the transportation network. The levy will have no impact on transportation time savings or auto use patterns and will not cause any modal shifts in transportation. In addition, the tool is not expected to have any land use impacts.

N.2.4  Scheme Design

Dedicated hotel taxes can provide funding for transportation investments needed to improve accessibility and mobility in areas with high tourism and/or business activity. This would ensure that visitors to the region where the hotel levy is in effect will contribute a fee for each hotel night stay.

The hotel levy would effectively increase the cost of hotel accommodation across the region in which the scheme is implemented. This has the potential to make the GTHA a marginally less competitive destination for leisure and business travel as the cost of accommodation would increase relative to other destinations. Therefore, the process of setting the fee level will need to take into account trends in tourism charges and taxes particularly for destinations which tend to compete with the GTHA.

Criteria Assessment (1 to 5)

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<td>Air Pollution and Emissions Savings</td>
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N.2.5  **Technical Implementation Considerations**

As various fees and taxes are already charged daily at hotels in the GTHA, such as voluntary destination marketing fees, this scheme can probably be implemented almost immediately after relevant approvals are received without any significant additional collection or administration costs.

The fee would be combined with the collection of other fees and taxes at the time of payment for accommodation. It is expected that collection will be carried out by hotels on behalf of Metrolinx or another government entity.

N.2.6  **Governance Considerations**

The implementation of a new levy will require legislative approval. However once approval has been granted, tracking the revenues collected from the levy and where the money is going should be relatively straight-forward, particularly if a flat fee is used.

It is expected that the levy will be collected by hotel operators on behalf of Metrolinx. The revenues can be then used to fund transportation investment in the region.

If a hotel and accommodation levy is introduced as a direct source of revenue for improving public transit within the region, the room invoice should make explicit reference to the hotel and accommodation levy and hotel customers should be able to obtain information about how their money is being spent. Education and information campaigns can be centred around hotels in order to efficiently target tourists and visitors.

N.2.7  **Equity and Distributional Impacts**

For visitors who are travelling to the GTHA for a specific reason (leisure or business), the only alternatives are to obtain accommodations outside the GTHA or stay with friends/relatives within the region. The availability of alternatives is therefore, limited. All visitors staying at hotels within the GTHA would have to pay the charges.

This tool performs poorly in terms of horizontal equity, as it targets visitors within the region who may not reap the benefits of an improved transportation system beyond the length of their actual stay in the GTHA (or any return visits). Visitors to the region often choose accommodation close to where they will be working/visiting. Additionally,
they may not even be aware that a portion of their nightly fees are going towards transportation funding. The use of a flat daily fee means that all users pay the same amount regardless of the location or type of accommodation. This means that the tool also performs poorly in the vertical equity assessment. Although many low income earners will not be frequently seeking commercial accommodation, those who are staying at less expensive locations will pay a higher proportion of their accommodation costs in fees.

N.2.8 Overall Efficiency Impact

A hotel levy would have a small adverse impact on the productivity and competitiveness of the GTHA region, to the extent that a hotel fee would make the GTHA a marginally less attractive destination for business or leisure tourism, due to increased accommodation costs. This effect may be most relevant for leisure tourism, which tends to be more price-sensitive than business travel.

The economic distortions refer to any changes in consumption patterns arising from the hotel charge. These distortions consist of two effects: (1) any reduction in the demand for hotel rooms in the GTHA compared to other competing leisure and business destinations; and (2) any shift in demand for hotel rooms from the GTHA to areas just outside the region which would not be subject to the charge. The costs associated with these economic distortions could be significant if a relatively high fee is charged (e.g. $4-5/night). For example, visitors who originally intended to stay in the outer-edges of the GTHA could stay instead at hotels outside the region to avoid paying the levy and still be within a relatively short drive of the GTHA.

The scheme would not affect travel behaviour or network performance. Nor would the revenue tool entail any significant incremental costs due to revenue collection and administration.

As a result, the overall efficiency impacts of this revenue tool are likely to be negative, but the magnitude of the adverse impact is likely to be small if the charge is set at a modest level ($2-3/night).

N.3 Case Study – Allegheny County Hotel Occupancy Tax

N.3.1 How the Tool Works

An hotel levy is an example of a sales and excise tax. We examined the Hotel Occupancy Tax (HOT) in Allegheny County, Pennsylvania as part our case study on sales and excise taxes, most of which apply to a very narrow tax base as compared to general sales taxes which apply to a large basket
of goods and services. The HOT consists of a 7% tax levied on the purchase price of a room in the Pittsburgh metropolitan area.

**N.3.2 Policy Objectives / Motivation**

Many states have introduced hotel occupancy taxes as revenue tools, but only a small number are dedicated to transportation uses. The Allegheny County Hotel Occupancy Tax (HOT) raises revenues to fund convention related purposes in support of tourism and business sectors.

**N.3.3 Revenue Potential and Pricing**

Hotel levies are typically only marginal revenue generators. The HOT generated US$24.6M in 2010.

**N.3.4 Impact on Travel Behaviour and Network Performance**

Hotel levies do not have any appreciable impacts on travel behaviour or network performance.

**N.3.5 Technical Implementation Considerations**

Hotel levies are relatively easy to implement, which can usually be achieved within a year following legislative approval. The levies are collected by hotel operators at the point of sale and remittances to tax authorities are made monthly or quarterly, depending on the level of sales.

**N.3.6 Governance Considerations**

Hotel levies such as that introduced by Allegheny County are usually characterized by limited transparency. This is because buyers do not typically receive a detailed breakdown of costs at the time they book their hotel room or order their room although they may well receive a more detailed breakdown on their final bill. Nor are buyers typically aware of the use made of the funds.

**N.3.7 Equity and Distributional Considerations**

Excise taxes such as hotel levies typically rate poorly in terms of horizontal equity, which amounts to the application of the user/beneficiary pays principle, because the revenue generated is not destined to benefit the users in any direct way. However, some hotel levies are in fact used to support local tourism marketing.

In terms of vertical equity, these taxes appear to rank relatively well, because the goods and services subject to these taxes are not essential goods. To ensure the best vertical equity ratings, users should be charged on the basis of ad valorem rather than flat charges, thereby ensuring that users pay more when they purchase higher end car rentals.
N.3.8 Overall Efficiency Impact

Hotel levies are likely to entail much higher efficiency costs than broad-based and country- or province-wide consumer sales taxes, because they are applied to a narrow consumption base (i.e. to very small parts of overall consumer spending) and often to restricted geographic areas. Hence, consumers are likely to be fairly sensitive to changing their consumption patterns in response to these excise taxes, including the value and types of goods and services purchased as well as the locations where they are purchased. These inefficiency costs are likely to lie at the top end of the following range: from $0.12 to $0.38 per dollar of revenue generated. In addition, we would need to add the costs of administering each tax, which are not included in the above estimates and could be significant.

N.4 Lessons for Metrolinx

N.4.1 Lessons from Revenue Tool Evaluation

Through the evaluation of a hotel and accommodation levy as a potential tool for implementation in the GTHA, some key points were identified for consideration by Metrolinx:

- A flat fee structure may be more beneficial when introducing the tool to allow users to become familiar with the process. It will make the process more transparent for users and reduce potential implementation issues. It will also improve Metrolinx ability to monitor revenues by reducing the degree of complexity associated with calculating the revenues due.
- A percentage based scheme would be more equitable but also increases the complexity around revenue tracking (Metrolinx would need to know more than just the number of room nights; rates charged by the hotel can vary depending on promotions, membership of the patron (e.g., reward programs, military status, etc), and other factors).
- The fee will only generate modest revenues for Metrolinx as hotel and accommodation night stays are a very small element of the GTHA’s economic activity.
- The fee could make the GTHA less competitive in the tourism and hotel stay market.

N.4.2 Lessons from Case Study

We can draw several lessons from the Allegheny County Hotel Occupancy Tax and the related case studies on other sales and excise taxes:

- In terms of revenue potential, a hotel levy would generate only modest revenues.
- A hotel levy ranks highly in terms of sustainability, because the tax base tends to rise with economic activity in the long-term.
• Avoid high excise tax rates, which can lead to large distortions in consumption patterns when the tax is applied to a circumscribed geographic area like the GTHA and there is room for avoiding the tax by “shopping” at other locations that are not subject to the tax.
• Apply the levy to as broad a geographic area as feasible in order to mitigate the economic distortions above. This is intended to endure that destinations in the GTHA are not penalized relative those in the rest of Southern Ontario or the province overall.
• Hotel fees are one of the few ways to charge people from outside the region for funding transportation or other infrastructure projects that they use during their stay. However, the negative efficiency impacts from such revenue tools are borne by local businesses and residents, because the local area can become a less attractive destination for tourists and business travel.
O. Tool Profile: Income Tax

0.1 Overview of Tool

0.1.1 How the Tool Works and Where it is Being Used

An income tax used to fund transportation initiatives is similar to an employee payroll tax, except that in addition to employment income, an income tax also includes capital income from investments, income from small businesses in the tax base and other sources.

The tax can be combined with a payroll tax, with the balance of tax due on total income being remitted with the income tax return or alternatively the tax can be remitted through the tax return only. It can be structured either as a flat tax per annum or as a percentage of gross income in a given period.

An income tax would function similar to standard taxation rates applied for Federal and Provincial income taxes through a percentage rate being applied to earnings (including capital gains) after exemptions and deductions. The percentage tax rate would be dependent upon the individual’s personal income level.

0.1.2 How the Tool is Being Considered for Evaluation

For the purpose of this analysis, it is assumed that the income tax would be implemented as a percentage of taxable income and applied uniformly across the GTHA. The levy would be treated similar to other Federal and Provincial deductions (i.e., varying by personal income level).

The income tax is assumed to be remitted to the Province for each payroll period, with the portion of tax revenues dedicated to transportation funding being transferred by the Province to Metrolinx. Any portion of the tax attributable to capital gains will be remitted to the Province annually (as part of an individual’s tax return) and subsequently transferred to Metrolinx for use in transportation funding.
O.2 Tool Evaluation Results

O.2.1 Revenue Potential

An additional income tax has the potential to generate significant revenues within the region. For the purposes of generating a revenue estimate from the implementation of an income tax within the GTHA, a percentage increase in the tax rate has been assumed to be applied to all personal income tax collected in GTHA.

Based on the assumption of approximately $12.8 billion in personal income tax attributable to the GTHA, a tax increase of 0.50% has the potential to generate between $640 million and $740 million by 2014. Using the conservative assumption that income tax revenues will increase at a rate of 3.10% per year, revenues could reach $800 million to $900 million by 2021.

We have not assessed an upper bound rate for the income tax, because there is only a limited literature on the revenue effects of changes in corporate tax rates and this literature is not easily adapted to small jurisdictions such as the GTHA.

The implementation of this levy would impact all employment income-generating residents of the GTHA as well as any person earning capital income in the region. The revenue potential for this tool is higher than a payroll tax due to the inclusion of capital income and investments. Income tax would be a sustainable source of revenue over the long-term because economic growth drives income tax revenues. The revenue would however, vary with the business cycle, especially capital income that increases/decreases with economic growth/contraction.

Capital income is subject to much more discretion than employment income in terms of how, when and where it is recognized. This mobility could lead to significant leakage in capital income tax to outside the GTHA. This leakage is likely to be offset by growth in the GTHA economy.

Revenue estimates for this tool are based on the GTHA portion (as a % of Ontario’s GDP) of the projected personal income tax revenues collected in Ontario in 2014 as per the Provincial budget. The estimate assumed an average personal income tax rate of 9.15%\textsuperscript{47} to determine the approximate tax revenues generated by 1% of the tax rate. A revenue band has been provided to account for the methodology used to estimate the GTHA portion of the personal income tax revenue.

\textsuperscript{47}http://www.cra-arc.gc.ca/tx/ndvdl/s/fq/txrts-eng.html#provincial

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Assessment (1 to 5)</th>
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<tbody>
<tr>
<td>Revenue Potential</td>
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</tr>
<tr>
<td>Sustainability</td>
<td>5</td>
</tr>
<tr>
<td>Cyclical Variability</td>
<td>3</td>
</tr>
</tbody>
</table>
O.2.2 Incremental Costs

Incremental costs associated with the income tax would be minimal as the current taxation infrastructure should be able to accommodate the rate increase or the creation of a new tax category. The additional tax can be lumped together with the current provincial taxes that are already collected annually.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Assessment (1 to 5)</th>
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<tbody>
<tr>
<td>Overall Incremental Costs</td>
<td>5</td>
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</tbody>
</table>

O.2.3 Impact on Behaviour and Transportation Network Performance

An income tax will have no definitive impact on the overall performance of the transportation network. The tax will be imposed on individuals in the GTHA regardless of proximity to the transportation network. People will be taxed regardless of the mode of transport that they use. Therefore, an income tax would provide no incentive to alter commuter habits and would not result in modal shifts or changes in driver behaviour.

As such, there is no time savings benefit anticipated from the implementation of an income tax.

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<thead>
<tr>
<th>Criteria</th>
<th>Assessment (1 to 5)</th>
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<tbody>
<tr>
<td>Overall Impact on Behaviour and Network Performance (simple average)</td>
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<tr>
<td>Impact on Network Performance</td>
<td>2</td>
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<tr>
<td>Time Savings</td>
<td>2</td>
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<tr>
<td>Savings Due to Decreased Auto Use / Fuel Savings</td>
<td>2</td>
</tr>
<tr>
<td>Reduction in Traffic Collisions</td>
<td>2</td>
</tr>
<tr>
<td>Air Pollution and Emissions Savings</td>
<td>2</td>
</tr>
</tbody>
</table>

O.2.4 Scheme Design

This is an income tax that an employer withholds on behalf of their employees and remits to the government. The balance of tax due in the year (such as on capital gains) will be remitted with the income tax return. The tax can either be a flat tax per pay period or as a percentage of gross income in a given period.

A new income tax would be applied similarly to payroll deductions for Federal and Provincial payroll taxes along with a year-end reconciliation.

We have assumed that the incremental income tax will be applied as a proportion of eligible income, as is the case with other income and payroll taxes, but with no cap on eligible income subject to the tax. This would mean that tax payments would be proportional to income.

Alternatively, the income tax can be structured as a flat rate charge which varies by taxable income bracket, as in the case of the Ontario Health Premium contributions (e.g. individuals with taxable income between $25,000 and $36,000 per year pay $300 in OHP premiums per year, while those earning between $38,500 to $48,000 per year are liable for a premium of $450 per year). The total revenue from OHP contributions in all of Ontario was $2.7B in 2009/10 and is expected
to be about $3.1B in 2011/12. This suggests that a similar tax (with similar flat rates) dedicated to transportation could generate $1.6-1.7 billion in $2014 for the GTHA.\textsuperscript{48}

The tax rate (or the flat tax which varies by income range) has the potential to be more distortionary than employer/employee payroll tax because the tax base includes capital income which is very mobile and could easily shift outside the GTHA.

\subsection*{O.2.5 Technical Implementation Considerations}

The scheme infrastructure is already in place as employers already withhold income taxes from an employee’s gross pay and individuals already pay capital gains taxes annually. As such, implementation of the new tax can be achieved with minimal administrative adjustment necessary after the tax legislation is passed by the Province. Currently, provincial income taxes are collected by the Canada Revenue Agency (“CRA”) and remitted to each of the provinces (except Quebec).

The current administrative infrastructure will also allow the tax to be implemented fairly according to the income tax brackets.

\subsection*{O.2.6 Governance Considerations}

Legislative approval will be required to introduce a new tax on income, revenue or profits. If structured as an income tax, it is likely that the tax can be implemented through the Provincial budget.

Important characteristics that will require definition in the proposed income tax will be, for example, who are the exempted parties and what constitutes the location of capital within the GTHA.

The flow of funds will also be an important issue. It is envisaged that employer’s will collect the tax and remit it to the Province as normal. The Province will then pass the tax collected in full to Metrolinx for the funding of transportation initiatives.

The legislative requirement for the introduction of the tax will add clarity to the definition of the tax, including who is liable for the tax and who (or what) is the direct beneficiary of the tax.

\begin{tabular}{|l|c|}
\hline
Criteria & Assessment (1 to 5) \\
\hline
Ease of Implementation & 4 \\
Time to Implementation & 4 \\
\hline
\end{tabular}

\begin{tabular}{|l|c|}
\hline
Criteria & Assessment (1 to 5) \\
\hline
Transparency of Scheme & 1 \\
\hline
\end{tabular}

\begin{tabular}{|l|c|}
\hline
Institutional Features & Y / N \\
\hline
New Revenue Tool? & N \\
Municipal Role? & N \\
\hline
\end{tabular}

\textsuperscript{48} This is based on the following assumptions: 2\% population growth; GTHA representing approximately half of the population of Ontario; and assuming the earnings distribution is the same in GTHA as in Ontario. The latter is a conservative assumption. Higher average incomes in the GTHA would entail higher revenues.
Tracking the revenues collected from the tax and where the money is going could be more challenging as the amount of the contribution per individual will vary based on their personal taxation circumstances (such as their tax bracket).

O.2.7  **Equity and Distributional Impacts**

The inclusion of capital income from investments and income from small businesses means that the income tax will have a greater impact on individuals who invest in the capital markets or who own small businesses, as the tax affects this income in addition to their employment income.

The implementation of the tax could have considerable distributional impacts on the region (e.g., the tax could influence the location decision for small businesses). Investment in the Province and municipal bond markets as well as other capital investments will be impacted as well. Investors can easily decide to invest in other provinces to achieve their desired portfolio spreads. The tax will apply to capital income remittance and so could have a wider economic impact in that it will stifle investment in the wider Canadian economy (as it will tax the economic investment activity of the largest block of Canadians).

In terms of alternatives, the definition of the GTHA could become important, as capital investment may pool in surrounding areas that are not subject to the tax. In addition, employees may choose to be employed outside of the GTHA. However, this is considered unlikely as it is generally not very practical for most people.

In terms of horizontal equity, this tool does not perform very well since anyone paying taxes will be targeted by the tool, regardless of their use of the transportation network. A percentage based tax is seen as more equitable than a fixed amount, as it will take account of varying income levels, particularly if structured similar to other income taxes.

The tax has the potential to reduce the competitiveness of businesses in the GTHA with potential costs associated with reduced work effort or the relocation of businesses outside the GTHA. It may also reduce the attractiveness of the GTHA for potential new businesses and capital investment.

Province-wide implementation would help to mitigate some of these distributional impacts.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Assessment (1 to 5)</th>
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<tbody>
<tr>
<td>Horizontal Equity</td>
<td>2</td>
</tr>
<tr>
<td>Vertical Equity</td>
<td>5</td>
</tr>
<tr>
<td>Availability of Alternatives</td>
<td>1</td>
</tr>
</tbody>
</table>
Overall Efficiency Impact

An income tax would have no user-benefit rationale, but should be considered since transportation infrastructure is partly funded through general tax revenues.

An income tax would entail significant efficiency costs in terms of reduced labour supply and work effort as well as reduced economic activity in the GTHA due to less attractive employment opportunities and increased costs of capital. Employment and capital investment in the GTHA will become inherently less attractive than in surrounding areas (as measured by net of tax earnings and returns to employees and investors). The increased costs could lead to the relocation of some economic activity/capital out of the GTHA. The resulting reduction in economic activity (associated with capital flight or employment relocation) could be a significant cost to the GTHA community.

A 2004 report by the federal department of finance conducted a simulation of the efficiency costs of taxation using a computable general equilibrium model. It showed that an increase in personal income taxes equivalent to 1% of GDP in revenue terms would entail a 1.29% drop in steady state GDP for Canada as a whole. When applied to the GTHA or even to the province of Ontario, this would imply an even larger negative impact on GDP, because the jurisdiction is smaller and hence, there is more room for individual business owners and entrepreneurs to reduce their income tax exposure by changing the location of economic activity.

In addition, the tax is not expected to produce any modal shifts or changes in travel behaviour and as such has no time saving impacts.

Therefore, we conclude that even a small increase in income tax rates applied to the GTHA region would entail significant negative overall efficiency impacts, and a reduction in output for the region. The magnitude of the reduction in GDP terms could exceed the revenue collected.

Case Study

No case study has been undertaken for an income tax dedicated to transportation funding for this paper.

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O.4 Lessons for Metrolinx

O.4.1 Lessons from Revenue Tool Evaluation

Through the evaluation of income taxes as a potential tool for implementation in the GTHA, some key points were identified for consideration by Metrolinx:

- The tax will affect those that are employed or generating income in the GTHA regardless of their use of the transportation network.
- Implementation can be undertaken through the current income tax system, though legislative approval will be required for implementing a new tax.
- A percentage based tax would be more vertically equitable than a flat charge as it takes account of varying income levels. However, it is also possible to introduce a flat rate charge which varies by income band, as in the case of Ontario Health Plan contributions. The latter can also be designed as a proportional tax (i.e. the charge rising proportionately with the income band) or even as a progressive tax (i.e. with the charge rising as proportion of income across each income band).
- The tax has the potential to reduce the competitiveness of businesses in the GTHA due to economic distortions arising from the tax, notably due to the reduction in labour supply, work effort and a relocation of economic activity outside the GTHA. It may also reduce the attractiveness of the GTHA for potential new businesses and investment.
- As it is a tax on total income, there will be scope for tax avoidance as some tax payers will move capital or gains recognition out of the GTHA or the province to avoid the tax.
- It is likely that the tax would have to be applied Province wide to help reduce some of the economic distortions associated with this tool.
P. Tool Profile: Land Transfer Tax

P.1 Overview of Tool

P.1.1 How the Tool Works and Where it is Being Used

A Land Transfer Tax is a method for generating revenues for transportation funding from property owners. The tool works by levying a land transfer tax on homebuyers for purchases of property within a designated area and on the disposition of all beneficial interests. There is currently a Provincial land transfer tax applied to the purchases of properties within the province and the City of Toronto is the only municipality in the province to charge an additional Municipal Land Transfer Tax (MLTT). The City of Toronto has adopted a tiered rate structure that is dependent upon the value paid for the property. The rates for properties containing at least one and not more than two single family residences are:

<table>
<thead>
<tr>
<th>Value of Consideration</th>
<th>MLTT Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to and including $55,000.00</td>
<td>0.5%; plus</td>
</tr>
<tr>
<td>$55,000.01 to $400,000.00</td>
<td>1.0%; plus</td>
</tr>
<tr>
<td>Over $400,000.01</td>
<td>2.0%</td>
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</table>

In some instances, the City of Toronto provides partial exemptions to the MLTT, such as for first-time homebuyers. Since being introduced in 2008, the City of Toronto MLTT has generated gross annual revenues ranging from $165 million in 2008\textsuperscript{50} to an expected $350 million in 2012\textsuperscript{51}.

Several other cities, states and provinces around the world utilize land transfer taxes (or similar variation) as a source of funding. US municipalities such as Chicago, New York, Philadelphia, Washington DC and Oakland charge a MLTT, as do several Australian states, and countries in southern Europe.

P.1.2 How the Tool is Being Considered for Evaluation

For the purpose of this analysis, the land transfer tax is considered to apply evenly across all GTHA property purchases as a percentage of the value of the transaction. This tax would be in addition to the existing Provincial land transfer tax, and the MLTT in Toronto. The increased revenues are assumed to be earmarked for transportation projects and remitted to Metrolinx.


### P.2 Tool Evaluation Results

#### P.2.1 Revenue Potential

A Land Transfer Tax has the potential to yield a significant amount of revenue. It is estimated that if a 1% MLTT is implemented across all of the municipalities in the GTHA and 1% is added to each of the tiered rates in the City of Toronto, approximately $400 million to $500 million could be generated in the GTHA in 2014. Assuming a growth rate in MLTT revenues of 3.50%, there is potential for revenues to reach $520 million to $620 million by 2021\(^2\).

An upper bound rate of Land Transfer Tax dedicated to transportation funding has been identified at 2%. This upper bound rate maintains the validity of revenue estimation approach. Furthermore, it allows for government to use this tax base as a source to fund other services.

While this tool would appear to be a relatively sustainable revenue source, the unpredictability of the housing market (i.e., both number of transactions and housing prices) makes the revenues from this tool more variable over the business cycle than those from a more traditional property tax.

For example, New York MTA’s similar Mortgage Recording Tax declined from $550M in 2007 to $225M in 2011 following the real estate market crash.

#### P.2.2 Incremental Costs

Incremental costs from the implementation of a Region-wide MLTT would be relatively low as the administrative infrastructure currently in place for tracking housing transactions and prices for the Provincial land transfer tax could be leveraged for use in tracking and recovering MLTT revenues.

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\(^2\) This estimate assumes that the number of transactions will remain constant over the forecast period and that housing prices will continue to grow at an exceedingly high rate. The 3.50% growth rate used for the estimate is a conservative assumption that considers the average MLS home price in Toronto from 1995 to 2012.
P.2.3  Impact on Behaviour and Transportation Network Performance

The implementation of an additional land transfer tax would have minimal impact on the overall performance of the transportation network. If the land transfer tax is too high, it could lead to reduced relocation, thereby discouraging GTHA residents to relocate closer to where they work.

Differences in land transfer tax rates between jurisdictions could influence where people choose to purchase homes and develop properties. This could influence where, how far and by what mode they travel. In the short term, a regional land transfer tax may reduce the incentive for homeowners to move within the region or to locations closer to work.

P.2.4  Scheme Design

The scheme assumed for this revenue tool is that a 1% regional LTT rate would be added to each of the tiered rates in the City of Toronto and a separate 1% tax would apply in other jurisdictions. The distributional impacts of this scheme must be taken into consideration, since it would continue to subject Toronto residents and businesses to a higher overall LTT rate, since they already pay a higher rate.

It should be noted that LTT exemptions exist for first-time homebuyers with a value of a purchase under $400,000 in the City of Toronto and $227,500 provincially. It was assumed for analysis purposes here that similar exemptions would be in place for the GTHA Land Transfer Tax.

Consideration should be given to potential adverse impacts of differential rates between tiers or perverse incentives that could favour low density development by assigning lower marginal rates to developments with lesser value.

P.2.5  Technical Implementation Considerations

Currently, Teranet is collecting the LTT for the City of Toronto and the Province of Ontario. Using the system currently in place means that the implementation of the LTT is relatively straight forward.
P.2.6 Governance Considerations

It is important to clearly communicate that proceeds from this revenue tool would be dedicated to new transit and transportation infrastructure in the region.

The transparency of the scheme may be limited as different entities are responsible for setting tax rates, collecting taxes and allocating revenues. In addition, if the proposed tax revenues are pooled, it may be difficult to determine if each of the municipalities is receiving a commensurate level of benefit.

P.2.7 Equity and Distributional Impacts

The LTT may have a relatively larger effect on the mobility of the less affluent. According to a 2008 study on the Toronto LTT, the tax caused a greater reduction in transaction values for houses below average value².

Although property purchasers are paying the tax, property sellers may bear some of the LTT burden, as demonstrated by the dampening effect LTT appears to have had on property sale prices in the six months after the City of Toronto LTT was implemented.⁵³

P.2.8 Overall Efficiency Impact

In relation to the potential revenue raised, imposing a regional land transfer tax may generate costs due to economic distortions, particularly in the short term. Imposing a regional land transfer tax may entail an efficiency loss arising from reduced incentives for residents to move, reduced property transaction volumes and prices, and changes to real estate development decisions. While an ordinary property tax will have similar effect on property prices, it does not discourage mobility.

Recent studies⁵⁴ indicate that in the six months after the Toronto LTT was imposed, there was evidence of

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<th>Criteria</th>
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<tr>
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<tr>
<th>Institutional Features</th>
<th>Y / N</th>
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<tbody>
<tr>
<td>New Revenue Tool?</td>
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<tr>
<td>Municipal Role?</td>
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<thead>
<tr>
<th>Criteria</th>
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<tr>
<td>Impact on Travel Behaviour and Network Performance</td>
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</tr>
<tr>
<td>Costs of Economic Distortions</td>
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</tr>
<tr>
<td>Overall Incremental Costs</td>
<td>5</td>
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</table>

decreased mobility for residents and reduced selling prices of houses relative to adjacent areas not subject to the tax. Reduced mobility means families will be more likely to remain in houses that are not appropriate for their needs, or are too far from their workplace or school. The study estimated that the value of this lost mobility is about $1 for every $8 in tax revenues generated for Toronto.

Furthermore, since the MLTT would likely reduce the number of transactions and average housing prices, it would therefore have a negative impact on the Provincial land transfer tax revenues collected. Theseforgone provincial revenues could result in a marginal reduction in provincial services or a marginal increase in some other provincial tax.

Compared to a Toronto-only implementation, applying an LTT on a GTHA basis may offset some of the impact on mobility, prices and development decisions. Given that a LTT is not likely to spur discernible transportation benefits, it is expected that the overall efficiency impact from LTT would remain negative.

P.3 Case Study

No case study has been undertaken of land transfer tax for this paper.

P.4 Lessons for Metrolinx

P.4.1 Lessons from Revenue Tool Evaluation

Through the evaluation of Land Transfer Tax as a potential tool for implementation in the GTHA, some key points were identified for consideration by Metrolinx:

- The LTT can yield significant revenue, which can grow and be sustainable over the long term.
- However, because the tax base is sensitive to the cycles in the housing market, annual revenues could vary from year to year.
- The LTT has some impact on land use, but is not expected to create measurable modal shifts and impact vehicle use.
- The LTT may entail some economic distortion costs by reducing the housing mobility of residents. For example, it would reduce the ability of households to relocate, possibly meaning they would remain in houses inappropriate or poorly located to meet their needs.

55 Sand in the Gears: Evaluating the Effects of Toronto’s Land Transfer Tax, December 2008

56 Ibid.
• Coordination between the Province / Metrolinx and the municipalities would be required for implementation.
Q. Tool Profile: Land Value Capture

Q.1 Overview of Tool

Q.1.1 How the Tool Works and Where it is Being Used

Land value capture (LVC) is designed to capture a one-time gain in property values associated with a decision to locate a transit station in the vicinity. Developments around transit stations benefit from greater accessibility and often lead to increased property values.

Attempts by public authorities to capture some of the land value uplift from a new transit investment can take the form of developer contributions, paid either up-front or as periodic contributions over the duration of a project. The potential for increased property values from transit investments is also makes these properties more attractive to developers and investors.

In Toronto, voluntary contribution agreements have been contemplated as a form of LVC for the Yonge Subway extension. Some other examples of LVC are Alexandria's Potomac Yard Metrorail Station in Virginia and Portland's Airport MAX extension in Oregon.

Q.1.2 How the Tool is Being Considered for Evaluation

Land value capture presents an opportunity to capture revenues as a result of joint ventures with land owners and developers looking to create high-value developments. This can be done in one of two ways:

- Inducing development on land currently owned by Metrolinx along transportation corridors; or
- Through a specific delivery agreement with local municipalities in developing privately owned land along key transit corridors. By doing this, Metrolinx can share in the revenues realized by the developer through the sale of new units.
Q.2 Tool Evaluation Results

Q.2.1 Revenue Potential

The revenue generation potential from land value capture can vary considerably depending on the type of transit investment and the size, location and type of developments located in the vicinity (e.g. offices, residential, mixed retail/residential). Each transit facility investment should be evaluated to assess the likely land value uplift in its proximity and the potential for extracting some of that value for the public sector. It is not a funding mechanism that can be used without a specific project in mind. Nor is it expected that this tool would be a significant revenue generator.

For example, since 1973 the Washington Metropolitan Area Transit Authority (WMATA) has implemented a land development program based on both owning and developing land around stations and capturing revenues on non-WMATA owned land with direct connections to Metrorail stations.\textsuperscript{57} WMATA has reported $150M in value captured through joint development activities over approximately 15 years. In addition to one-time uplift capture, WMATA also captures annual rental revenues from developed properties. For example, in the 2011/2012 fiscal year WMATA reported revenues of $20M from real estate rentals.\textsuperscript{58} Metrolinx is currently exploring asset maximization around stations, potentially in a similar scheme as WMATA has implemented.

The implementation of LVC would impact owners of property in the LVC-designated areas. Revenues are not sustainable over the long-term as there is a limit to the amount of developable land in the region, particularly along transit corridors.

In addition, the revenues from LVC will be highly variable due to the fact that they are linked to specific developments.

The table below illustrates several examples of the uplift in property values which may benefit a developer in the GTHA as a result of locating a rail station within a half mile of the development in question. Assuming that a quarter of the land value uplift can be captured, this would yield one-time revenues between $78/SF for a downtown office development.

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<tr>
<th>Criteria</th>
<th>Assessment (1 to 5)</th>
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<tbody>
<tr>
<td>Revenue Potential</td>
<td>2</td>
</tr>
<tr>
<td>Sustainability</td>
<td>1</td>
</tr>
<tr>
<td>Cyclical Variability</td>
<td>1</td>
</tr>
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</table>


\textsuperscript{58} WMATA Financial Statement 2011/2012 http://www.wmata.com/about_metro/docs/WMATA_FS_FINAL.pdf
through to $1.5/SF for a suburban real estate complex. These are sample values which developers
should be willing to contribute to an LVC, while ensuring that the developments remain attractive
investments.

<table>
<thead>
<tr>
<th>Public Value Capture Illustrations for the GTHA ($ / SF)</th>
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<tr>
<td></td>
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<tr>
<td>----------------</td>
</tr>
<tr>
<td>Land value without rail service</td>
</tr>
<tr>
<td>Land value with rail service</td>
</tr>
<tr>
<td>Increase in supportable land value</td>
</tr>
<tr>
<td>Public value capture (based on 25% capture rate)</td>
</tr>
</tbody>
</table>

Source: AECOM analysis "Residual Land Value and Development Value Impact of Rail Investment" 22 March 2012

Q.2.2 Incremental Costs

Incremental costs associated with implementing the land value capture tool could be significant in administrative terms. This is because any implementation must be specific to a designated property.

There will also be legal costs associated with developing the contracts that Metrolinx or the regional transit authorities will be entering into with the private developers and investors.

Q.2.3 Impact on Behaviour and Transportation Network Performance

The implementation of the land value capture tool is not expected to have any impact on the overall performance of the transportation network.

If the proportion of land value appreciation attributed to transit initiatives is too high, it could lead to reduced real estate development in the region as developers may not view these types of developments as being profitable.

If LVC can be implemented successfully, it could lead to more intensive land uses by making it less profitable for owners to withhold land for speculative purposes. In

Criteria                     | Assessment (1 to 5) |
-------------------------------|---------------------|
Overall Incremental Costs     | 3                   |

Criteria                     | Assessment (1 to 5) |
-------------------------------|---------------------|
Overall Impact on Behaviour and Network Performance (simple average) | 2 |
Impact on Network Performance | 2 |
Time Savings                  | 2 |
Savings Due to Decreased Auto Use / Fuel Savings | 2 |
Reduction in Traffic Collisions | 2 |
Air Pollution and Emissions Savings | 2 |

59 Slack (2002: 19) indicates that “the landowner probably either realizes the opportunity cost of holding the land vacant by putting it to more profitable use or sells it to someone who will”.

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the long term, the transportation infrastructure improvement could lead to positive impacts on network performance as more people and businesses locate closer to the transit system and thereby increase usage. However, it is the transportation infrastructure improvement and not the LVC tool per se that is directly responsible for the increased development.

Q.2.4 Scheme Design

Land value capture attempts to capture a portion of the increase in property values associated with improvements to the transportation infrastructure and associated services. The premise behind the tool is that developments around transit stations create a windfall gain for the property owners and that this gain should be used to fund the infrastructure improvement. In other words, the beneficiaries of the transit investment should contribute to its funding.

There are several mechanisms that can be used to extract the incremental value, including:

- requiring the developer to provide facilities, cash or infrastructure
- through a tax on the commercial revenues generated by the property
- from a property tax on the incremental value of the property

It is essential that the tax or contribution requested from the developer not exceed the incremental value due strictly to the transportation infrastructure improvement, otherwise the development opportunities will be compromised.

Q.2.5 Technical Implementation Considerations

This tool can be implemented in the GTHA through joint ventures with land owners and developers looking to create high-value developments. Implementation will be difficult as each property will have unique characteristics that need to be addressed. Care must be taken to estimate the expected value uplift to the property by isolating the change in value due to the nearby transit infrastructure investment from other market forces that affect property values. Failure to isolate this value could lead to a land value capture tax that taxes past increases in land values which may have already been paid for by the new owners. This would distort the value of the land and likely delay development.

In addition, zoning changes may be required to ensure that the property in question can realize its full incremental value. As well, a mechanism needs to be selected in order to extract the highest possible portion of the incremental value while leaving the property owners sufficient incentive to develop the property in the desired timeframes. Depending on the mechanism used, there may also be negotiations and contracts to execute with the owner.

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60 Kitchen (2008: 42).
Q.2.6  Governance Considerations

The introduction of land value capture may require regulatory approvals on a site-by-site basis.

Implementing this tool will require Metrolinx, or an intermediary government entity, to establish upfront procedures and a mechanism to engage with developers and owners and administer the revenue collection. The amount of the LVC dedicated to funding transit initiatives should be relatively easy to identify and track.

It is easy to draw a connection between increased property values and the proximity to new transit initiatives. Property owners should have a fairly good understanding of this connection and why the increased property value derived from the transit is being used to fund this initiative.

Q.2.7  Equity and Distributional Impacts

Evaluating the equity and distributional impacts requires an initial recognition that the incremental property value subject to an LVC instrument is a windfall gain (also known as a “rent” in economic terms). Since the beneficiary of the windfall is being asked to give up a portion of the gain, there is no adverse impact either on horizontal or on vertical equity. However, by the very nature of the tool, some geographic locations within the region will bear a higher funding burden when compared to other areas and groups. Owners and developers of properties within the targeted areas will not have many alternatives to the land value capture process, other than selling (realizing their gain) and moving their development activities outside the targeted area.

The LVC agreements or special tax assessments will need to be structured appropriately to ensure that only the portion of incremental land value attributable to the transportation improvements is captured. Otherwise, there would be a disproportionate impact on these properties. This tool is not expected to have any effect on the location of economic activity other than the potential for more developments around transit hubs and corridors.

Q.2.8  Overall Efficiency Impact

The overall efficiency impact of the LVC tool is positive if it is used where justified – i.e., on a developments which benefit from windfall gains due to their proximity to new transit facilities. The rationale is that the LVC is designed to capture a positive externality (i.e., the windfall gain) and use it to fund the infrastructure project that is creating that externality. Failure to capture this gain could, in principle, lead to the under provision on such transit investments.
The LVC tool per se (as opposed to the transit investment) has little impact on travel behaviour or network performance, as discussed earlier. Nor does it have any significant impacts in terms of economic distortions, because the LVC tool is designed to extract a windfall gain and hence, it should not alter developer incentives. In practice, attempts to extract the value uplift can lead to some distortions if the incremental value is not correctly identified and isolated from other market influences on property value. However, there can be some incremental costs to implementing an LVC tool, because this is by its nature a bespoke exercise which must be carried out on each parcel of land which is subject to the infrastructure-induced windfall gains.

Therefore, the overall impact of the LVC tool is to improve the efficiency of public funding for the region by reducing the cost of developing public transportation infrastructure.

**Q.3 Case Study**

*No case study has been undertaken of land value capture for this paper.*

**Q.4 Lessons for Metrolinx**

**Q.4.1 Lessons from Revenue Tool Evaluation**

Through the evaluation of LVC as a potential tool for implementation in the GTHA, some key points were identified for consideration by Metrolinx:

- LVC is not a funding mechanism that can be used without a specific project in mind.
- Each major transit investment should be evaluated to assess the likely land value uplift in its proximity and the potential for extracting some of that value for the public sector.
- Revenue is not sustainable over the long-term, because the LVC is designed to capture a one-time gain. Moreover, there is a limit to the amount of developable land in the region, particularly along transit corridors.
- The initial implementation may be costly in terms of time and administrative effort, because each LVC tool needs to be adapted to the circumstances of the particular property in question – otherwise, it is not possible to limit the LVC to the extraction of the designated windfall gain.

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<thead>
<tr>
<th>Criteria</th>
<th>Assessment (1 to 5)</th>
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<td>Costs of Economic Distortions</td>
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<tr>
<td>Overall Incremental Costs</td>
<td>3</td>
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</table>
• Land value capture is a modest revenue tool which should be used on a project-by-project basis to generate funding.
• If structured properly, LVC effectively funds infrastructure initiatives by drawing on the land value uplift created by the project.
R. Tool Profile: New Vehicle Sales Tax

R.1 Overview of Tool

R.1.1 How the Tool Works and Where it is Being Used

A new vehicle sales tax is a fee paid by owners of new vehicles at the time of first registration. The fee is charged at registration rather than at the time of sale, since purchasers would otherwise have an incentive to buy new vehicles in other jurisdictions.

New vehicle taxes are currently used in any states across the US, including in Connecticut, Iowa, Kansas, Maryland, Michigan, Minnesota, Missouri, North Carolina, Nebraska, Oklahoma, South Dakota, and Virginia, as well as in Denmark. However, in some of the US states above, such as Minnesota, the new vehicle sales tax is applied instead of the general retail sales tax. In Canada, both new and used vehicles are subject to the broad-based federal and provincial sales taxes.

R.1.2 How the Tool is Being Considered for Evaluation

For the purpose of this analysis, a percentage based tax is assumed to be levied on the purchase price of the vehicle at the time of registration on all new vehicles registered in the GTHA. This would be a one-time levy and unlike the vehicle registration fee, is not collected annually.

The fee is assumed to be collected by the Province along with the initial vehicle registration charges and subsequently remitted to Metrolinx for use in transportation funding.
R.2 Tool Evaluation Results

R.2.1 Revenue Potential

A new vehicle sales tax is not expected to be a significant source of revenue as it will be difficult to achieve revenues greater than $100 million per year. For the purposes of generating a revenue estimate from the implementation of a new vehicle sales tax, a percentage tax rate was assumed to be applied to all new vehicle purchases within the GTHA.

Based on the assumption of approximately 278,000 new vehicle purchases in the GTHA in 2010, a 1.00% new vehicle sales tax could generate revenues between $65 million and $75 million in 2014. Assuming that new vehicle purchases will increase annually at a rate of 0.67%, revenues could potentially reach $70 million to $80 million by 2021.

A new vehicle tax rate of 1.00% has been estimated as the upper bound rate for this tool. This upper bound was determined based on a rough estimate of the applicable range for the estimated price elasticity of demand for vehicles. It is expected that at a rate greater than 1.00%, the demand response of users may diverge significantly from that implied by the point estimate used in the dynamic revenue calculation.

The implementation of this tax would impact all drivers purchasing new vehicles who reside within the GTHA. The sustainability of this option depends on the magnitude of the tax. If it is relatively low (e.g. 0.5%), vehicle sales trends are unlikely to be impacted significantly. Major durable goods purchases such as new vehicle sales are also fairly sensitive to economic conditions which would result in a variation in revenues from year to year.

Implementing this tool may have an effect on the number of new vehicles purchased, but not necessarily the number of cars on the road. It is unlikely to have a major impact on vehicle use.

Revenue estimates for this tool have been developed using the number of new vehicles sold in Ontario in 2010 (Stats Canada) and the average cost of a new passenger vehicle ($25,259). An approximation for the number of vehicles sold in the GTHA was estimated based on the GTHA’s portion of Ontario’s population. As such a revenue band has been included to reflect this estimate.

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<th>Static Revenue (2014) (before adjustments)</th>
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<td>Yield for 1% tax</td>
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<th>Upper Bound Rate</th>
<th>Annual Yield from Upper Bound Rate</th>
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<tr>
<td>1% of vehicle purchase price</td>
<td>$72M</td>
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<th>Dynamic Revenue – 1.00% of vehicle value (after behavioural adjustments)</th>
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<td>2014</td>
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<td>$65M - $75M</td>
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<td>Revenue Potential</td>
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<td>Sustainability</td>
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<tr>
<td>Cyclical Variability</td>
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</table>
R.2.2 Incremental Costs

Incremental costs associated with implementing a new vehicle sales tax would be minimal as payment and collection mechanisms already exist for registering vehicles. This tool leverages the existing systems and vehicle registration procedures. These fees would simply be an additional levy added to the initial registration of new vehicles.

There may be some incremental administrative costs associated with processing the collection of the new tax and remitting to Metrolinx; however, these costs are not expected to be significant.

R.2.3 Impact on Behaviour and Transportation Network Performance

Instituting a new vehicle sales tax is not expected to have any material impact on the performance of the transportation network. While there may be a slight reduction in the number of new vehicles purchased, the actual number of cars on the road is expected to remain relatively stable.

Additionally, the tax is likely to have little to no material impact on travel behaviour and will not generate any time savings or fuel and emissions savings. However, it could potentially entail marginal adverse emissions effects if some consumers delay their purchase of new and more fuel efficient vehicles. The latter effect can be mitigated by applying the vehicle sales tax to both new and used vehicles.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Assessment (1 to 5)</th>
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<tbody>
<tr>
<td>Overall Impact on Behaviour and Network Performance (simple average)</td>
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<td>Impact on Network Performance</td>
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<td>Time Savings</td>
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<td>Savings Due to Decreased Auto Use / Fuel Savings</td>
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<tr>
<td>Reduction in Traffic Collisions</td>
<td>2</td>
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<tr>
<td>Air Pollution and Emissions Savings</td>
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</table>

R.2.4 Scheme Design

A new vehicle sales tax is a fee paid by owners of new vehicles at the time of first registration. The fee is expected to be collected by the Province and subsequently transferred to Metrolinx.

This tax would vary with vehicle sales prices and, if set too high, could cause consumers to delay purchases, or alternatively purchase used vehicles. The higher the tax, the more likely customers will be to look into alternatives such as purchasing a used car.

While this evaluation only considers applying this levy to new vehicles only, applying it to all vehicle purchases (new and used) would minimize economic distortions, such as discouraging the purchase of new, more fuel-efficient vehicles in favour of used car purchases to avoid the tax.
Moreover, if the tax is charged upon registering the vehicle, it will be difficult for residents of the GTHA to avoid paying the fee without using an address from outside of the region.

R.2.5  Technical Implementation Considerations
The Province would collect the tax from consumers as part of their existing vehicle registration procedures. The tax can be implemented almost immediately after receiving the necessary approvals and costs should be minimal as collection will be through payment mechanisms that already exist. There will be a minimal amount of time required to update new vehicle registration protocols.

R.2.6  Governance Considerations
Regulatory approvals will be required before implementing a new vehicle sales tax, though the type of approval required depends on whether it is structured as a tax or a fee. A new sales tax would require Provincial approval, while if it were structured as an additional fee charged upon registering the vehicle, the municipalities could potentially provide approval. It is possible to explicitly state that the tax will go toward improving transit within the region to reduce potential opposition during the approvals process.

The fee would be collected by the Province and transferred to Metrolinx, and should be able to be integrated with the existing vehicle registration system. The new tax can be included as part of the sales tax charged on the vehicle at the time of purchase and collected directly by the Province.

R.2.7  Equity and Distributional Impacts
The availability of alternatives to this tool is limited. GTHA residents purchasing a new vehicle would not have a choice but to pay the tax. The alternatives include purchasing a used vehicle, not owning a vehicle at all, or purchasing and registering a new vehicle outside of the GTHA region.

This tool would provide transportation funding to the region by targeting users of the road network (although limited to purchasers of new vehicles). While these users should be contributing to the improvement of the transportation network, the tool is also targeting a specific segment of the population: new vehicle purchasers. If the tool is applied to both new and used cars, as we recommend in section R.2.8.
below, it would rank highly in terms of horizontal equity, because the tax would not single out a particular group of vehicle owners.

The tool would also rank highly in terms of vertical equity, because buyers of higher-value vehicles would pay more under this ad valorem tax.

**R.2.8 Overall Efficiency Impact**

This revenue tool would have negative overall efficiency impacts due to significant costs from economic distortions likely to result from the tax. There would be no material impact on travel behaviour or network performance nor any incremental capital, operating or compliance costs from implementing the tool.

The application of the tool to new vehicle sales would distort consumer purchases between new vehicles and used vehicles (especially used vehicles purchased in the last year or two). This effect can be avoided by applying the revenue tool to both new and used vehicles at the time of initial registration.

Some economic distortions would remain even if the tax is applied to both new and used vehicles (e.g. some incentives to shift purchases and vehicle registrations to outside the GTHA), but these would be much smaller.

**R.3 Case Study – Minnesota Motor Vehicle Sales Tax (MVST)**

**R.3.1 How the Tool Works**

We examined the Motor Vehicle Sales Tax (MVST) in Minnesota as part our case study on sales and excise taxes. The MVST is a 6.5% tax on sales of the majority of new and used vehicles in Minnesota.

**R.3.2 Policy Objectives / Motivation**

Twelve states have vehicle sales tax revenues dedicated to transportation, of which Minnesota is one. The Minnesota Motor Vehicle Sales Tax (MVST) was not originally intended for transportation funding but has evolved to become a key source of funding for the sector.
R.3.3  Revenue Potential and Pricing

Vehicle sales taxes can be important revenue generators, as in the case of the MVST, which was expect to generate US$252M in 2012. However, the revenue yield has been declining since 2006, suggesting that it is sensitive to the business cycle.

R.3.4  Impact on Travel Behaviour and Network Performance

The most likely behavioural effects for sales and excise taxes on a narrow consumption base are largely unintended (from a policy perspective) and involve shifting purchases to lower-value items, such as lower-value vehicles, which may not mean lower-emission vehicles. Yet, the largest inefficiency costs are associated with shifting purchases to non-taxed or lower-taxed jurisdictions.

R.3.5  Technical Implementation Considerations

Vehicle sales taxes are relatively easy to implement, which can usually be achieved within a year following legislative approval. These sales taxes are collected by dealerships or when the (used) vehicle is registered. The remittances to tax authorities are made monthly or quarterly, depending on the level of sales.

R.3.6  Governance Considerations

The MVST was enacted by the Minnesota legislature and will be dedicated entirely to transportation uses as of fiscal year 2012, with the revenues split 60/40 between the highway fund and public transit.

A sales tax such as the MVST is characterized by some degree of transparency if it is visible to buyers. (Note that not all sales taxes are equally visible). However, the buyers may not be fully aware of the use made of the funds.

R.3.7  Equity and Distributional Considerations

Sales taxes such as the MVST usually rate poorly in terms of horizontal equity, which refers to the application of the user/beneficiary pays principle. However, the MVST is an exception in that the revenue generated is destined to the transportation sector.

In terms of vertical equity, these taxes appear to rank relatively well, because the goods and services subject to these taxes are not essential goods. To ensure the best vertical equity ratings, users should be charged on the basis of ad valorem, as in the case of the MVST, thereby ensuring that users pay more when they purchase higher end goods and services.
R.3.8 Overall Efficiency Impact
Sales taxes such as the MVST are likely to entail much higher efficiency costs than broad-based and country- or province-wide consumer sales taxes, because they are typically applied to a narrow consumption base (i.e. to very small parts of overall consumer spending) and often to restricted geographic areas. Hence, consumers are likely to be fairly sensitive to changing their consumption patterns in response to these excise taxes, including the value and types of goods and services purchased as well as the locations where they are purchased. These inefficiency costs are likely to lie at the top end of the following range: from $0.12 to $0.38 per dollar of revenue generated. In addition, we would need to add the costs of administering each tax, which are not included in the above estimates and could be significant.

R.4 Lessons for Metrolinx

R.4.1 Lessons from Revenue Tool Evaluation
Through the evaluation of a new vehicle sales tax as a potential tool for implementation in the GTHA, some key points were identified for consideration by Metrolinx:

- Implementing this tool may have an effect on the type of new vehicles purchased, but not necessarily the number of cars on the road.
- A new vehicle sales tax would be a modest revenue generator for Metrolinx, although this is less so if used vehicles are included as well.
- The revenue tool is not expected to have a any impact on the performance of the transportation network.
- To minimize the costs of economic distortions, the tool should apply to both new and used vehicles and it should apply to as broad a geographic area as possible.

R.4.2 Lessons from Case Study
The overview of excise and other sales taxes (i.e. taxes on specific goods and services rather than broad-based sales taxes) included a case study on the Minnesota motor vehicle sales tax. We can draw several lessons from this case study and the other case studies on excise and sales taxes, which are applicable to the extent that they also apply to a relatively narrow tax base:

First, in terms of revenue potential, these tools tend to generate modest revenues. However, applying the tax to used vehicle transactions would make this a more significant revenue generator.
Additional lessons follow:

- These revenue tools rank highly in terms of sustainability, because the tax base tends to rise with economic activity in the long-term.
- Avoid high excise tax rates, which can lead to large distortions in consumption patterns when the tax is applied to both a narrow consumption basket and to a circumscribed geographic area like the GTHA. This is the case even if both new and used vehicles are included in the tax base. There is room to avoid the tax by “shopping” at other locations that are not subject to the tax.
- Apply the tax to as broad a geographic area as feasible in order to mitigate the economic distortions above. Ideally this would mean an Ontario-wide tax base. However, should that not be feasible, Metrolinx should envisage including municipalities adjacent to but outside the GTHA (even if the tax is applied at a lower rate in those municipalities).
S. Tool Profile: Parking Sales Tax

S.1 Overview of Tool

S.1.1 How the Tool Works and Where it is Being Used

A parking sales tax on paid parking transactions is a commonly used tool to generate revenue. While a sales tax is typically included in the price of parking, a parking sales tax can be imposed in addition to these taxes with the proceeds being dedicated to transportation funding.

In Vancouver, TransLink implemented a 7% parking sales tax that generated approximately $15M in 2008. This rate has since been increased and is currently 21%. Parking Sales Taxes also exist in Seattle, Baltimore, Washington DC, Los Angeles, New York City, Chicago, Miami, Philadelphia, San Francisco, and Pittsburgh.

S.1.2 How the Tool is Being Considered for Evaluation

For the purpose of this analysis, it was assumed that an additional parking sales tax would be charged on all paid non-residential, off-street parking within the GTHA. It is expected that the tax would be collected through existing parking sales tax systems. On-street parking has been excluded from the analysis, because on-street meter spaces exist to allocate scarce resources through a pricing mechanism.62

Although a sales tax is already levied on paid parking through the HST, a parking sales tax would be in addition to the HST and the revenue would be designated for transit infrastructure. Proceeds from the new tax would be submitted to the Province by parking operators as part of their sales taxes and then remitted to Metrolinx.

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S.2 Tool Evaluation Results

5.2.1 Revenue Potential

A parking sales tax has the potential to generate modest revenues within the region. However, revenues are limited because this tool only captures revenues from non-residential, off-street charged parking and the majority of parking in the region is non-charged. For the purposes of generating a revenue estimate from the implementation of a parking sales tax within the GTHA, a percentage increase in the sales tax charged on parking has been assumed. This sales tax would be implemented as an additional cost above the current taxes charged on parking.

Based on the assumption (as outlined below) that there are approximately 330,000 charged parking spaces in the region, a 1% increase in the parking sales tax would generate approximately $8 million in revenues. A 5% increase in the parking sales tax (which is more in line with the parking sales tax rate originally implemented by TransLink in Vancouver) has the potential to generate approximately $30 million to $50 million in 2014 and approximately the same amount in 2021 (using a 0.50% growth rate in car park spaces per annum). Similarly, a 10% parking sales tax could generate approximately $50M to $75M in revenues in 2021.

Further, if an upper bound rate of 25% is used, there is the potential to generate about $200 million per year. This upper bound was determined based on a rough estimate of the applicable range for the estimated price elasticity of demand for parking. It is expected that at a rate greater than 25%, the demand response of users may diverge significantly from that implied by the point estimate used in the dynamic revenue calculation.

The implementation of the parking sales tax would impact all parking space users who currently pay for parking within the GTHA. A parking sales tax is a relatively sustainable source of revenue over the long term as the increase in price associated with the tax is marginal. Increased parking prices could lead to a modal shift toward public transit to avoid the extra cost of parking; however, drivers who currently pay for parking are unlikely to be significantly affected by the marginal increase in price.

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<tr>
<th>Criteria</th>
<th>Assessment (1 to 5)</th>
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<tbody>
<tr>
<td>Revenue Potential</td>
<td>2</td>
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<tr>
<td>Sustainability</td>
<td>4</td>
</tr>
<tr>
<td>Cyclical Variability</td>
<td>3</td>
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</table>
Estimating the number of charged parking spaces in the region proved to be challenging as this type of information is not readily available. A Toronto Parking Authority study conducted in 2006 indicated that there were approximately 180,000 charged, non-residential, off-street parking spaces in Toronto; including:

- 20,000 off-street Toronto Parking Authority spaces;
- 100,000 in commercial facilities;
- 20,000 operated by universities;
- 20,000 operated by hospitals; and
- 20,000 other destination based spaces (e.g., Woodbine race track, Ontario Place, the Toronto Zoo, etc.).

A recent analysis performed by Metrolinx that used geographic information systems to establish an estimate of the land area used for parking in the GTHA indicated that there are approximately 4.1 million non-residential, off-street parking spaces in the GTHA, including 1.05 million in Toronto (including both charged and uncharged). For the non-Toronto portion of the GTHA (3.05 million spaces), it was assumed that approximately 5% of those spaces were charged with the remainder being non-charged (in Toronto approximately 20% of non-residential, off-street parking spaces are charged). To account for any margin of error in this estimate of charged parking spaces in the region, a range of the revenue potential of this tool has been provided.

5.2.2 Incremental Costs

Incremental costs associated with implementing a parking sales tax would be minimal since parking sales tax mechanisms are already in place and existing systems can be leveraged.

There will likely be a small administrative cost associated with sorting and allocating the appropriate parking sales tax proceeds that are earmarked for transit initiatives.
S.2.3 Impact on Behaviour and Transportation Network Performance

A parking sales tax in the GTHA is unlikely to result in any discernible improvement in the performance of the road network, but it may result in marginal reductions in auto travel times and some of the other associated impacts (e.g. emissions savings) due to any shift to public transit. The expectation is that the increased cost of paid parking may lead some individuals to use public transportation rather than driving, creating some fuel and emission savings. The tool is not expected to have a significant impact on land use.

S.2.4 Scheme Design

The proposed parking sales tax would be levied on the purchase price of paid-parking across the region. The impacts would be limited to short-term paid parking stalls. The fee is expected to either be collected by the Province through current sales tax collection mechanisms and subsequently transferred to Metrolinx or collected by Metrolinx directly as is currently done by TransLink.

Although a sales tax is already levied on paid-parking through the HST, a parking sales tax would be in addition to the HST and the revenue would be designated for transit infrastructure.

S.2.5 Technical Implementation Considerations

There is integration potential with the existing parking sales tax collection mechanisms, resulting in low administrative costs. Notwithstanding political considerations, it is expected that the new parking sales tax can easily be added to the current taxes charged and collected on non-residential, off-street paid parking in the region and remitted to Metrolinx for use in transportation funding.

### Criteria Assessment

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<tr>
<td>Time to Implementation</td>
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5.2.6 Governance Considerations

The introduction of the parking sales tax will require government approvals before implementation can begin. The approvals may take time as it may be difficult to draw a link between parking and transit projects.

Appropriate regulations will need to be put in place to allow Metrolinx to collect revenues directly, if this tool is chosen.

The tool is not transparent if the tax is lumped in with the other sales taxes currently charged on parking. It will be difficult to track the portion of the tax dedicated for transport funding and from the users’ perspective, there may not necessarily be an obvious link between parking and transit initiatives. Transparency may be improved if the tax is itemized separately and if public education campaigns are carried out.

5.2.7 Equity and Distributional Impacts

There are alternatives available to parking space users in the form of other modes of transportation rather than driving. These alternatives may be limited when travelling to areas that are not well-connected with the public transit system. However, the majority of the areas with limited public transit facilities do not have charged parking and would therefore not be impacted by the new parking charges.

The impacts of this tax are limited to short-term paid parking stalls. This tool cannot be viewed as being very equitable in horizontal terms since it only affects users who are already paying a fee for parking; non-charged spaces will not be affected by a parking sales tax. Additionally, there is not necessarily a direct link between paid parking and transit initiatives.

In terms of vertical equity, a parking sales tax is likely to affect primarily individuals with moderate to high levels of disposable income, since these individuals tend to be the drivers where most of the short-term paid parking stalls are located.

If the implementation of the tool reduces the number of vehicles on the road, it benefits all road users (including the users who are not affected by the parking sales tax).
S.2.8 Overall Efficiency Impact

Parking sales taxes will at best have only a minimal impact on the productivity and competitiveness of the GTHA region. The tool is likely to have very modest if any positive impacts on travel behaviour in the region and these impacts will tend to be more than offset by the costs of the economic distortions associated with the parking sales tax, including changes in consumer behaviour (e.g. shifting purchases away from areas where parking is priced and hence subject to the parking sales tax). In addition, a parking sales tax could potentially have unintended effects, such as causing some municipalities to abolish their parking fees on any off-street facilities in order to avoid tax liabilities under this revenue tool, as indeed occurred under the Toronto Commercial Concentration Tax in the early 1990s. Therefore, the overall impact on efficiency would likely be negative after accounting for the costs associated with the behavioural changes.

S.3 Case Study – TransLink Parking Sales Tax

S.3.1 How the Tool Works

The Parking Sales Tax is applied to all parking transactions within Translink’s service area.

TransLink considers taxable parking to be a site, space or any other area in which a motor vehicle may, for a price or other consideration, be parked for any period of time. Examples of taxable parking include parking lots and parkades, commercial and municipally-owned sites (e.g. hospitals or universities), residential building sites where visitors are charged, and accommodations or other businesses (e.g. retailers) where there is a separate charge for parking.

S.3.2 Policy Objectives / Motivation

TransLink collects the tax in order to generate revenue to pay for transit and road maintenance and improvements in the Metro Vancouver area. The tax forms one element of a wider suite of tax revenues dedicated to TransLink, including the Motor Fuel Tax, Property Tax, Replacement Tax and Hydro Levy, which together form a significant portion of Translink’s overall revenue (Parking Sales Tax is the third (a distant third) most significant taxation revenue after the Motor Fuel Tax and Property Tax).
S.3.3 Revenue Potential and Pricing

Initially, the tax rate was set at 7%, but in 2010 it increased to 21% of the purchase price of the parking rights sold to the customer before HST – the 12% HST rate is applied on top of the sale price.

Recent revenue yields are as follows:

- 2009: $15.6 million
- 2010: $58.4 million
- 2011 (Budgeted): $49.2 million
- 2012 (Projected): $50.0 million

Between 2012 and 2014, forecasts assume a 1.5% increase on the price of paid parking, based on rises in fuel prices, a rise in the Consumer Price Index (CPI) and an increase in population. By 2021, the outlook for parking sales tax revenues is $57.1 million. The parking tax is therefore considered to be a sustainable revenue tool for at least the next decade, increasing year on year.

S.3.4 Impact on Travel Behaviour and Network Performance

It is acknowledged that the tripling of the tax rate, as well as the addition of HST to that rate, may serve to reduce parking demand. However, there is no empirical evidence available on actual behavioural impacts for the TransLink parking sales tax.

Elasticity of parking demand from parking pricing studies estimates range between -0.2 and -0.4, meaning that for every 10% increase in parking prices, parking demand is reduced by 2%-4%. Travellers may respond by paying the extra tax, changing modes, destinations, parking location or the duration of their parking.

Any beneficial impacts on network performance attributable to the tax are unlikely to be significant or discernible to the public. While the parking sales tax applies to a very broad geographic area, the incidence of priced parking – where the tax applies – is likely limited to Vancouver city centre and possibly to any Skytrain or commuter train stations with paid parking in the suburbs. While there may be some mode shift in auto trips to these destinations, this effect may not be discernible on the overall network.

S.3.5 Technical Implementation Considerations

The tax is relatively easy and quick to implement once the necessary approvals have been gained. In this example, the tax replaced the previous Parking Site Tax and therefore the wider structure was already in place. Translink’s charter now allows for the collection of such tax revenues directly by TransLink (previously through the Province) and so the process has become more streamlined. Key considerations regarding its implementation are as follows:
• TransLink directly administers, enforces and collects the Parking Sales Tax.
• To sell parking rights, a Parking Tax Certificate must be issued to the vendor by TransLink; the Administrator for the Parking Sales Tax has the right to approve or refuse applications.

S.3.6 Governance Considerations

In July 2010, the Province gave the rights to TransLink to administer, enforce and collect the Parking Sales Tax. This was passed under the South Coast British Columbia Transportation Authority (SCBCTA) Act, Section 169. The Parking Sales Tax had been one of the taxes included in Provincial Sales Tax (PST), which was eliminated in July 2010 with the introduction of HST. As such, the Province made the decision to grant TransLink the legislated rights for administration. Under the SCBCTA Act, TransLink is now permitted to raise revenues by means of taxes, including property, fuel and parking taxes.

The tax perhaps offers a greater level of transparency to the end user than, for example, the Melbourne Congestion Levy, because where a receipt is issued the tax must be specified as a separate item, or the receipt must indicate that the purchase price includes the tax. In addition, the revenues collected by TransLink are reinvested back into public transit or road improvements within Metro Vancouver and so users have a level of transparency in knowing what the tax revenues are used for.

S.3.7 Equity and Distributional Considerations

While some mode shift may be possible for certain trips, there is little availability of alternatives to this tool because it is applied over such a large geographic area.

The TransLink parking sales tax may rank well in terms of horizontal equity because it covers a broad area (Metro Vancouver). The horizontal equity weakness is that users of free parking are not subject to the charge. From a vertical equity perspective, the parking sales tax may rank fairly well to the extent that it impacts users of priced parking in central Vancouver and commuters into the city, both of which are likely to have above-average incomes.

S.3.8 Overall Efficiency Impact

The Parking Sales Tax in Vancouver is unlikely to have any appreciable impacts on either travel behaviour or the performance of the transportation network as discussed earlier. When this is combined with the costs of economic distortions arising from changes in the destination of shopping trips away from the areas with increased parking prices, it suggests that the overall efficiency impacts may well be negative. This conclusion holds even though the Parking Sales Tax does not involve significant capital, operating or compliance costs.

The economic distortions from the parking sales tax are likely to be significant given the tripling of the sales tax from 7% to 21%.
S.4 Lessons for Metrolinx

S.4.1 Lessons from Revenue Tool Evaluation

Through the evaluation of a parking sales tax as a potential tool for implementation in the GTHA, some key points were identified for consideration by Metrolinx:

- A parking sales tax on non-residential, off-street parking would not be a significant revenue generator for Metrolinx.
- The main challenge with a parking sales tax is that it applies to a relatively narrow tax base – i.e., only those parking spaces which are already priced to the end user. Since most non-charged parking spaces are in the suburbs, a parking sales tax would increase the differential between the cost of parking in central areas relative to the suburbs. This, in turn, further increases the competitive advantage that suburban retail and office locations may already have relative to city centre (i.e., generally more transit-accessible) locations.
- A parking sales tax could potentially have unintended effects, such as causing some municipalities to abolish their parking fees on any off-street facilities in order to avoid tax liabilities under this revenue tool, as indeed occurred under the Toronto Commercial Concentration Tax in the early 1990s.
- A parking sales tax may well entail an overall efficiency loss for the GTHA if the sales tax rate is set at the latest level prevailing in Metro Vancouver, because the small changes in travel behaviour could be more than offset by the costs of economic distortions.

S.4.2 Lessons from Case Study

The TransLink Parking Sales Tax offers the following lessons:

- There can be an inclination to introduce a relatively high parking sales tax rate (at least relative to general sales tax rates) in order to compensate for the limited revenue generation potential of the tool.
- The relatively high parking sales tax rate may have led to overall reductions in efficiency to the extent that any behavioural effects were more than offset by the costs of economic distortions. Confirmation of this point will need to await direct evidence of the impacts of the parking sales tax in Metro Vancouver.
T. Tool Profile: Parking Space Levy

T.1 Overview of Tool

T.1.1 How the Tool Works and Where it is Being Used

A parking space levy is a per-day charge on all non-residential, off-street parking spaces within a specified region. Pricing is typically implemented on an area basis rather than a per stall basis in order to mitigate tax avoidance. Owners of the parking spaces are charged directly and this cost is typically passed through to users in the form of increased parking prices.

Per-space parking levies are used in Sydney and Melbourne, Australia.

T.1.2 How the Tool is Being Considered for Evaluation

For the purpose of this analysis, it was assumed that a daily levy would be charged on all non-residential off-street parking spaces within the GTHA. The charge will be collected directly from the parking space owners. Since the charge is assumed on an area basis rather than a per stall basis, the levy will be similar to property taxation and as such, may require municipal cooperation.
T.2 Tool Evaluation Results

T.2.1 Revenue Potential

A parking levy has the potential to generate a significant amount of revenues within the region depending on the amount of the daily levy. For the purposes of generating a revenue estimate from the implementation of a parking levy within the GTHA, a fixed fee charged per parking space per day has been assumed.

Based on the assumption of approximately 4.1 million non-residential off-street parking spaces in the GTHA (as described below), a $0.25 per space daily fee could generate between $310 million and $410 million in 2014. If the number of parking spaces in the region grows at a rate of 0.50% per year, the tool could potentially generate $320 million to $420 million by 2021.\(^6\) Similarly, including the behavioural response, a $1 per space per day fee could generate approximately $1.4B to $1.6B in 2021.

Using an upper bound daily rate of $2 per parking space could generate approximately $3 billion in revenues. This upper bound was determined based on a rough estimate of the applicable range for the estimated price elasticity of demand for parking (for priced parking spaces). It is expected that at a rate greater than $2 per parking space, the parking demand response may diverge significantly from that implied by the point estimate used in the dynamic revenue calculation.

The implementation of the parking space levy would impact all parking lot owners and some parking lot users within the GTHA. For parking lots that are already priced, the levy would likely be passed on to the parking lot users in the form of increased parking charges. In the case of private parking lot operators, the extent of the pass-through to the end user would depend on the strength of local demand for priced parking. For parking spaces that are not priced, some of these spaces may be converted to priced parking, depending on the ownership and the strength of local demand for priced parking. Some of the other non-priced parking spaces are likely to be eliminated by their owners, because the levy makes them more expensive to maintain.

\[^6\] Subsequent work to refine parking space estimates in the GTHA is possible and is recommended should this revenue tool be advanced towards implementation.

<table>
<thead>
<tr>
<th>Static Revenue (2014) (before adjustments)</th>
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<tr>
<td>Yield for $0.10/day fee</td>
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<tr>
<th>Upper Bound Rate</th>
<th>Annual Yield from Upper Bound Rate</th>
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<tr>
<td>$2 per space per day</td>
<td>$3B</td>
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<th>Dynamic Revenue – $0.25/space (after behavioural adjustments)</th>
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<tr>
<td>2014</td>
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<td>$310M - $410M</td>
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<td>Revenue Potential</td>
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<td>Sustainability</td>
<td>4</td>
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<tr>
<td>Cyclical Variability</td>
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A parking space levy is a relatively sustainable source of revenue over the long term, particularly for paid parking lots. As years pass, parking space owners may realize that the cost of owning spaces is too high and may convert some parking spaces to other uses to avoid the tax burden which in turn would reduce future revenues. It is unlikely that parking space owners will adjust the number of spaces on an annual basis; if spaces are removed, they will not likely be brought back in the future.

Increased parking prices could lead to a modal shift toward public transit to avoid the extra cost of parking. Revenues are expected to be somewhat variable to shifts in the economic cycle as both parking owners and users may choose to avoid the increased cost of parking in difficult economic times through reducing the number of spaces or not driving (and thus reducing the demand for spaces).

A recent analysis performed by Metrolinx used geographic information systems to establish an estimate of the land area used for parking by sampling certain areas and expanding it to the GTHA. This assessment, along with other research allowed Metrolinx to come up with an estimate of approximately 4.1 million non-residential, off-street parking spaces in the GTHA. To account for any margin of error in this estimate of the number of parking spaces in the region, a range of the revenue potential of this tool has been provided.

### T.2.2 Incremental Costs

Incremental costs associated with implementing a parking space levy would be relatively low since no new infrastructure is required. An inventory of all non-residential, off-street parking will need to be developed at the outset and maintained annually to ensure an accurate count of parking spaces in the region.

There will be incremental administrative costs required for collection, though a mechanism for collecting parking tax already exists which could be leveraged.

### T.2.3 Impact on Behaviour and Transportation Network Performance

Instituting a parking space levy could have some effect on the overall performance of the transportation network depending on several factors that are difficult to assess in quantitative terms, given the limited experience with parking levies to date. These factors are as follows:

1. Some free parking spaces may be eliminated (i.e. converted to other uses in order to avoid the parking levy). We expect that private owners of parking spaces (other than retailers and shopping centres, for whom it can be a competitive advantage) are likely to reduce their spaces, because the levy makes these more expensive to hold. This is likely to reduce the supply of free parking in suburban areas, although it is unclear by how much.

2. Some free parking spaces may be converted to priced parking. This may occur in areas where there is already a strong local demand for priced parking.
3) For priced parking stalls, some or the entire levy will be passed on from the property owners to the end users. The extent of the pass-through will depend on the strength of local demand for priced parking.

We have taken an optimistic view of the third factor and conducted two simulations of the Greater Golden Horseshoe (GGH) network model for 2021: a reference case without the parking levy which represents our best view of prevailing trip patterns in 2021 without any revenue tools in place; and a simulation with a $1/day parking levy, where the levy is added to all traffic zones in the GTHA where parking is already subject to a charge.64

The results of the GGH runs suggest that there would be some significant mode shift to transit and associated decongestion benefits. Moreover, if we focus only on the traffic zones where there are already parking charges (i.e., the zones subjected to the full impact of the parking levy), the auto mode share for trips destined to these zones would fall slightly with the bulk of this shift going to transit. This reduction in car use will also entail savings in auto operating cost, fewer collisions and emission savings.

However, these significant behavioural changes and improvements in network performance are almost certainly optimistic and probably represent the upper bound of potential behavioural effects, because it is unlikely that the full $1/day levy would be passed onto end users even in the traffic zones where parking is already subject to a charge. As a result, we have downplayed these benefits in the evaluation scores for this tool.

It should be noted that this tool also has the potential for positive impacts on land-use through intensification of commercial development. This is due to the reduction of free parking spaces which may have more valuable uses and to the fact that retailers in suburban areas with free parking are likely to become less attractive destinations compared to retailers in denser urban settings with priced parking and better access to public transit services.

### T.2.4 Scheme Design

If the proposed parking levy were to be priced on an area basis rather than a per stall basis, then it would be similar to a property tax. This would involve the municipalities and could likely be lumped in with current property tax collection performed by the municipalities. It is expected that

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64 For commuting trips, the additional $1 charge is applied to all home-based work trips destined to the zones where there are already some parking charges. For non-work trips destined to the same zones, a $0.50 charge per trip is added to the auto operating cost, based on an assumption that an average stall is used by two non-work trips per day.
the parking levy would be collected by the municipalities and remitted to Metrolinx for use in funding transportation initiatives.

The trade-off between making the levy commercially viable and worthwhile without having a significant negative impact on the well-being of parking space users is an important factor to consider when determining the pricing of the levy. There is the potential for parking space owners to reduce the number of parking spaces to reduce/avoid the levy or for users of parking spaces within the region to change modes of transportation if the fee is perceived to be too high.

T.2.5  Technical Implementation Considerations

Before implementing this tool, Metrolinx will need to establish an inventory of regional parking in the GTHA which may take a considerable amount of effort and time. There is potential for land owners to self report the number of parking spaces they have to help implement the tool more quickly; however, an audit of the reported numbers would still be required to ensure accuracy and compliance.

It is very likely that large retailers will push back on the implementation of this tool as there is likely going to be an impact on their business operations.

T.2.6  Governance Considerations

The introduction of the parking space levy will require municipal engagement as property taxation requires input from municipal level. The necessary approvals may take time as it may be difficult to draw a link between parking spaces and transit projects, and opposition is anticipated from large retailers.

The tool will also require coordination between the Province, Metrolinx and the municipalities within the GTHA to ensure the tool is being implemented consistently across the region.

Appropriate regulations will need to be put in place if Metrolinx is to collect revenues directly.

The tool is not highly transparent as the end-users who are likely to end up paying for the levy indirectly through increased car parking prices may not be aware of how the parking fare proceeds are being utilized. There is not necessarily an obvious link between parking in public places and transit initiatives; however, the introduction of public education campaigns surrounding the tool could help improve transparency.
T.2.7 Equity and Distributional Impacts

The cost burden is borne directly by the parking space owners, but will likely be passed on to the consumers in the form of higher parking fees or a higher cost of consumer goods.

For parking space users, there are alternatives available in the form of other modes of transportation rather than driving; however, these alternatives may not be viable for travelling to some areas of the region that are not well-connected with the public transit system. People may also choose to shop at locations where there is comparably cheaper parking, particularly near the edges of the GTHA region. There are minimal options available for space owners, and they could elect to remove parking spaces, particularly if they don’t charge for the space or cannot pass on the extra cost burden due to decreasing space demand.

Since the tool will be levied on parking space owners across the regions, the funding burden is likely to be shared proportionally based on the number of spaces provided by land owners. If these costs are passed along to consumers in the form of priced parking, it has the potential to have a greater impact on drivers in rural areas or the suburbs where the daily use of passenger vehicles is more prevalent.

T.2.8 Overall Efficiency Impact

Parking space levies are expected to have an overall positive impact on the productivity and competitiveness of the GTHA region due to the changes in travel behaviour and network performance resulting from the charge, although these benefits are partly offset by the costs of the economic distortions arising from the charge and the incremental costs of implementation.

The changes in travel behaviour – a shift from auto to transit trips – and the resulting benefits of reduced congestion and improvements in network performance are significant. However, we have downgraded these benefits, because they depend on full pass-through of the levy to parking users and there is considerable uncertainty about this assumption.

The economic distortions arising from the parking levy include changes in the behaviour of parking lot owners, who may choose some alternative land uses for some of their parking lots and/or may choose to sell these in light of the increased charges to holding and managing this property. The economic distortions also include any changes in the behaviour of consumers, who may change the location of their purchases to avoid the charge (i.e., specifically those charges passed on to the

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<td>Availability of Alternatives</td>
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<tr>
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<tr>
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<tr>
<td>Overall Incremental Costs</td>
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end users), as well as changes in the behaviour of employers, who may change office locations to minimize their exposure to the parking levy (either directly as owners, or indirectly through their property leases). All of these changes in behaviour of owners, consumers and employers likely entail additional costs (and some benefits, such as intensification of commercial activity). These adverse efficiency impacts will tend to partly offset the efficiency gains from changes in travel behaviour.

T.3 Case Study – Congestion Levy (Melbourne City Council)

T.3.1 How the Tool Works

The congestion levy is an annual charge payable on long-stay parking spaces in both public and private car parks in the Melbourne core business district (“CBD”). This levy area covers Melbourne’s major commercial, retail and entertainment precincts. It is payable by owners of private and public car parks in the levy area, applying to non-residential, off-street, long stay and permanently leased parking spaces.

For a private car park, the owner will be able to pass on the levy to another person who has the right to use the parking space under a lease, license or other arrangement. For public car parks, the owner of the premises (car park) and the operator of the car park are each responsible for paying the levy with the discretion of passing this cost onto the car park users. For public car parks, the levy is charged on 75% (the statutory ratio) of all parking spaces which are not exempt.

T.3.2 Policy Objectives / Motivation

Traffic congestion imposes significant financial, time, and environmental costs and is an increasing challenge to Melbourne’s economic prosperity. The Bureau of Transport and Regional Economics estimate that social costs of congestion in Melbourne amount to approximately C$ 3.08 billion per year in 2005 and are set to rise to approximately C$ 6.26 billion by 2020.

The primary aim of the Melbourne Congestion Levy was to reduce traffic congestion in Melbourne’s inner city and encourage the use of public transport by commuters. A secondary aim of the levy was to create more parking options for shoppers and visitors through increased availability of short-stay parking spaces.

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65 Long-stay car parks are typically those used by commuters through some form of long-term leasing arrangements, while short-term car parks are those typically used shoppers and other trip purposes where the length of stay is typically only a few hours.

66 Exempt parking spaces include loading bays, guest parking at hotels and parking spaces owned by local governments and some non-profit organizations. See case study for full list.
T.3.3  Revenue Potential and Pricing

Between 2007 and 2011 the congestion levy ranged from C$407 per space per year (in a developing area within the levy zone) to C$895 (CBD) per space per year; in 2012 the range will be from C$660 (development area) to C$925 (CBD) per space.

Recent revenue yields are as follows:

- 2009/10 $ 47.2 million (C$ 48 million)
- 2010/11 $ 44.1 million (C$ 45 million)

While this data shows a recent decrease in overall revenue generated, it is difficult to make assumptions on the long-term sustainability of the revenue tool based on two years' worth of financial data. However, it is important to note that the levy is increased year on year, indexed in line with Melbourne CPI.

T.3.4  Impact on Travel Behaviour and Network Performance

The key impact on travel behaviour has been the reduction in traffic volumes within the levy area (6% on the average weekday between February 2005 and August 2009). In addition, 4% of travelers who switched modes from car to non-car transport in 2006 did so as a direct result of the levy, while 29% of all travelers who switched modes cited parking costs as a key factor. Public transport patronage has shown a strong increase over the past decade which has been accelerated since 2005/06 when the levy was introduced. This reduction in traffic volumes and mode shift to non-car transport has had a positive impact on network performance and has also achieved time savings for trips within the levy area. However, it has been estimated that only 11% of the theoretical reduction in car demand that was expected from the levy has in fact been achieved. This has been due to the fact that the levy is not passed on by parking providers.

T.3.5  Technical Implementation Considerations

The congestion levy was introduced within a year of its announcement by Government and within two months of receiving assent. It is therefore relatively straightforward and quick to implement once the necessary approvals have been gained. Key considerations regarding its implementation are as follows:

- The State Revenue Office (SRO) is responsible for collecting the levy and this involves sending out annual return forms, issuing assessments and reminder notices.
- Non-compliance has been a key issue: it has been necessary to implement a compliance program designed to identify unregistered owners/operators, investigate non-payments, conduct audits and review car parks with approved variations to the statutory ratio.
• The process is also open to human error: common errors include a lack of understanding of the requirements, non-lodgement of returns or non-registration of an applicable car park.

T.3.6 Governance Considerations

The congestion levy was announced by the Victorian Government and was subsequently presented to Legislative Assembly and Council. This Bill was passed under the Congestion Levy Act 2005. The Department for Treasury and SRO are responsible for administering the act and since its implementation it has been reviewed on two occasions to recommend administrative improvements.

While the provenance of the scheme has been relatively transparent, there is likely to be limited transparency for the end user. For example, the end user (i.e. motorist) may not necessarily receive a detailed breakdown of the parking costs or the proportion of any increases which may be attributable to the levy. However, some transparency is provided in the fact that the revenues are used to reinvest back into transport infrastructure projects and initiatives.

T.3.7 Equity and Distributional Considerations

There is the availability of alternatives to this tool; drivers may choose to park outside of the levy area or use non-car modes of transport to make the same trip. Transit options into the CBD also present a viable alternative.

The Melbourne levy enjoys some features which can be considered horizontally equitable, but it also has features which are not. For example, the levy is only applied to a relatively small area (the CBD) and as such will only impact upon specific types of trips. However, a per-space levy is also considered to be more equitable if it varies to reflect differences in costs, such as higher rates in denser urban areas. The congestion levy is only applied in the CBD and therefore reflects these higher costs, while it also has a reduced rate for the developing area within the levy area.

The levy ranks highly in terms of vertical equity, because it is located in the CBD, where parking spaces are used mainly by businesses and higher-income motorists. However, applying the levy to public car park spaces may also impact upon other motorists using the spaces for retail or other services only found in the CBD (e.g. healthcare) and therefore raises equity concerns.

T.3.8 Overall Efficiency Impact

It is far from clear whether the Melbourne congestion levy has generated efficiency gains for the city and the surrounding area. This is because the positive travel behaviour impacts have been much smaller than originally expected (only 11% of the original expected reduction in auto demand has been achieved) and a significant portion of these impacts are likely due to factors other than the levy (e.g. fuel price rises). Hence, it is unclear whether the modest efficiency
impacts that have been achieved are large enough to offset the costs associated with any economic distortions and the implementation and compliance costs.

The economic distortions arising from the CBD levy include changes in the behaviour of parking lot owners which are unable to pass on the incremental charge to parking users (e.g. reductions in parking supply); changes in the behaviour of employers who bear the parking costs of their employees (e.g. relocation of employees to other offices) and changes in the behaviour of consumers who bear any of the parking levy. The Melbourne levy led to substantial changes in parking supply (a 2.7% reduction in long-stay parking spaces and a 25% increase in short-stay spaces between 2006 and 2010). The changes in welfare of long-stay car park users and the administrative and other costs borne by parking lot owners who implemented these changes are likely to be significant. There is no evidence of significant changes in employer or consumer behaviour.

As for incremental implementation costs, the congestion levy did not involve significant capital, operating or compliance costs.

T.4 Lessons for Metrolinx

T.4.1 Lessons from Revenue Tool Evaluation

Through the evaluation of a parking space levy as a potential tool for implementation in the GTHA, some key points were identified for consideration by Metrolinx:

- A parking space levy is expected to generate a significant amount of revenue and it may also shift some auto-based trips to public transit.
- The success of this tool in generating changes in travel behaviour and hence efficiency gains for the GTHA depends critically on how much of the parking space levy is passed through to parking lot users in the prices they pay for parking.
- The municipal approvals process may take time and this will need to be preceded by an inventory of the parking spaces within the region.
- Appropriate regulations will need to be put in place to allow Metrolinx to collect revenues directly.
- There are alternatives available to parking space users in the form of other modes of transportation rather than driving. However, these alternatives may not be viable for those travelling to areas that are not well-connected with the public transit system.
T.4.2 Lessons from Case Study

The Melbourne congestion levy provides several lessons:

- Achieving cost pass-through from parking lot owners to users was a major challenge which undermined the effectiveness of the scheme. This was the case even though the levy was applied to the CBD of Melbourne, which already contained a high proportion of priced parking.
- The Melbourne levy was designed to increase the price of long-stay parking spaces (used primarily by commuters and businesses) relative to the price of short-stay spaces used by shoppers and other trip purposes. This was achieved only in part (due to the cost pass-through challenges), but it is a policy objective well-worth incorporating explicitly into the design of any GTHA parking levy.
- It is very unlikely that a congestion levy applied to a much larger area of the city of Melbourne would have led to any greater pass-through of the levy to end-user parking lot prices. Rather, an application to a larger geographic area would have led to greater reductions in the supply of long-stay parking spaces in the wider region.
- Careful consideration was given as to which groups and organizations should be exempted from the levy.
- The degree to which the parking levy is passed through to parking lot users will likely be lower in the GTHA, because the levy is set to apply to suburban areas as well as the core business district.
U. Tool Profile: Property Tax

U.1 Overview of Tool

U.1.1 How the Tool Works and Where it is Being Used

Property taxes are typically a percentage based tax levied on the value of real property owned by individuals and organizations in a given region. Property taxes are a common revenue tool for municipal and other levels of government to use to pay for a variety of programs and services. If using property taxes to generate revenue for new spending, then an incremental increase to the property tax rate would be required.

Property taxation is a ubiquitous revenue tool. It is specifically used for funding transit projects by TransLink within the Metro Vancouver Region and by the City of London, Ontario.

U.1.2 How the Tool is Being Considered for Evaluation

For the purpose of this analysis, revenue estimates are generated through an increase in the existing property tax rates charged on the assessed value of all categories of property in the GTHA. The increased revenues are assumed to be earmarked for transportation projects and remitted to Metrolinx.
### U.2 Tool Evaluation Results

#### U.2.1 Revenue Potential

The property tax tool has the potential to significant amounts of revenue within the region. For the purposes of generating a revenue estimate from the implementation of a property tax within the GTHA, a percentage increase in the existing property tax revenues was assumed to be apportioned to transit. For clarity, revenue estimates have been developed based on a percentage increase in property tax revenues rather than identifying a specific percentage increase in the property tax rate (due to differing property tax rates across the municipalities within the GTHA).

Based on the assumption of approximately $7.7 billion in property tax revenues in the GTHA in 2010\(^67\), increasing revenues by 5.2% has the potential to generate $500 million. A more conservative increase in property tax revenues of 3.00% could generate between $250 million and $330 million in 2014, increasing to between $390 million and $470 million by 2021, assuming a growth rate of 5.85% in property tax revenues (based on the compound annual growth rate in residential and commercial property tax revenues in Toronto from 2006 to 2010). Similarly, a 5% increase in property tax revenues could generate approximately $650 million to $750 million in 2021.

An upper bound on the increase in property tax revenues in the region being dedicated to transportation funding has been identified at 10%. Using property tax revenues to fund transportation within the region can be difficult since property taxes are a major revenue tool for municipalities. A property tax increase dedicated to transportation funding is expected to be limited (i.e., less than the upper bound) so as to allow municipalities to continue to use this tax base as a primary source to fund other municipal services and capital projects.

The implementation of this levy would impact all property owners within the GTHA. This tool is a highly sustainable source of revenue over the long-term as revenues are linked to the value of land in the region and it is likely that the values will continue to grow. Assuming property values remain relatively stable, there would be minimal fluctuation in assessed taxes.

\(^{67}\) The estimate for the property tax revenues attributable to the GTHA is based on the assumption that the City of Toronto municipal property tax revenues ($3.86B in 2010) represent approximately half of the municipal property tax revenues of the region.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Assessment (1 to 5)</th>
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<tbody>
<tr>
<td>Revenue Potential</td>
<td>4</td>
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<tr>
<td>Sustainability</td>
<td>5</td>
</tr>
<tr>
<td>Cyclical Variability</td>
<td>5</td>
</tr>
</tbody>
</table>
U.2.2 Incremental Costs

Incremental costs associated with implementing an additional property tax would be moderate overall. Payment and collection mechanisms already exist for property taxes. However, coordinating the increase across the municipalities within the GTHA will likely have incremental costs associated with it. In addition, public opposition is likely to be high during the approvals stage which could lead to delays.

There may be some incremental administrative costs associated with processing the collection of the new tax and remitting to Metrolinx; these costs are not expected to be significant.

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<tr>
<th>Criteria</th>
<th>Assessment (1 to 5)</th>
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<tbody>
<tr>
<td>Overall Incremental Costs</td>
<td>5</td>
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</table>

U.2.3 Impact on Behaviour and Transportation Network Performance

The implementation of the additional property tax would not have any impact on the overall performance of the transportation network. If the property tax is too high, it could lead to reduced real estate development in the region and induce some individuals and businesses to relocate outside of the GTHA.

Even property tax differences between jurisdictions can affect business and residential location decisions. For example, commercial property tax differences between the City of Toronto and neighbouring municipalities have already shifted the location of some businesses outside of Toronto, which has adverse impacts on transit accessibility.

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<tr>
<th>Criteria</th>
<th>Assessment (1 to 5)</th>
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<tbody>
<tr>
<td>Overall Impact on Behaviour and Network Performance (simple average)</td>
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<td>Time Savings</td>
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<td>Savings Due to Decreased Auto Use / Fuel Savings</td>
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<td>Reduction in Traffic Collisions</td>
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<tr>
<td>Air Pollution and Emissions Savings</td>
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U.2.4 Scheme Design

Property taxes are typically a percentage based tax levied on the value of real property owned by individuals and organizations in a given region. The additional property tax revenue can be collected by the municipalities and subsequently transferred to Metrolinx. The dedicated transportation funding tax proceeds will then be used by Metrolinx to implement transportation initiatives.

The effective rate of property tax applied must not exceed the cost for individuals and organizations to consider relocating outside the GTHA limits. Additionally, consideration for not encroaching upon municipal revenues must be given when setting the tax amount.

One variant of a property tax is a Municipal land transfer tax, which is discussed in the box below.
U.2.5  **Technical Implementation Considerations**

The approval process may incur delays due to public opposition. The tax can be implemented almost immediately after receiving the necessary approvals from municipalities and costs should be minimal as collection can be through payment mechanisms that already exist. There will be additional time and resources required to sort and allocate the appropriate portion of the revenues to transportation.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Assessment (1 to 5)</th>
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<tbody>
<tr>
<td>Ease of Implementation</td>
<td>4</td>
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<tr>
<td>Time to Implementation</td>
<td>4</td>
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U.2.6  **Governance Considerations**

The introduction of a property tax increase would require regulatory approvals. The link between property taxation and transit infrastructure is not as obvious as other tools, and as a result, may require more time during the approvals process.

Taxes could be collected by municipalities and transferred to Metrolinx. The additional tax could be integrated with the existing property taxation system. Given that property taxes are a primary source of revenues for municipalities, care must be taken so as to not eliminate the municipality’s ability to continue to increase revenues from property taxes.

The transparency of the scheme may be limited as municipalities have differing property tax rates. In addition, if the proposed tax revenues are pooled, it will be difficult to determine if each of the municipalities is receiving a similar benefit (particularly since these are direct municipal revenues). It is expected that administering the proceeds that are dedicated to transportation funding could also be challenging. However, these challenges may be lowered if a separate category for transportation funding is explicitly created and indicated similar to the education share of property taxes.

It may also be difficult to draw the connection between a property tax increase and improvements in transportation infrastructure as many residents may not be aware of exactly how the property tax proceeds are used. This challenge can be addressed through public education campaigns.

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<tr>
<th>Criteria</th>
<th>Assessment (1 to 5)</th>
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<tbody>
<tr>
<td>Transparency of Scheme</td>
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<tr>
<th>Institutional Features</th>
<th>Y / N</th>
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<tbody>
<tr>
<td>New Revenue Tool?</td>
<td>N</td>
</tr>
<tr>
<td>Municipal Role?</td>
<td>Y</td>
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</tbody>
</table>
U.2.7 Equity and Distributional Impacts

If the tool is implemented Region-wide, there are not many alternatives for property owners to avoid the tax, other than purchasing property outside of the GTHA region in future. The tax increase would most likely flow through to renters and prices charged by businesses in the GTHA as well.

All residents and businesses within the GTHA would be impacted at varying levels. The cost burden would be borne by property owners who pay directly, with an indirect payment made by renters and businesses.

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<tr>
<th>Criteria</th>
<th>Assessment (1 to 5)</th>
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<tr>
<td>Horizontal Equity</td>
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<tr>
<td>Vertical Equity</td>
<td>3</td>
</tr>
<tr>
<td>Availability of Alternatives</td>
<td>1</td>
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</tbody>
</table>

U.2.8 Overall Efficiency Impact

Implementing a property tax increase is expected to have some negative impacts on the productivity and competitiveness of the GTHA region as property owners and businesses may consider alternative regions for operations in future.

A higher relative increase in property tax for outlying municipalities could help correct the distortion arising from office locations which have shifted outside of Toronto. However, this could lead to similar challenges with the outlying municipalities and the municipalities located just outside of the GTHA. Therefore, any such considerations should be subject to further examination.

Property taxes per se entail economic distortions even in the absence of tax rate differentials between municipalities. For example, there is considerable empirical evidence that property taxes reduce the density of developments. This is because the property tax is levied on the assessed property value. Any investment or improvement in that property attracts an incremental property tax (assuming the improvement flows through to assessed property values). Hence, property taxes discourage investments on brownfield developments, which are an important vehicle for densification.68

U.3 Case Study

No case study of property taxes has been undertaken for this paper.

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68 See Enid Slack (2002: 8-9) for a review this issue and the Canadian and US evidence in support of this argument.
U.4 Lessons for Metrolinx

U.4.1 Lessons from Revenue Tool Evaluation

Through the evaluation of a property tax as a potential tool for implementation in the GTHA, some key points were identified for consideration by Metrolinx:

- Consideration must be given to not taking over the traditional tax base and principle revenue source for municipalities. There is only one property tax base, which means that a higher property tax from one authority can pre-empt tax increases from other authorities.

- If the tax rate is too high, it may result in property owners relocating outside of the GTHA. However, a higher relative increase in property taxes for outlying municipalities could help correct the distortion arising from office locations shifted outside of Toronto, which had adverse impacts on transit accessibility. Any such considerations should be subject to further examination.

- An increase in property taxes may also discourage intensification of both commercial and residential developments unless considerations are made in how the rates or complimentary measures are established.
V. Tool Profile: Sales Tax

V.1 Overview of Tool

V.1.1 How the Tool Works and Where it is Being Used

A sales tax is a percentage applied on all goods and services sold in a region that is used to fund transportation projects. This alternative of funding transportation projects often attracts strong political and public debate; however, tax payers are typically used to the concept. A sales tax has the advantage of a broad tax base, which generally produces high revenue yields.

Many American cities use sales taxes as a way of funding transit infrastructure, but it is only approved as a tool when dedicated to specific transportation projects. For instance, over the last 25 years, residents of 20 counties in California have voted to raise sales taxes to pay for transportation projects; they raised roughly $2.5 billion per year and this has been the fastest-growing source of revenue for transportation funding in California. Other cities in the US using this method include New York, Chicago, Minneapolis, and Houston.

V.1.2 How the Tool is Being Considered for Evaluation

For the purpose of this analysis, it is assumed that this sales tax will be applied uniformly to all goods sold in the GTHA. The Province or Federal government is assumed to collect the sales tax revenues and then distribute the transportation portion to Metrolinx.
V.2 Tool Evaluation Results

V.2.1 Revenue Potential

The sales tax tool has the potential to generate a significant amount of revenue within the region; with the potential to exceed $1 billion in annual revenues depending on the amount of the tax. For the purposes of generating a revenue estimate from the implementation of a sales tax within the GTHA, a percentage increase to the current HST rate has been assumed.

Based on the assumption of approximately $10 billion in sales tax revenue attributable to the GTHA, a 0.25% sales tax increase could generate between $260 million and $390 million in 2014, increasing to $340 million and $460 million by 2021 (assuming a growth in sales tax revenues of 3.50% per annum from 2014). Similarly, a 1% sales tax could generate approximately $1.4B to $1.6B in 2021.

In addition, a 2% sales tax is set as the upper bound, generating close to $2.5 billion. This upper bound rate was determined based on a rough estimate of the applicable range for the estimated price elasticity of demand for consumer goods. It is expected that at a rate greater than 2%, the demand response of users may diverge significantly from that implied by the point estimate used in the dynamic revenue calculation.

The implementation of this tax would impact all individuals purchasing goods and services within the GTHA. Revenues are expected to be sustainable into the future as they are related to the sale of goods and services, though some variability may be experienced year-to-year depending on the economy.

Revenue estimates for this tool are based on the GTHA portion (as a percentage of Ontario’s gross domestic product) of the projected sales tax revenues in Ontario in 2014 per the provincial budget. Using the provincial sales tax portion of the HST (8%), an estimate of the revenues generated per percentage point of the sales tax rate was developed. To account for this methodology used to estimate the GTHA portion of sales tax revenues, a revenue band has been provided.

69 A 3.5% nominal growth rate in sales tax revenues is slightly lower, and hence more conservative, than the GDP nominal growth assumptions of 4.1% for 2014 and 4.2% for 2015 in the Fall 2012 Ontario Economic Outlook (p. 38).
V.2.2 **Incremental Costs**

Incremental costs associated with implementing an increase in the sales tax would be minimal as payment and collection mechanisms already exist. The transportation-related portion of the tax can be introduced through an increase in the provincial HST rate.

There may be some incremental administrative costs associated with processing the collection of the new tax and remitting to Metrolinx; however, these costs are not expected to be significant.

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V.2.3 **Impact on Behaviour and Transportation Network Performance**

Since all buyers of goods and services in the GTHA (including non-drivers) will bear the cost of additional sales taxes, no behavioural changes can be expected from this scheme.

Instituting a sales tax will have no effect on the overall performance of the transportation network. The tax will have no impact on time savings or auto use patterns and will not generate any modal shifts. If the tax increase is overly punitive, it could lead to reduced economic activity in the region.

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V.2.4 **Scheme Design**

A sales tax is a percentage applied on all goods and services sold in a region, used to fund transportation projects. The current HST rate is 13% with 8% of that being the provincial portion. The current HST rate can be increased through the Provincial budget, with proceeds from that increase being dedicated to transportation funding.

V.2.5 **Technical Implementation Considerations**

Due to the recent introduction of the HST, it may be difficult to increase the rate from its current 13%. In addition, there are added complications to charging a different sales tax rate within the GTHA versus the rest of the Province and as a result, this tool may need to be implemented Province-wide. As a result, the scores for this tool were evaluated for a province-wide implementation. Our approach under a province-
wide dedicated sales tax does not take account of the revenues generated outside the GTHA, implying that Ontarians outside the GTHA would not be funding GTHA transportation.

The administration and collection of the transportation-related tax revenues could utilize the current mechanisms being employed for administering and collecting general sales tax revenues.

V.2.6 Governance Considerations

Any increase in the HST rate will require Provincial approval and dedicating a portion of those revenues to transportation funding will likely require new legislation.

The Province would receive the Provincial portion of the sales tax revenues (as is currently done) and then direct the portion of revenues allocated to transportation funding to Metrolinx. A drawback of this tool is that it may be difficult to draw the connection between an increase in the HST and improvements in particular infrastructure.

Segregation of the tax from other portions of the HST could also dilute the transparency of the scheme. Further, if the tax is implemented Province-wide, there would be reduced transparency since only the GTHA revenues would fund transportation infrastructure within the GTHA.

V.2.7 Equity and Distributional Impacts

This scheme does not allow room for alternatives. It does not provide a horizontally equitable solution as everyone purchasing goods and services within the region will be affected by the incremental tax, regardless of their use of the transportation network, and will share the cost burden associated with funding transportation in the region. For lower income groups, the proportion of the funding burden measured as a share of their income is likely to be higher when compared to other groups. To reduce this funding burden, individuals in this group may be forced to modify their consumption patterns.

Vertical equity is affected as this scheme may put purchasers of goods and services in the GTHA at a disadvantage relative to residents of other regions within the Province due to the higher sales taxes. However, since the tool is directly related to consumer purchases, it will mean that individuals who consume more will be paying more (typically higher income earners will consume more). An impact may also be felt by sellers of goods and services that are based in the GTHA region as purchasers may choose to make their purchases in regions that are not under the influence of the higher sales tax scheme.
If the tool is implemented Province-wide, there are not many alternatives for individuals who want to avoid the tax, other than going outside of the Province to make purchases. This would mean that no particular segment of the population is impacted disproportionately.

V.2.8 Overall Efficiency Impact

Implementing an increase in the sales tax rate is expected to have some small negative impacts on the productivity and competitiveness of the GTHA region or the Province. It is likely that there will be a marginal reduction in consumption as the additional tax will increase the cost of purchasing goods or services within the region.

In a simulation using a computable general equilibrium model, an increase in sales taxes equivalent to 1% of GDP in revenue terms would entail a 0.19% drop in steady state GDP for Canada as a whole. When applied to the GTHA or even to the province of Ontario, this would imply a larger negative impact on GDP, because the jurisdiction is smaller and hence, there is more room for distortions to consumption and the location of economic activity.

The tool would have no impact on the performance of the transportation network or travel behaviour.

Hence, a small increase in sales taxes suggests a small overall negative impact on efficiency for the GTHA region.

V.3 Case Study – Overview of Sales Taxes Dedicated to Transportation

V.3.1 How the Tool Works

Two case studies have been highlighted to show how state or local sales taxes have been used to fund specific infrastructure projects. These are the Georgia Special-Purpose Local-Option Sales Tax (SPLOST) and Los Angeles Metro’s Measure R.

V.3.2 Policy Objectives / Motivation

The purpose of SPLOST is to fund the capital portion of public infrastructure such as parks, schools, roads, bridges, and other public facilities including courthouses and jails.

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The purpose of Measure R is to help finance new transportation projects and programs, as well as accelerating the delivery of those already underway. These projects include rail and bus rapid transit, commuter rail improvements, Metro Rail system improvements, highway projects, and other locally-sponsored transportation improvements.

V.3.3 Revenue Potential and Pricing
Measure R is a 0.5% sales tax collected by Metro and applied across the Los Angeles County, which has a population of almost 10 million people (the most populous county in the US and more populous than 42 of the US states). It is expected to raise $40 billion in new local sales tax revenues over a 30-year period. By the end of June 2010, after its first year of implementation, Measure R collected over $551 million in sales tax revenues.

As for the SPLOST, the state of Georgia currently collects a 4% sales tax. In addition, other separate sales taxes are collected at the county level or by eligible municipalities. The SPLOST is one of these sales taxes which dates back to 1985 and is normally a one percent county sales tax that is approved by voter referenda and used to fund specific capital outlay projects. The revenue is allocated exclusively to the county where it is collected. Total revenue from this type of local sales tax in Georgia was just over $1.2 billion in 2009.

V.3.4 Impact on Travel Behaviour and Network Performance
Sales taxes do not have any direct impact on travel behaviour.

V.3.5 Technical Implementation Considerations
Both the SPLOST and Measure R were relatively easy to implement, because they piggy-back on existing sales tax revenue collection mechanisms. For example, the Georgia Department of Revenue collects SPLOST levies, as it does with all other state sales taxes. The Department retains 1% of the gross revenue in order to cover its administrative expenses. Measure R limits the administrative costs for collecting the tax revenues to 1.5% of revenues annually.

V.3.6 Governance Considerations
A SPLOST must be initiated by a county commission and it is usually passed with the agreement of the city councils within the county, and voted upon in a county-wide referendum, usually held during the next scheduled election. Under the original law as it applies to county governments, SPLOST expires after a period of five years and must be voted upon again if it is determined that funds are still required via this method.

Measure R was put to the Los Angeles County electorate in November 2008 and was approved by voters with a 67% vote. (A two-thirds majority is required by the state of California to raise taxes.) This ballot measure created an ordinance called “Traffic Relief and Rail Expansion Ordinance”.
This ordinance included the Expenditure Plan for Measure R, which detailed the level of expenditure required for each of the major projects and programs proposed.

**V.3.7 Equity and Distributional Considerations**

Sales taxes are considered to be regressive because they impose a greater burden on poorer households. Sales taxes generally account for a higher percentage of low-income household budgets. This is particularly the case when sales taxes are applied to essential goods.

Regarding T-SPLOST, concerns have arisen regarding the equity impacts of imposing an additional 1% sales tax during the current economic climate, especially in the counties under the jurisdiction of MARTA, which are already subject to the 1% MARTA sales tax.

As for Measure R, the Los Angeles County Economic Development Corporation (LAEDC) estimated that the tax increase will cost each resident of the County an average of $25 per year.

However, these adverse equity effects in the case of both SPLOST and Measure R can be mitigated through the use of sales tax rebates and tax exemptions on necessities.

**V.3.8 Overall Efficiency Impact**

Sales taxes are the most widely used source of dedicated local and regional funding for transit in the US. They have historically provided the highest yield per tax point and until recently were often seen to provide a stable source of revenue. However, recent declines in sales tax revenues during the recession have altered this perspective.

In terms of overall impacts on economic efficiency, an increase in sales tax creates no positive impacts on travel behaviour or improved network performance. Nor does it require any incremental capital or operating costs to collect; or arguably any additional compliance costs on the part of businesses remitting the tax.

However, the biggest advantage of sales taxes is that they tend to create the fewest economic distortions relative to other taxes. A 2004 study by the federal department of finance found inefficiency costs ranging from $0.13 in lost welfare per dollar of consumption tax revenue; to $0.15 for payroll taxes; $0.32 for personal income taxes; $0.37 for corporate income taxes; through to $1.30 for sales taxes on capital goods. It is important to note that these estimates are based on taxes applied at the federal and provincial levels in Canada. One would expect similar taxes applied to more circumscribed areas such as the GTHA would have significantly higher inefficiency costs.
V.4 Lessons for Metrolinx

V.4.1 Lessons from Revenue Tool Evaluation

Through the evaluation of a sales tax as a potential tool for implementation in the GTHA, some key points were identified for consideration by Metrolinx:

• Revenue potential is significant for even a small increase in the sales tax rate.
• As residents are already paying sales taxes on goods and services, and because of the broad tax base associated with sales taxes, the incremental costs for effective implementation of this scheme should be minimal.
• This scheme may put suppliers of goods and services in the GTHA at a disadvantage relative to suppliers in other regions. If GTHA residents adjust their behaviour to purchase outside the GTHA, this will negatively impact these suppliers. This suggests that a sales tax should be applied to a broader area than only the GTHA and ideally at the province-wide level.
• The incremental sales tax rate should be small enough in magnitude as to minimize any changes in purchase behaviour.
• A sales tax is a powerful tool for raising revenue, and it entails the lowest economic distortions relative to other types of taxation (including payroll, income and corporate income taxes as well as more narrow excise taxes)
• To the extent that lower-income households bear a disproportionate part of the tax burden from an additional sales tax, this can be remedied through an increase in the HST tax credit
• This tool has no impact on the performance of the transportation network.

V.4.2 Lessons from Case Study

Lessons from the overview of sales taxes in other jurisdictions include:

• Incremental sales taxes are the most widely used revenue tool dedicated to funding transportation capital projects in US cities and states, and in most cases the additional tax rates are at or below 1 per cent.
• These incremental taxes are often voted in through referenda held concurrently with other elections. The proposed sales tax increases are usually dedicated to a detailed list of projects in the city or state. Hence, the electorate is voting for both a bundle of projects and a funding tool.
While a sales tax creates no additional benefits in terms of desired changes in travel behaviour, it is also one of the most efficient tax tools for raising revenue. This conclusion holds to the extent that:

1) the sales tax is applied to a broad basket of goods;
2) the tax is applied to a sufficiently broad geographic area so as to mitigate changes in the location of purchases; and
3) the tax rate is small enough that it does not create significant distortions (in terms of changes in the basket of goods and services purchased or changes in the location of the purchases).
W. Tool Profile: Tax Increment Financing (Special Assessment Districts)

W.1 Overview of Tool

W.1.1 How the Tool Works and Where it is Being Used

Tax increment financing ("TIF") is a public finance technique used by local government jurisdictions to fund infrastructure initiatives and stimulate economic development in designated geographic areas. TIFs work by leveraging future tax revenue increases to finance current infrastructure projects. The mechanism effectively dedicates the incremental tax revenue between the assessed value of designated areas ("TIF zones") prior to the development and its assessed value over time. By doing this, future tax gains are leveraged to finance the present costs of eligible improvements in designated areas.

This financing technique was originally used in California as a way to stimulate development in blighted areas and have since been authorized in 49 of the 50 US states.

TIFs are much less prevalent in Canada. In Ontario, the Province only recently approved legislation to permit TIF on a pilot basis for the Toronto-York-Spadina Subway Extension and the West Don Lands redevelopment initiative.

W.1.2 How the Tool is Being Considered for Evaluation

TIFs can be implemented by municipalities along corridors that will be directly impacted by the construction of new public transit. It is expected that the municipalities can project the future increase in property values related to the new public transit investment (i.e., above the expected natural increase in property values) and use those future revenues to finance the construction of the project. These incremental tax revenues can be monetized (through the issuance of bonds backed by the TIF revenues) to generate funding upfront or the annual revenues can be used to fund the transportation infrastructure. There is no bonding of the future TIF revenues assumed in this evaluation.
W.2 Tool Evaluation Results

W.2.1 Revenue Potential

The revenue generation potential from tax increment financing can vary substantially as it is largely dependent on the real estate market and the size of the TIF zone that is established. During early implementation revenues are likely to be small to modest after which they can be expected to ramp up. Each transport/infrastructure initiative should be evaluated to determine if they are eligible for funding through TIF. It is not a funding mechanism that can be used without a specific project in mind and requires forecasts of real estate growth in the identified areas over the long-term.

The revenue estimates provided for this tool are what can be expected for a specific project, based on the City of Toronto’s analysis of funding options for the Sheppard East Subway Extension (capital cost of approximately $3.7 billion). Estimates have been provided for 2017 and 2025 (assuming that TIF zones are established in 2014). Each year after establishing the TIF zones, TIF revenues are expected to increase, but it will take several years before annual revenues are significant (annual revenues are estimated to reach the hundred millions after 30 or 40 years). TIF zones are typically established for a period between 30 to 50 years.

Tax increment financing revenues are made up of two components that are identified through the current value assessment of properties in the TIF zones; the tax increment uplift in existing property values; and the tax increment from new development in the TIF zones that has been accelerated and presumed to be incremental.

TIF revenues are driven by the strength of the real estate market in which the TIF zones have been established. As a result, there is a lot of risk associated with recognizing projected revenues over the long-term. The revenues can also be affected by shifts in the economic cycle. This lack of guaranteed revenues creates funding (debt service) issues if bonds are being issued upfront based on the projected future TIF revenues to support a transportation initiative.

W.2.2 Incremental Costs

Establishing TIF zones is a complicated process that requires significant administrative and legislative input in terms of researching the zones, designating the zones, valuing the current properties and projecting the type and location of development in the long-term.
Once the zone is established, there will be costs associated with the annual valuation of properties; however, administrative and collection costs should be minimal since mechanisms are currently in place for collecting property taxes.

**W.2.3 Impact on Behaviour and Transportation Network Performance**

TIFs would have no impact on travel behaviour or the performance of the transportation network apart from the benefits of the projects they are funding. TIFs are likely to have some impact on land-use within the designated areas due to their proximity to the proposed transit. Land within the TIF zone is more likely to be developed in manners that maximize land value through a residential / commercial / retail mix that will likely maximize space use, such as through the use of high rise condominium developments and/or other such high density development strategies. TIFs are designed to capitalize on anticipated growth in areas where new infrastructure helps increase the attractiveness of the area.

**W.2.4 Scheme Design**

Tax increment financing is a public finance technique used by local government jurisdictions to fund infrastructure initiatives. Establishing the TIF zones can be a complex process and bears the greatest degree of cost in the process.

TIFs work by leveraging future tax revenue increases to finance current infrastructure projects through the dedication of the incremental tax revenue of TIF zones (based on value differential prior to and post development). In so doing, future tax gains are leveraged to finance the present costs of eligible improvements in designated areas. In order to derive the full benefit, there must be a sophisticated municipal bond market in the jurisdiction that would be willing to look favourably upon bonds supported by future TIF revenues.

Once a TIF zone is established, ongoing administrative costs should be minimal as mechanisms are currently in place for collecting property taxes.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Assessment (1 to 5)</th>
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</thead>
<tbody>
<tr>
<td>Overall Impact on Behaviour and Network Performance (simple average)</td>
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<tr>
<td>Impact on Network Performance</td>
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<tr>
<td>Time Savings</td>
<td>2</td>
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<tr>
<td>Savings Due to Decreased Auto Use / Fuel Savings</td>
<td>2</td>
</tr>
<tr>
<td>Reduction in Traffic Collisions</td>
<td>2</td>
</tr>
<tr>
<td>Air Pollution and Emissions Savings</td>
<td>2</td>
</tr>
</tbody>
</table>
W.2.5  **Technical Implementation Considerations**

TIFs have recently been implemented on a pilot basis in Toronto, but municipal and provincial approvals are required before this financing technique can be rolled out to other initiatives.

TIF pricing is defined in legislation. There is however a complex upfront assessment process that is necessary to determine the amount of the tax increase attributable to transit initiatives rather than other factors such as general economic expansion and growth or new business initiatives in the area. Detailed real estate forecasting is also required to help project future land value assumptions.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Assessment (1 to 5)</th>
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</thead>
<tbody>
<tr>
<td>Ease of Implementation</td>
<td>2</td>
</tr>
<tr>
<td>Time to Implementation</td>
<td>3</td>
</tr>
</tbody>
</table>

W.2.6  **Governance Considerations**

Implementation of any TIF zone will require compliance with the TIF Act, 2006.

The TIF pilots that have been launched in Ontario allocate any revenues above the projected property tax revenues for the TIF zone in any given year (which are typically projected to increase), meaning that the tax base for the zone is not frozen at a flat rate for the duration of the TIF period. Once established, allocation of revenues is relatively straightforward as they are clearly defined in the implementation process.

It is important to note that when raising bonds against future TIF revenues, you are simply bringing the future tax revenues forward to the present (monetizing the future incremental tax revenues). It is not necessarily a “new” funding source, but rather a means of tapping future revenues today.

Using current property tax collection infrastructure, municipalities would collect the property tax revenues, strip out the incremental tax revenues and pass them along to Metrolinx for use in funding an initiative or making debt service payments (if the future TIF revenues were monetized).

The scheme is relatively transparent because there is a clear connection between increased property values and the proximity to new transit initiatives. Residents within the TIF zone should also be educated to ensure full transparency of the scheme.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Assessment (1 to 5)</th>
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<tbody>
<tr>
<td>Transparency of Scheme</td>
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<table>
<thead>
<tr>
<th>Institutional Features</th>
<th>Y / N</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Revenue Tool?</td>
<td>Y</td>
</tr>
<tr>
<td>Municipal Role?</td>
<td>Y</td>
</tr>
</tbody>
</table>
W.2.7  Equity and Distributional Impacts

Landowners within the TIF zones do not have a choice on whether they participate or not. It is generally seen however that these land owners will benefit from a more rapid increase in their land value due to the transport initiative that has defined the TIF zone. Residents within the TIF zones are not charged a higher property tax rate, but rather experience higher property tax payments due to the increased value of their properties. The latter suggests that TIF zones are characterized by some measure of horizontal equity (i.e., beneficiaries do pay for improvements). The tool has not been given a vertical equity score as it does not impact (positively or negatively) the tax rate paid by a property owner, but rather generates revenues from the increase in assessed value. However, by redirecting investment to transportation in blighted areas, TIF can indirectly improve vertical equity.

W.2.8  Overall Efficiency Impact

This revenue tool requires that we consider the efficiency impacts of the financing in conjunction with the efficiency impacts from the spending of the proceeds. (In the case of other tools, we have considered only the revenue collection side).

TIF does not have any direct impacts on travel behaviour, but the new infrastructure does generate additional economic welfare (i.e. consumer surplus) for residents and visitors to the redevelopment zone. With appropriate planning and land use decisions, the TIF zone may also encourage greater reliance on public transit and active modes of transportation.

However, the above welfare gains are offset by the administrative costs of setting up and operating a TIF over its lifetime as well as any economic distortions arising from the TIF implementation, such as the displacement of economic activity from other parts of the region.

Overall, the potential exists for TIF zones to generate efficiency gains and improve social welfare, provided these are implemented effectively.
W.3 Case Study – Overview of Tax Increment Financing (US)

W.3.1 How the Tool Works
TIF directs a portion of future tax revenue from a specific area to support and promote development within that area, for a defined period of time.

TIF is ideally used as part of a wider package of financing and implementation tools and funding mechanisms.

W.3.2 Policy Objectives / Motivation
The principal purpose of a TIF is to encourage and support (re)development in an area that suffers from blight or economic decline and has obstacles that discourage investment, such as inadequate infrastructure.

TIF can help make development of a marginal site more attractive, entice private sector investment and provide a catalyst to achieve public policy objectives, including transit oriented development and place-making. TIF provides a mechanism to issue and repay bonds.

W.3.3 Revenue Potential and Pricing
This tool offers modest overall potential as a revenue source. Nevertheless, it does provide a reasonably reliable, steady, and sustainable stream of funding, since tax increment funds are tied directly to property values and TIF districts are typically in place for two or three decades.

TIF districts are often used in conjunction with other special districts, thereby enhancing their financing potential through collection of sales tax, additional property tax or special assessment. In these cases, revenues do not rely solely on growth in the assessed value within the district. Securing private sector development partner(s) is a crucial component for a successful TIF.

Costs that are typically eligible for TIF reimbursement involve capital projects (e.g. streets, sidewalks, parks, sewers) and generally include professional services, land acquisition and site preparation.

W.3.4 Impact on Travel Behaviour and Network Performance
TIF does not have a direct impact on travel behaviour or network performance. However, the spending of TIF proceeds indirectly support a change in travel behaviour through transit oriented development and transit- and pedestrian-oriented public realm. TIF provides the ability to affect
and direct changes to land use and public infrastructure within a specific area, especially in order to achieve broader policy goals.

W.3.5 Technical Implementation Considerations
The process of creating a TIF District is relatively straightforward; however, it can take a year or more depending upon the political sensitivities and level of community support. The process includes: conducting a “but-for” test; defining the boundaries; developing a plan for development and improvements; determining existing and projected assessed value, tax revenue and lifecycle; establishing governance and administrative structure; holding public hearings; and seeking agreement from participating taxing authorities. Seeking private sector partner(s) also requires time and energy, but this would usually occur before launching into the TIF District creation process.

W.3.6 Governance Considerations
TIF districts are usually created by, and have oversight from, a municipality. Day-to-day governance can be provided by an appointed board of directors (i.e. representatives of the taxing authority, property owner, developer, etc.).

Depending on the size and rate of growth of a TIF district, administration can vary from a consulting service, to a staff of one or more. TIF districts are often combined with redevelopment authorities and other overlay districts, which can share administrative support.

A criticism of TIF is that the process can lack transparency and accountability. This can be overcome with appropriate TIF district creation policies and procedures, and appropriate levels of public involvement and oversight.

W.3.7 Equity and Distributional Considerations
By redirecting investment to blighted areas, TIF improves vertical equity. However, this can be viewed as compromising horizontal equity if it redirects investment away from other areas in need. TIF can also be viewed as serving narrow private interests.

Some taxing entities, such as school boards, are exempted from participating in TIF districts, as they resent the freezing of their property taxes at a time when they are experiencing growth in demand as a result of the revitalization and new development.

W.3.8 Overall Efficiency Impact
The financing component of TIF has no direct effect on travel behaviour
TIF can be effective in creating transit oriented development and promoting economic development in a particular area, as well as generating increased tax revenues to support public improvements within that area.

From the broader perspective, since TIF can be seen to direct development from one area of a city/region to another rather than generate new growth, it is debatable whether the revenue would have been seen by the municipality over the long run regardless of the TIF.

W.4 Lessons for Metrolinx

W.4.1 Lessons from Revenue Tool Evaluation

Through the evaluation of tax increment financing as a potential tool for implementation in the GTHA, some key points were identified for consideration by Metrolinx:

- Each transportation infrastructure investment should be evaluated to determine if the benefits would flow to any priority redevelopment areas. In such cases, it may be desirable to establish TIF zones in those areas to capture the incremental property tax revenues created by the increase in property values if this can help finance and thereby expedite the investment in question.
- Differences in land prices and development potential can result in large variations in revenue potential and there is no guarantee of revenue sustainability; this can create funding (debt service) issues if bonds are issued upfront based on the projected future TIF revenues.
- When issuing bonds against future TIF revenues, you are simply bringing forward the future tax revenues to the present. It is not necessarily a “new” funding source, rather a means of tapping future revenues today.
- Tax increment financing is a useful tool for generating immediate funding (albeit, relatively low in the early years), though it is unlikely to affect travel behaviour outside of the impact of the proposed transportation investment.

W.4.2 Lessons from Case Study

Relevant lessons from the overview of TIF in the US include:

- When implemented effectively, TIF can contribute to the redevelopment of an area that may otherwise have remained blighted
- TIF can have a significant role in financing infrastructure packages, provided that the future property tax revenues at stake are not already leveraged through other instruments
• TIF should focus strictly on areas targeted for redevelopment, which would otherwise have difficulty attracting funding.
• Widespread use of TIF in an urban area is much more likely to create significant economic distortions by diverting resources from other areas which would have been preferred by investors and developers in the absence of any incentives.
X. Tool Profile: Utility Levy

X.1 Overview of Tool

X.1.1 How the Tool Works and Where it is Being Used

A transportation utility levy is a monthly fee that can be collected from residences and businesses within a region to help fund transportation initiatives. The fee can be implemented as a fixed dollar amount that is collected through the City's regular utility bill.

To date, 12 Oregon communities have adopted transportation utility programs to augment shrinking roadway maintenance revenues from gas taxes and other sources. Port Orange in Florida has also used the tool successfully. In Vancouver, TransLink has implemented a $1.90/month hydro levy which generates just over $18M annually.

X.1.2 How the Tool is Being Considered for Evaluation

For the purpose of this analysis, a utility levy is being considered as a monthly charge on all dwelling units (including ownership and rental) within the GTHA. This charge would be in addition to the charges already incurred for household utilities. The evaluation excludes levying the charge on businesses.
X.2 Tool Evaluation Results

X.2.1 Revenue Potential

A utility levy implemented within the GTHA has the potential to generate a moderate amount of revenue. For the purposes of developing a revenue estimate for the tool, a fixed monthly levy per private dwelling has been assumed.

Based on the assumption of approximately 2.1 million dwelling units in the GTHA, a $3.00 per month levy has the potential to generate between $85 million and $95 million annually. Assuming a growth factor in the number of private dwellings in the region of 2.50%, the revenue potential of the tool could be $105 million to $115 million by 2021.

In addition, a $3.33 per month per dwelling unit is set as the upper bound charge to the public. This upper bound was determined based on a rough estimate of the applicable range for the estimated elasticity of demand relevant to household access to utilities. It is expected that at a rate greater than $3.33 per month, the demand response may diverge significantly from that implied by the point estimate used in the dynamic revenue calculation.

The implementation of this levy would impact all private dwelling owners and occupants in the GTHA. Revenues are expected to be sustainable as the number of people residing in the region and paying utilities will likely be maintained into the future. Similarly, shifts in the economic cycle will have little effect on the revenues being generated by the tool.

The revenue estimate provided for this tool only reflects charges being levied on dwelling units within the region. If the utility levy were to be extended to businesses within the region, there is the potential to generate higher revenues, but would likely increase the economic displacement effects associated with the tool.

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<td>Revenue Potential</td>
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<td>Sustainability</td>
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<tr>
<td>Cyclical Variability</td>
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### Static Revenue (2014) (before adjustments)

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<th>Yield for $1</th>
<th>Rate for $100M yield</th>
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<tbody>
<tr>
<td>$30M</td>
<td>$3.30/month</td>
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### Upper Bound Rate

<table>
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<th>Annual Yield from Upper Bound Rate</th>
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</thead>
<tbody>
<tr>
<td>$3.33 / month</td>
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<tr>
<td>$102M</td>
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</table>

### Dynamic Revenue – $3.00/month (after behavioural adjustments)

<table>
<thead>
<tr>
<th>2014</th>
<th>2021</th>
</tr>
</thead>
<tbody>
<tr>
<td>$85M - $95M</td>
<td>$105M - $115M</td>
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</table>
X.2.2 Incremental Costs

Implementing the levy under the current utilities billing regime will minimize any incremental costs.

There may be additional administrative expenses associated with the collection and remitting of the revenues to Metrolinx from multiple utility providers / hydro companies. The introduction of a flat fee will not require additional metering infrastructure.

X.2.3 Impact on Behaviour and Transportation Network Performance

A utility levy will have no impact on travel behaviour or performance of the transportation network. The levy will have no impact on transportation time savings or auto use patterns and will not cause any modal shifts in transportation. In addition, the tool is not expected to have any land use impacts.

X.2.4 Scheme Design

The transportation utility levy considered in this analysis is a monthly fee that is collected from residences within the Region to help fund transportation initiatives. The fee is set up as a fixed dollar amount and is collected through monthly utility bills.

Transportation utility levies have been resisted by residents in the past due to the taxing nature of the charge. Pricing should be cognizant of the fact that there is little scope for residents to avoid the charge. The charge could be scaled (like other property taxes) to be fairer to small households, low energy users, low-income households, etc. Similarly, different rates can be attributable to a 3 bedroom semi-detached versus a 4 bedroom detached etc. The levy can also be tiered according to postal code addresses, with addresses easily accessible by different modes of transportation paying a higher levy in recognition of higher service quality (e.g., downtown Toronto).

Implementing a dynamic pricing structure (as outlined in the paragraph above) will reduce the scheme’s transparency and increase the administrative costs associated with implementation.
X.2.5 Technical Implementation Considerations

Implementation of an additional levy should be straightforward, with the new charge being easily added to monthly utility bills. Therefore, following legislative approval the levy can be implemented almost immediately.

The costs of implementation should be minimal as collection of monthly fees can continue to be processed through mechanisms that are already in place.

X.2.6 Governance Considerations

Regulatory approval is likely to be required to implement the new tax. Utility providers will be obliged to collect the levy on behalf of the Province and/or Metrolinx.

These companies already remit taxes to the Province and the Utility Levy can be included with these remittances. As it will be a flat rate, tracking the revenues collected from the levy and where the money is going should be relatively straightforward.

A minor, yet important detail that should be determined is which utility bill the levy should be attached to (e.g., electricity, gas or hydro). Legislation may also be required to define who is ultimately liable for the levy in the case of landlord and tenant (i.e., home owners or home occupants). Other items for consideration would be homes not yet connected to all utilities such as gas mains and how the levy should be charged to these residences.

If a utility levy is introduced as a direct source of revenue for improving public transit within the region, users should have a fairly good understanding of where their money is going. The use of a dynamic pricing model may have a negative effect on the transparency of the scheme, but may be a more equitable pricing option.
X.2.7  **Equity and Distributional Impacts**

All owners/occupants of a private residence within the GTHA must pay the fee. The charge is unlikely to displace economic activity or result in people moving outside of the GTHA to avoid paying the levy.

A flat charge on all household may be perceived to be inequitable and lead to public backlash, especially in areas poorly supported by public transport. While the rate can be applied equally across the region, a flat monthly fee is likely to place a disproportionate funding burden on lower income groups when compared to other groups, measured as a share of income. The use of a variable pricing scheme that is dependent on household size, energy efficiency, proximity to transit or other factors may a be more vertically equitable solution.

<table>
<thead>
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<th>Criteria</th>
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<td>Horizontal Equity</td>
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<tr>
<td>Vertical Equity</td>
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</tr>
<tr>
<td>Availability of Alternatives</td>
<td>1</td>
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</tbody>
</table>

X.2.8  **Overall Efficiency Impact**

The overall efficiency impact of a utility levy will be marginally negative as there is little scope for avoiding the charge. The charge will not result in any changes in travel behaviour, nor will it improve the performance of the transportation network.

There may be some costs arising from economic distortions. However, these are likely to be small. While it is not a feasible option for most households to disconnect their residence from the public electrical grid and to use alternative energy sources instead, it is possible that the utility charge contributes to the cost of accommodation in the GTHA and thereby makes the region a marginally less attractive for current and potential residents. This suggests the overall efficiency impacts of a nominal utility charge would likely be very small.

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<td>Costs of Economic Distortions</td>
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<tr>
<td>Overall Incremental Costs</td>
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</table>

X.3  **Case Study**

*No case study of a utility levy has been undertaken for this paper.*
X.4 Lessons for Metrolinx

X.4.1 Lessons from Revenue Tool Evaluation

Through the evaluation of a utility levy as a potential tool for implementation in the GTHA, some key points were identified for consideration by Metrolinx:

- A fixed monthly levy per dwelling unit may be beneficial when introducing the tool to allow for users to become familiar with the process and it may also help make the implementation easier; then, graduating to a tiered approach could increase revenues, though it would likely increase the administrative cost and could entail additional economic distortions (such as relocation of residents of the GTHA to areas unaffected by the charge or affecting the location choice of new migrants and businesses). A dynamic pricing model may also have negative effects on the transparency of the scheme.
- Legislation may be necessary to define who is liable to pay the levy in the case of landlord and tenant i.e. home owners or home occupiers.
- Pricing needs to be cognizant of the fact that there is little scope for residents to avoid the charge.
- A utility levy has limited revenue potential.
- There is little scope for avoiding a utility charge, and it entails only small economic distortions.
Y. **Tool Profile: Vehicles Kilometres Travelled Fee**

Y.1 **Overview of Tool**

Y.1.1 *How the Tool Works and Where it is Being Used*

In a VKT system, drivers pay a charge for every kilometre that they travel within a designated area or in all areas. A driver’s VKT is tracked through odometer readings or GPS tracking.

VKT charging has been proposed as an alternative to gas taxes currently in use in many jurisdictions. It is currently being used for tracking truck VKTs in Austria and Germany, although the tracking is limited to the Federal motorway network.

Y.1.2 *How the Tool is Being Considered for Evaluation*

For the purposes of the analysis, it has been assumed that VKT charges would be applied to all drivers (trucks and passenger vehicles) in the GTHA on all highways and arterial / local roads within the region. To achieve this, in vehicle GPS units with transponders would likely be installed in all vehicles to assist with tracking VKT. Since there are considerable costs associated with the installation of GPS devices on all cars, it is likely that a pilot area or two would be used to test the technology and assess how well VKT is tracked prior to implementing the tool across the entire GTHA. Additional considerations would be needed for visiting vehicles.
Y.2 Tool Evaluation Results

Y.2.1 Revenue Potential

A vehicle kilometres travelled fee has the potential to generate a significant amount of revenues within the region, with the potential for over $1 billion annually. For the purposes of generating a revenue estimate from the implementation of a VKT charge, a fixed fee per kilometre travelled on all highways and arterial roads for passenger vehicles and trucks within the GTHA has been assumed.

Revenue estimates are based on total kilometres travelled in the GTHA. The 2009 estimates were 20.7 billion passenger vehicle highway VKT, 3.2 billion truck highway VKT, 31.0 billion passenger vehicle arterial VKT and 1.0 billion truck arterial VKT\(^1\). A $0.05 per kilometre charge could generate revenues between $2.5 billion and $3.5 billion annually by 2014 (if the tool were fully implemented). Assuming a traffic growth factor of just 1.5%, the tool could generate between $2.8 billion and $3.8 billion in 2021. Similarly, including the behavioural response, a rate of $0.03 per kilometre are estimated to generate $1.4B to $1.9B in revenues in 2021 (after taking into account the cost to implement and operate).

While revenue estimates have been provided based on the assumption that VKT will be fully implemented across the region, it is more likely that several pilots will be conducted prior to launching the scheme across the region. As such, the revenue estimates provided are not likely to be attainable in the short-term.

Further, if an upper bound rate of $0.10 per kilometre is used, there is the potential to generate over $6.0 billion annually. This upper bound was determined based on a rough estimate of the applicable range for the estimated price elasticity of demand for vehicle travel. It is expected that at a rate greater than $0.10 per VKT, the demand response of users may diverge significantly from that implied by the point estimate used in the dynamic revenue calculation.

\(^{1}\) Based on Metrolinx analysis of information provided in the 2009 Canadian Vehicle Survey
The implementation of this levy would impact all drivers travelling within the GTHA and is a reasonable way to directly charge users of the road network. Revenues from this tool are expected to be sustainable but will depend on the pricing structure of the tool. Shifts in the economic cycle will have an effect on employment levels and to an extent the amount of discretionary travel which could adjust the amount of kilometres travelled. The use of dynamic toll rates could help insulate revenues even more from changes in the economic cycle; however, for the purposes of this evaluation, tolls have been assumed to be fixed.

There is the potential for a significant shift from cars to other modes of transportation. The added costs of driving would likely reduce the number of cars on the road and thus reduce congestion on highways and arterials. However, if implemented on all major highways within the region, there are few alternatives for essential travel and it is likely that many users would pay the tolls. The behavioural adjustments are likely to reduce revenue in initial periods, depending on speed of adjustment.

The revenue estimates provided are based on the total number of vehicle kilometres travelled on all highways and roads within the GTHA. Since VKT has not been rolled-out on a large scale before, there is significant uncertainty around how much the kilometres travelled in the GTHA will be affected by the implementation. As a result, a fairly broad revenue estimate has been provided.

### Y.2.2 Incremental Costs

The incremental costs associated with the implementation of a VKT tolling scheme would be significant. To effectively monitor and measure the kilometres travelled, special GPS equipment would be required for every vehicle. This would be very expensive to install and maintain. There would also need to be systems put in place that would receive the information from the GPS monitors on the vehicles for the purposes of monitoring movement for tolling purposes.

In addition the operating and compliance costs associated with this tool are quite significant as well. When considering the fact that this tool has not been implemented on a large scale, it is inevitable that administrative and compliance costs will be higher than expected in the early years and decrease over time.

According to the Transportation Research Board’s examination of the Netherlands VMT fee system, administration and collection and enforcement costs are low in comparison to regular

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road tolling schemes. Their report finds that administration costs represent approximately 3.4% of revenues, while collection and enforcement costs for maintaining the system are around 1% of revenues (compared to their examination of tolling agencies in the report which indicated “that approximately 20% of revenue may be spent on collecting tolls”).

Y.2.3 Impact on Behaviour and Transportation Network Performance

Instituting VKT tolls could have a significant effect on the overall performance of the transportation network through reduced congestion on all major highways. The added costs of driving would likely reduce the number of cars on the road, thus reducing congestion on highways and arterials. A reduction in the number of vehicles on the road and the kilometres travelled will also lead to savings due to decreased auto use, a reduction in traffic collisions and air pollution and emissions savings.

The scheme possesses strong potential to result in significant positive effects on travel behaviour (mode shifts and suppressing / regrouping low value trips).

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<tr>
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<th>Assessment (1 to 5)</th>
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<tbody>
<tr>
<td>Overall Impact on Behaviour and Network Performance (simple average)</td>
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<tr>
<td>Impact on Network Performance</td>
<td>5</td>
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<tr>
<td>Time Savings</td>
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<td>Savings Due to Decreased Auto Use / Fuel Savings</td>
<td>5</td>
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<tr>
<td>Reduction in Traffic Collisions</td>
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<tr>
<td>Air Pollution and Emissions Savings</td>
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Y.2.4 Scheme Design

This scheme would result in drivers paying a charge for every kilometre that they travel within a designated area or in all areas. Each individual vehicle’s distance travelled is tracked through odometer readings or GPS tracking.

In order to address Metrolinx’s revenue requirements as well as cause positive behavioural change, a time-of-day or peak/off-peak pricing (i.e., two rates only) scheme could be implemented. Such a scheme could help reduce congestion and have the potential to result in significant time savings. In this case, it is likely that a public education campaign would be required to ensure drivers understood how they were being charged.

Y.2.5 Technical Implementation Considerations

Because of the inherent complexity of this scheme, VKT programs have not been rolled-out on a large scale before. Therefore there are likely to be significant challenges in implementation (more so than on other road pricing tools).

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<th>Criteria</th>
<th>Assessment (1 to 5)</th>
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<tbody>
<tr>
<td>Ease of Implementation</td>
<td>1</td>
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<tr>
<td>Time to Implementation</td>
<td>1</td>
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</table>
In the most extensive and efficient approach to implementing this scheme, special GPS equipment is required to be installed in every vehicle. GPS is currently the most practical way to accurately measure the distance a vehicle travels since traditional gantry systems (suggested for other road pricing schemes) would be too infrastructure intensive and lack accuracy. The use of GPS devices would present some logistical challenges and have a relatively high cost of installation/maintenance. Additionally, there may be a lengthy approval process given the perceived privacy concerns associated with GPS tracking.

The cost of implementing this scheme could be mitigated slightly by integrating GPS transponders with other tolling collection systems; however, the positive impact of this may be minimal and could be offset by additional back-end system requirements and administration.

By integrating GPS transponders, it may also be possible to implement “smart parking” in the GTHA, whereby the authorities would be able to direct drivers to available parking spaces using the GPS monitoring. This could potentially reduce congestion and driving time.

Y.2.6 Governance Considerations

Implementing road use tolls based on VKT in the region will require additional authority from the Province and municipalities in the case of municipally-owned highways and local roads (e.g., Section 41 and 116 of the City of Toronto Act require the City to file for regulations to allow them to impose road use tolls). Additional regulations will need to be put in place to allow Metrolinx (or municipalities) to charge and collect tolls related to the use of roads.

If this scheme is implemented across the GTHA, it may be beneficial for a single authority (e.g., Metrolinx) to monitor and collect the road use revenues due to the resulting reduction/efficiencies that can be achieved in performing the administrative functions associated with collection. This could be done by either Metrolinx or a private sector operator (although using a private sector operator may deepen the concerns around privacy and the intended use of the data collected by the operator).

The public is less familiar with VKT than other tolling methods and may be reluctant to accept this additional charge. If VKT fees are introduced as a direct source of revenue for improving public transit within the region, users should have a fairly good understanding of how this money is being used. A comprehensive education campaign will be necessary to improve the transparency of the scheme for the public as they would be less familiar with VKT than other tolling methods.

In order to protect the privacy of user information, there may be a legislative requirement to protect customer data and define the context in which it can be utilized by tolling authorities, law enforcement authorities, traffic control, emergency services, etc.
Y.2.7  Equity and Distributional Impacts

Unlike the HOT lanes scheme, using a VKT scheme leaves drivers with few alternatives (other than public transit) to avoid the cost. By definition, any distance travelled in the designated region would result in the driver being charged. The impact of this scheme would also be felt more broadly than a conventional road tolling scheme, affecting travel in surrounding areas as well.

The cost burden will be borne by all drivers in the GTHA and in particular, would impact commuters who may not have easy access to public transportation as an alternative to driving. This tool would likely place a higher proportion of the funding burden on individuals in rural and suburban areas of the region when compared to individuals in urban areas, who are in closer proximity to public transit. Additionally, lower income individuals who use a car will bear a disproportionate amount of the funding as measured as a share of their income.

Y.2.8  Overall Efficiency Impact

VKT fees are expected to have a significant positive impact on the productivity and competitiveness of the GTHA region by facilitating high-value trips and through mode-shifting and suppressing lower-value trips.

In the short-term, positive efficiency impacts may be possible if the value of travel time savings and improved safety (fewer collisions) exceed the value of the capital expenditures and operating costs required for implementing this scheme. It is likely that technology costs and the associated operating costs will trend downward over time which could increase the overall efficiency of the scheme.

The tool also has the potential to have positive, long-term impacts on the location of work, residences and amenities within the region. Having said that, a VKT scheme may impact the location of some economic activity, particularly for transport-related businesses, as the costs of doing business within the GTHA region will increase. These businesses may relocate or adjust their business model to avoid paying the additional tolls. This effect could be mitigated by extending the tolled network to include key provincial or municipal highways outside the GTHA but inside the GGH.
We would expect that the overall efficiency impacts of a well-considered VKT scheme would be positive, because the value of the changes in behaviour and improved network performance is likely to exceed the incremental capital and operating costs associated with implementing such a scheme.

**Y.3 Case Study**

*No case study of a VKT charge (or pilot scheme) has been undertaken for this paper, although we have drawn on the lessons from the German truck toll in Section M.3.*

**Y.4 Lessons for Metrolinx**

**Y.4.1 Lessons from Revenue Tool Evaluation**

Through the evaluation of a vehicle kilometres travelled fee as a potential tool for implementation in the GTHA, some key points were identified for consideration by Metrolinx:

- There are significant capital costs associated with this tool and these costs should be carefully analyzed prior to implementation.
- This tool is inherently complex due to the tracking required for billing purposes, potentially requiring special GPS equipment installed in every vehicle. It has never been rolled out on a large scale before, which can likely result in significant challenges in implementation. It is important that the strategy for implementation is well thought out prior to incurring significant start-up costs.
- This scheme may give rise to major perceived privacy concerns associated with the use of GPS or other monitoring technology on private individual’s vehicles.
- VKT fees can be a great tool for managing congestion on highways and increasing time savings for road users.
- A VKT scheme can address some of the perverse side-effects of a highway toll, such as trip diversions to arterial roads. This would also mean that drivers and truck carriers would have few alternatives (outside of behaviour change) to avoid a VKT charge.
- The German truck toll suggests that the impact of tolls on final goods prices are very small (i.e. price increases less than 0.15%) even when the full toll charge is passed onto end user goods prices. This is because transportation costs are a very small proportion of final goods prices.
Z. **Tool Profile: Vehicle Registration Fee**

Z.1 **Overview of Tool**

Z.1.1 *How the Tool Works and Where it is Being Used*

A vehicle registration fee is a fee paid by vehicle owners upon registering a new vehicle and renewing that registration annually. This tool is based on vehicle ownership as opposed to vehicle usage. As a result, the cost of ownership becomes slightly more expensive while operating costs are not impacted.

Vehicle registration fees are used in New York City and the Province of Quebec and were recently used in Toronto before they were removed in January 2011.

Z.1.2 *How the Tool is Being Considered for Evaluation*

For the purpose of this analysis, it is assumed that an annual registration fee per vehicle would be levied on all vehicles registered by residents of the GTHA. Vehicle registration charges are currently collected on an annual basis and it is assumed that those fees would increase to include a dedicated transportation funding portion of the fee. It is assumed that the current collection mechanism can continue to be employed through Service Ontario with the portion of the fee dedicated to transportation funding being remitted to Metrolinx.

The fee can be a flat rate per vehicle or could be tiered according to vehicle class, engine size/CO$_2$ emissions or vehicle value. For the purposes of this evaluation, a flat fee per registration event has been assumed.
Z.2 Tool Evaluation Results

Z.2.1 Revenue Potential

A vehicle registration fee has the potential to generate a fairly substantial amount of revenues within the region, depending on the amount of the tax. Prior to 2011, the City of Toronto collected a vehicle registration tax of $60 per year per personal vehicle which generated approximately $50 million annually. For the purpose of generating a revenue estimate from the implementation of a vehicle registration fee in the GTHA, a fixed annual registration fee per vehicle has been assumed.

Based on the assumption of approximately 3 million vehicles registered in the GTHA in 2006 (based on TTS data), a $50 fee has the potential to generate between $120 million and $200 million in revenues in 2014. Assuming a growth rate in the number of vehicles registered in the region of 1.80%, the tool could generate between $145 million and $225 million in 2021. Similarly, in 2021 a $100 charge per renewal could generate $300 million to $400 million of revenues in 2021.

Further, if an upper bound rate of $200 per year is used, there is the potential to generate over $700 million annually. This upper bound was determined based on a rough estimate of the applicable range for the estimated elasticity of demand for vehicle registrations. It is expected that at a rate greater than $200 per year, the demand response of users may diverge significantly from that implied by the point estimate used in the dynamic revenue calculation.

The implementation of this tool would impact all owners of vehicles registered in the GTHA region. It may have an impact on vehicle ownership with lease and rental options possibly being preferred by infrequent drivers; however, the scale of the charge envisaged is unlikely to have a significant modal impact.

On its own, revenues from a vehicle registration fee would be expected to remain relatively flat and perhaps increase slightly as the fee is increased over time. However, if implemented with other tools that increase the cost to drivers, this could reduce the number of drivers in the GTHA, thus potentially reducing revenues over time. Additionally, shifts in the economic cycle may have a slight impact on revenues on a year-by-year basis.

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<thead>
<tr>
<th>Criteria</th>
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<td>Revenue Potential</td>
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</tr>
<tr>
<td>Cyclical Variability</td>
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</table>
Z.2.2 **Incremental Costs**

Incremental costs associated with implementing a vehicle registration fee are expected to be minimal as payment and collection mechanisms already exist for vehicle registration fees. This tool could leverage existing systems and vehicle registration procedures.

There may be some incremental administrative costs associated with processing the collection of the new tax and remitting to Metrolinx; however, these costs are not expected to be significant.

Z.2.3 **Impact on Behaviour and Transportation Network Performance**

Instituting a vehicle registration fee is not expected to have any material impact on the performance of the transportation network. While there may be a marginal reduction in the level of vehicle ownership, the actual number of cars on the road is expected to remain relatively unchanged.

If the fee being charged is high enough, it may deter some individuals from owning vehicles within the region.

Z.2.4 **Scheme Design**

A flat rate per vehicle may be beneficial when introducing the tool to allow for users to become familiar with the process and it may also help make the implementation easier; then, graduating to a more dynamic pricing system could increase revenues.

This fee could vary with vehicle class, vehicle efficiency (in terms of engine size or emissions) or vehicle value. If the fee is structured correctly, it could encourage favourable car purchases such as more efficient vehicles. While the fee is unlikely to result in any significant change in ownership levels, if it is priced too high, it could result in infrequent road users seeking rental or lease vehicle alternatives.

The registration fee charged in the City of Toronto prior to the abolishment of this tax should be considered when setting the fee amount to ensure that the fee is not priced too aggressively in comparison to what the City of Toronto charged historically.
Z.2.5  **Technical Implementation Considerations**

It is expected that this tool would be implemented in the GTHA by adding an additional fee to the vehicle registration fee already paid by drivers upon registration (and registration renewal). The fee is expected to be collected by the Province of Ontario using their existing payment and collection mechanisms and subsequently transferred to Metrolinx. The dedicated transportation funding tax proceeds will then be used by Metrolinx to implement transportation initiatives.

The fee can be implemented almost immediately after receiving the necessary approvals. In Toronto, implementation may be unpopular, as the vehicle registration fee was recently abolished. Costs should be minimal as collection will be through payment mechanisms that already exist.

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<th>Criteria</th>
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<td>Time to Implementation</td>
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Z.2.6  **Governance Considerations**

Regulatory approvals will be required before implementing a vehicle registration fee, though the type of approval required depends on whether it is structured as a tax or a fee. It is possible to explicitly state that the fee will go toward improving transit within the region to prevent any opposition during the approvals process.

Fees could be collected by the Province and transferred to Metrolinx, and as a result there would not be a need for any legislative amendments surrounding changes in collection responsibilities. The additional fee could be integrated with the existing vehicle registration system.

The use of public education campaigns could help improve the transparency of the scheme as the public can be clearly informed that the fee will go towards improving transit in the region.

<table>
<thead>
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<th>Criteria</th>
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<td>Municipal Role?</td>
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</table>

Z.2.7  **Equity and Distributional Impacts**

The availability of alternatives to this tool is limited. GTHA residents who own their vehicle will not be able to avoid the fee. The alternatives include renting or leasing a car or considering other transportation modes. The fee is unlikely to lead to modal shifts for the majority of road users.

Since the tool is related to vehicle ownership, only individuals who own their vehicles will be subject to the fee. If the tool is structured as a flat rate, all owners will pay the same fee across the region and will generally share the funding burden; however, lower income groups will be

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<td>Horizontal Equity</td>
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<tr>
<td>Vertical Equity</td>
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<td>Availability of Alternatives</td>
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</table>
paying a higher proportion measured as a share of their income when compared to other groups. The use of a variable pricing scheme that is dependent on vehicle type, energy efficiency or other factors may be a more equitable solution.

If a vehicle registration fee is introduced as a direct source of revenue for improving public transit within the region, users should have a fairly good understanding of where their money is going. There is a reasonable connection between vehicle ownership and improvement of transit.

**Z.2.8 Overall Efficiency Impact**

Overall efficiency impacts will be negative but small in magnitude. This is because there may be some costs associated with economic distortions. These distortions include all changes in behaviour designed to avoid or mitigate the impact of the tax, including:

- Not purchasing a vehicle or delaying the purchase of a vehicle (e.g., relevant for young adults in a multi-vehicle household)
- Increased sharing of vehicles (not carpooling) in place of purchasing an additional vehicle
- Changing the location of vehicle registrations. For example, people with a second home outside the GTHA could potentially succeed in registering their vehicle at this second location. The same goes for students or other workers with an alternative residence outside the taxed jurisdiction

The changes in travel behaviour resulting from this tool are likely to be insignificant.

The overall efficiency impacts of this revenue tool will tend to be negative and entirely attributable to the costs of economic distortions. However, these costs are likely to be relatively small in magnitude.

**Z.3 Case Study – Minnesota Motor Vehicle Sales Tax (MVST)**

The case study most relevant to this revenue tool is the vehicle sales tax examined as part of the overview of excise and other sales taxes. The rationale is that a vehicle registration fee adds to the fixed cost of vehicle ownership, as does a vehicle sales tax. This is in contrast to fuel taxes, tolls and parking charges, which add to the variable costs of auto usage—the charges are incurred only if the vehicle is used.
Z.3.1  How the Tool Works
We examined the Motor Vehicle Sales Tax (MVST) in Minnesota as part of our case study on sales and excise taxes. The MVST is a 6.5% tax on sales of the majority of new and used vehicles in Minnesota.

Z.3.2  Policy Objectives / Motivation
Twelve states have vehicle sales tax revenues dedicated to transportation, of which Minnesota is one. The Minnesota Motor Vehicle Sales Tax (MVST) was not originally intended for transportation funding but has evolved to become a key source of funding for the sector.

Z.3.3  Revenue Potential and Pricing
Vehicle sales taxes can be important revenue generators, as in the case of the MVST, which was expected to generate US$252M in 2012. However, the revenue yield has been declining since 2006, suggesting that it is sensitive to the business cycle.

Z.3.4  Impact on Travel Behaviour and Network Performance
The most likely behavioural effects for sales and excise taxes on a narrow consumption base are largely unintended (from a policy perspective) and involve shifting purchases to lower-value items, such as lower-value vehicles, which may not mean lower-emission vehicles. Yet, the largest inefficiency costs are associated with shifting purchases to non-taxed or lower-taxed jurisdictions.

Z.3.5  Technical Implementation Considerations
Vehicle sales taxes are relatively easy to implement, which can usually be achieved within a year following legislative approval. These sales taxes are collected by dealerships or when the (used) vehicle is registered. The remittances to tax authorities are made monthly or quarterly, depending on the level of sales.

Z.3.6  Governance Considerations
The MVST was enacted by the Minnesota legislature and will be dedicated entirely to transportation uses as of fiscal year 2012, with the revenues split 60/40 between the highway fund and public transit.

A sales tax such as the MVST is characterized by some degree of transparency if it is visible to buyers. (Note that not all sales taxes are equally visible). However, the buyers may not be fully aware of the use made of the funds.
Z.3.7  **Equity and Distributional Considerations**

Sales taxes such as the MVST usually rate poorly in terms of horizontal equity, which refers to the application of the user/beneficiary pays principle. However, the MVST is an exception in that the revenue generated is destined to the transportation sector.

In terms of vertical equity, these taxes appear to rank relatively well, because the goods and services subject to these taxes are not essential goods. To ensure the best vertical equity ratings, users should be charged on the basis of ad valorem, as in the case of the MVST, thereby ensuring that users pay more when they purchase higher end goods and services.

Z.3.8  **Overall Efficiency Impact**

Sales taxes such as the MVST are likely to entail much higher efficiency costs than broad-based and country- or province-wide consumer sales taxes, because they are typically applied to a narrow consumption base (i.e. to very small parts of overall consumer spending) and often to restricted geographic areas. Hence, consumers are likely to be fairly sensitive to changing their consumption patterns in response to these excise taxes, including the value and types of goods and services purchased as well as the locations where they are purchased. These inefficiency costs are likely to lie at the top end of the following range: from $0.12 to $0.38 per dollar of revenue generated. In addition, we would need to add the costs of administering each tax, which are not included in the above estimates and could be significant.

Z.4  **Lessons for Metrolinx**

Z.4.1  **Lessons from Revenue Tool Evaluation**

Through the evaluation of a vehicle registration fee as a potential tool for implementation in the GTHA, some key points were identified for consideration by Metrolinx:

- A flat rate per vehicle may be beneficial when introducing the tool to allow for users to become familiar with the process and it may also help make the implementation easier; then, graduating to a tiered approach based on vehicle class, engine size/CO2 emissions or vehicle value could have other desirable properties in terms of incentivizing the purchase of lower-emission vehicles and vertical equity.
- The availability of alternatives to this tool is limited and could result in a relocation of vehicle intensive industries, such as taxi companies, trucking companies and car rental agencies if the fee is high enough.
- A vehicle registration fee is a good tool to derive a modest amount of income without resulting in tangible changes in driver behaviour or performance of the network.
- Avoid a high fee, which could lead to large economic distortions.
- Apply the fee to as broad a geographic area as feasible. Ideally, this would mean a province-wide fee. Should that not be feasible, a fee applied to the Greater Golden Horseshoe would also be preferable.
## Appendix – Summary of Revenue Tool Scores

<table>
<thead>
<tr>
<th>Revenue Potential</th>
<th>Costs</th>
<th>Overall Impact on Behaviour and Network Performance</th>
<th>Technical Implementation Considerations</th>
<th>Governance Considerations</th>
<th>Equity and Distributional Impacts</th>
<th>Economic Efficiency</th>
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