June 27, 2016

Executive Committee
City of Toronto
c/o City Clerks Office
100 Queen Street West
9FL West Tower
Toronto, Ontario M5H 2N2

Dear Mayor John Tory and members of the Executive Committee,

Re: EX16.3 – Updated Assessment of Revenue Options under the City of Toronto Act, 2006

On behalf of both CAA South Central Ontario (CAA SCO), a not-for-profit automobile club representing over two million road users, and the Trillium Automobile Dealers Association (TADA) representing over 1,000 new car dealers of every brand and franchise across Ontario, we submit this joint letter to Executive Committee as you consider potential revenue options for the City of Toronto.

As you know, the proposal to implement a motor vehicle registration tax was previously passed in the fall of 2008 but was later repealed following considerable public opposition in early 2011. The consensus around Council was clear with the vote being 39-6 in favour of repealing the tax.

When enacted, the former “vehicle registration tax” penalized motorists and motorcycle users by imposing a tax on Torontonians, separate from the fees already charged and collected by the province, at an annual rate of $60 and $30 respectively.

In a recent survey conducted among CAA members, only 22% support municipalities having the ability to charge a vehicle ownership registration tax. Similarly, a public poll conducted by Nanos Research for TADA (attached) earlier this year, showed that nearly three quarters of Ontarians oppose any new taxes on motor vehicles.

The Nanos survey also identified that approximately 83% of Ontarians surveyed view automobile ownership as a necessity and imposing this additional tax burden on motorists would be unfair and regressive. Recognizing that the City of Toronto faces pressure on its capital spending needs and coupled with potential budget shortfalls, we understand that generating new forms of sustainable revenue must be found. However, we caution you to avoid imposing new taxes targeting drivers and automobile retailers who already contribute billions of dollars in revenue every year, to all three levels of governments.

A report produced by the Conference Board of Canada (see attached) identified that a significant portion of road infrastructure costs in the province is funded through the taxation of motorists.

Rather than simply impose new taxes, we urge you to approach the provincial and federal governments to provide additional funding to meet the needs of your capital budgets. We also encourage the city to continue to identify additional cost savings which could be dedicated toward infrastructure improvements.

Moreover, as we have seen provincially, it is imperative that any new costs collected are dedicated to specific initiatives (e.g. road infrastructure).

Thank you for your time in considering our concerns and we look forward to speaking with you about this issue should you require further information.

Respectfully submitted,

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CAA South Central Ontario (CAA SCO)

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The Conference Board of Canada

WHERE THE RUBBER MEETS THE ROAD

How Much Motorists Pay for Road Infrastructure.

REPORT OCTOBER 2013

The Conference Board of Canada

Where the Rubber Meets the Road: How Much Motorists Pay for Road Infrastructure
by *Vijay Gill* and *John Lawson*

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Preface

Remedies to address road congestion are often predicated on the presumption that road users do not cover road infrastructure costs. This report estimates the extent to which road users and particularly light-duty vehicle users cover their costs in Ontario. In addition, it estimates the extent to which road users cover infrastructure costs in Ontario's largest urban area, the Greater Toronto and Hamilton Area (GTHA).

The report finds that road users in Ontario cover a significant portion of road infrastructure costs and that cost recovery in the GTHA is higher than it is for the province as a whole. A subsequent report will further interpret these results and place them into the context of the broad principles that should govern our infrastructure policy.

Contents

Acknowledgements

The authors thank Teresa Di Felice and Christine Allum of the Canadian Automobile Association South Central Ontario (CAASCO) for initiating and defining the research and research questions. The authors thank Robin Lindsey and Harry Kitchen for their comments on an earlier draft of this report. They also thank members of the Centre for Transportation Infrastructure, including staff at the Ontario Ministry of Infrastructure, for their comments on an earlier draft. Thanks also go to various individuals at Transport Canada, Ontario Ministry of Transportation, Natural Resources Canada, Environment Canada, and the Ontario Good Roads Association for their responses to inquiries during the research and data collection process. Finally, the authors thank Trevor Foster, Michael Grant, David Stewart-Patterson, and Glen Hodgson of The Conference Board of Canada for their comments and/or research support.

The Conference Board also acknowledges the CAASCO for financially supporting this research. In keeping with Conference Board guidelines for financed research, the design and method of research, as well as the content of this report, were determined solely by the Conference Board. The Conference Board of Canada alone is responsible for the report's methodology, scope, and findings—including any errors and omissions.

Executive Summary

Where the Rubber Meets the Road: How Much Motorists Pay for Road Infrastructure

At a Glance

- Remedies to address road congestion are often predicated on the presumption that road users do not cover road infrastructure costs.
- This report provides estimates of the extent to which motorists in Ontario cover infrastructure costs.
- Light-duty vehicle users cover a significant portion of road infrastructure costs. In addition, cost recovery in the Greater Toronto and Hamilton Area is likely significantly higher than at the provincial level.

Most people agree that road congestion is a problem, but there is considerably less of a consensus on what to do about it. Should we build more transit or road infrastructure? Should we introduce tolls or increase fuel taxes? Should we be more prescriptive in terms of restricting the growth of residential and commercial areas?

Economists seem to agree that we have the structure of road prices wrong, and that some form of road tolls, which vary by time and place, are part of the answer. In this case, do we simply restructure the prices in order to collect the *same* amount of revenue? Or do we restructure prices and, as well, collect *more* or *less* revenue? If more, how much more do we need? And what do we do with that revenue?

There are no simple and straightforward answers. But virtually all of these questions are related to a single presumption—that road users are heavily subsidized. And, as a result, road users don't consider the full costs of their behaviour in their individual decision-making. To begin answering these questions, it is necessary to first quantify the extent to which road users are subsidized. This is the key focus of this report, using the Province of Ontario as the target of our analysis. A subsequent report will elaborate on the policy implications.

INFRASTRUCTURE COST RECOVERY OF LIGHT-DUTY VEHICLE USERS IN ONTARIO

For this report, the Conference Board has produced new comprehensive estimates of the costs and revenues of the Ontario road network. The estimates are based on the most current data and methods that reflect best practices of government agencies and independent researchers worldwide. Determining the degree to which road users recover their infrastructure and related costs is no straightforward task. This is due to data limitations and the numerous government departments and levels

of government involved in providing services to road users. To determine total road infrastructure and related costs, we took three broad approaches:

1. A direct, expenditure-based (pay as you go) approach.
2. An annualized capital expenditure approach (where depreciation and interest on the net current value of the capital stock is added to operating expenses).
3. A road inventory (bottom-up) approach.

The first two approaches relied primarily on public accounts data. The third approach relied on geographic information system (GIS) data and engineering estimates of the unit cost of various road and related infrastructure costs.

Revenues that were raised from taxes and fees unique to road users—such as excise taxes and vehicle registration fees—were used for the basis of determining road user revenues. Non-unique taxes—such as the HST charged on the purchase of the fuel or on the excise tax—were not included as road user revenues.

Furthermore, to limit the calculation to light-duty vehicle users or motorists (drivers of light-duty passenger vehicles [LDVs] such as cars, minivans, and SUVs) we required an assessment of the extent to which these vehicles impose costs on the road network, relative to heavy vehicles.

ALLOCATING COSTS AND REVENUES AMONG USERS

Some costs, such as clearing the snow and debris from our roads, do not vary by vehicle type. In that case, we should allocate routine maintenance costs on the basis of the vehicle-kilometres travelled (VKT) per vehicle. Other costs, such as the creation and maintenance of the rights-of-way, do vary in some proportion with the size of the vehicle. Therefore, we should allocate costs based on passenger car equivalent units (PCU). Accordingly, a heavy truck that is approximately three times the size of the average passenger vehicle would count as three PCUs.

Some costs vary according to the gross weight of the vehicle. For example, bridge structures that are constructed to accommodate heavy trucks must be built to a higher standard. And, the life of the structure varies according to the weight of the vehicles that it carries over time. Vehicles also cause direct wear on pavement, which generates maintenance and eventual replacement costs as a result. The extent to which a given vehicle causes wear on the pavement is directly related to axle weight and not the gross weight of the vehicle. For costs associated with pavement wear, we should allocate on the basis of equivalent single axle loads (ESAL).

ALLOCATING REVENUES AMONG USERS

A large portion of the revenues generated from road users comes in the form of fuel excise taxes. While we do not have a direct measure of how much of the fuel tax revenue is collected from motorists, we do have data on gasoline and diesel fuel consumed for on-road use. As well, we have estimates of the proportion of these fuels that were consumed by light-duty vehicles. This allows for an estimate of fuel tax revenues generated from motorists. Detailed data on other sources of revenues—such as licensing, registration, and traffic infractions—are more difficult to attain. Therefore, we have to rely on more approximate allocations, such as by VKT or PCU.

SUMMING-UP HOW MUCH USERS PAY

Taking all of these factors from above into consideration, we estimated the Ontario motorist cost recovery for the three years ending in 2010—the most recent year for which the necessary cost data are available. Chart 1 summarizes the results.

Cost recovery is estimated to be highest when using the expenditure approach (over 80 per cent in 2010). In all three of the infrastructure and related cost approaches we took, the cost recovery has declined over the three-year period. This is due to the unusual large increases in spending—including the various recent government infrastructure and stimulus programs. Note that the

above estimate does not allow for any allocation of costs to non-users. Moreover, the results mask the issue of the imbalance of revenues and expenditures by level of government. The federal government collects a significant portion of the revenues but owns and maintains a relatively small portion of the road network, whereas local governments find themselves in the opposite situation.

In the Greater Toronto and Hamilton area, the road infrastructure cost recovery is significantly higher at the urban level and is over 100 per cent.

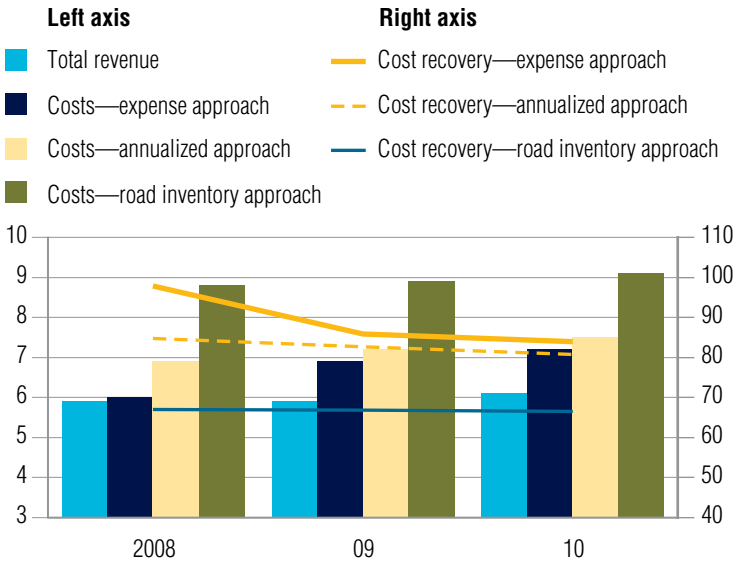
These results provide an indication of cost recovery at the provincial level. But, for policy purposes, it is more instructive to understand cost recovery within urban areas and, indeed, even for specific links and nodes on the road network. This is virtually impossible to do using publically available data. However, we did use GIS and vehicle registration data to help estimate the road network costs in the Greater Toronto and Hamilton Area (GTHA), which is the largest urban area in the province. This allowed for an estimate using only the road inventory approach, which produced the highest cost estimate at the provincial level. Chart 2 summarizes the result for all road users in the GTHA (not just motorists).

These results are subject to greater uncertainty than the provincial estimate. However, the magnitude of the difference is such that we have confidence that the road infrastructure cost recovery is significantly higher at the urban level and is over 100 per cent. Cost recovery is greater than for the whole province, essentially due to greater traffic density and higher fuel consumption, which raise revenues per kilometre of road relative to costs per kilometre.

NON-INFRASTRUCTURE COSTS

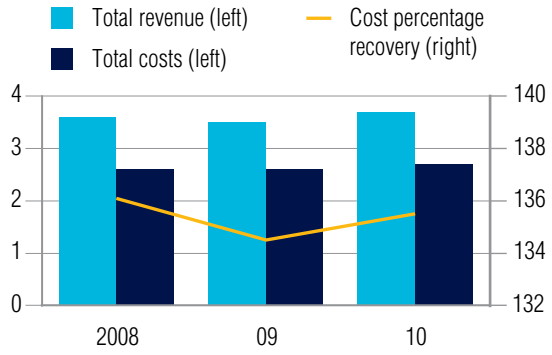
There are other costs associated with driving, such as the cost of owning and maintaining a vehicle, accident costs, congestion costs, and environmental costs. Vehicle ownership and maintenance costs are the most

Chart 1
Ontario Light-Duty Vehicle Cost Recovery
($ billions; per cent)



Source: The Conference Board of Canada.

Chart 2
Road Network Cost Recovery—All Road Users in the GTHA
($ billions; per cent)



Source: The Conference Board of Canada.

significant of these (approximately $50 to $60 billion at the provincial level). For policy-making purposes, we are less concerned with these costs because they are absorbed directly by users. But to put them into context, they are approximately $0.45 per VKT, whereas infrastructure costs are $0.06 to $0.07 per VKT. If we were to look at cost recovery in terms of recovery of

infrastructure *and* vehicle costs (which may be more useful when comparing the cost recovery ratio to most other modes of transportation), the cost recovery would always tend toward 100 per cent as a result.

The other costs are more difficult to quantify, but we can rely on previous research to place these costs into the context of the infrastructure costs. Table 1 offers rough estimations of these costs on a per VKT basis in order to provide an indication of how large they might be relative to vehicle and infrastructure costs.

Table 1
Vehicle, Infrastructure, and Social Costs
(cents per vehicle kilometre travelled)

Costs	¢/VKT
Vehicle costs	45.0
Infrastructure costs	7.0
Accident costs	7.0
Congestion costs	2.0
GHG emissions costs	1.0
CAC emissions costs	1.5

GHG = greehouse gas; CAC = criteria air contaminants
Source: The Conference Board of Canada.

Caution must be taken with social cost estimates as they vary considerably, and small changes in assumptions (such as the unit value of time for congestion cost) can alter the estimates radically. And while it may seem counterintuitive given the magnitude of the costs, for policy purposes (at least for infrastructure policy) the accident costs are less of a concern. The reason is that they are, for the most part, met by individual users. In other words, we do not need to "charge" users for these costs as we might want to do for infrastructure and other social costs. Emissions costs, on the other hand, are pure externalities. They are generated by the group of road users and absorbed by non-users. The rough estimates above show criteria air contaminant (CAC) emissions costs to be above GHG emissions costs. But it is worth noting that CAC emissions from light-duty vehicles have been on a steady decline in Canada and are expected to continue their steady decline in the future. For example, particulate matter (PM_{10} and $PM_{2.5}$) and volatile organic compound (VOC) emissions from LDVs in Canada were approximately half of their 2002 levels in 2011, while sulfur oxide (SOx) emissions have been declining even more quickly.

Congestion costs are in a category of their own. They may be external to the individual user but they are, for the most part, internal to the *group* of road users. As such, while there is an important policy rationale to minimize these costs, congestion costs should not be added to the other costs in order to determine "total" costs for the purpose of a cost recovery calculation. Moreover, the concept of an "average" congestion cost has little meaning. Congestion costs are, by definition, marginal and cannot be averaged across time and space.

CONCLUSION

Motorists in Ontario meet at least a large portion of the costs that they impose on the road infrastructure—and in major urban areas probably much more than those costs. If we look at the total cost of driving, including vehicle costs, cost recovery will tend to be closer to 100 per cent.

Our calculations can be improved upon if better data were collected and made available to the public. This is no small task given the various governments involved in the provision of road infrastructure. But data gathering should be the focus of more effort given the implications for infrastructure policy. Nevertheless, these results are a useful first step toward answering the questions about the use of user charges for efficiency purposes, revenue generation, and revenue allocation. Because all of these purposes often call for similar remedies, such as new taxes and fees, policy-makers should be explicit in the foundation and intended purpose of these remedies. In a subsequent report, we will further interpret these results and place them into the context of the broad principles that ought to govern our infrastructure policy.

Résumé

Le moment de vérité : L'ampleur des coûts de l'infrastructure routière assumés par les automobilistes

Aperçu

- Les remèdes à l'engorgement des routes partent souvent du principe que ce ne sont pas les usagers de la route qui assument les coûts de l'infrastructure routière.
- Le présent rapport fournit des estimations sur la contribution des automobilistes au recouvrement des coûts de l'infrastructure en Ontario.
- Les utilisateurs de véhicules légers absorbent une part importante des coûts de l'infrastructure routière. En outre, le recouvrement des coûts dans la région du Grand Toronto et de Hamilton est probablement beaucoup plus élevé que dans l'ensemble de la province.

La plupart des gens conviennent que la congestion routière constitue un problème, mais le consensus est loin d'être aussi clair quant aux moyens de le résoudre. Devrait-on construire davantage d'infrastructures de transport en commun ou de routes? Devrait-on instaurer des péages ou augmenter les taxes sur le carburant? Devrait-on adopter une approche plus normative pour restreindre l'expansion des zones résidentielles et commerciales?

Les économistes semblent s'accorder pour dire que notre structure de tarification routière n'est pas appropriée, et que les péages, dont la forme varierait selon l'heure et l'endroit, font partie de la solution. Dans ce cas, devrait-on tout simplement restructurer les tarifs afin d'engranger le *même* montant de recettes? Ou vaudrait-il mieux restructurer les tarifs, tout en percevant *plus* ou *moins* de recettes? S'il faut accroître les recettes, de combien avons-nous besoin en plus? Enfin, que fera-t-on avec ce surcroît de recettes?

Il n'y a pas de réponses simples et directes. Mais pratiquement toutes ces questions convergent vers une seule hypothèse, à savoir que les usagers de la route sont généreusement subventionnés. Par conséquent, ces derniers ne tiennent pas compte de l'ampleur totale des coûts entraînés par leurs comportements suite à leur prise de décisions. Pour commencer à répondre à ces questions, il faut d'abord et avant tout calculer dans quelle mesure les usagers de la route sont subventionnés. Tel est l'objectif principal du présent rapport, que nous nous proposons d'atteindre en ciblant notre analyse sur la province de l'Ontario. Un autre rapport examinera les incidences sur l'élaboration des politiques.

LE RECOUVREMENT DES COÛTS DE L'INFRASTRUCTURE DONT SE SERVENT LES UTILISATEURS DE VÉHICULES LÉGERS EN ONTARIO

Aux fins du présent rapport, le Conference Board a préparé de nouvelles estimations complètes des coûts et des recettes du réseau routier ontarien. Ces estimations reposent sur les données les plus récentes et des méthodes inspirées des pratiques exemplaires d'organismes gouvernementaux et de chercheurs indépendants d'un peu partout dans le monde. En raison des limites des données et du nombre élevé de ministères et d'ordres de gouvernement qui contribuent à la prestation de services aux usagers de la route, ce n'est pas chose aisée que de déterminer dans quelle mesure les usagers de la route assument les coûts de l'infrastructure et les coûts connexes. Afin de calculer la totalité des coûts de l'infrastructure routière et des coûts connexes, nous avons privilégié trois grandes approches :

1. Une approche directe, axée sur les dépenses (principe du paiement à l'utilisation);
2. Une approche annualisée, fondée sur les dépenses en capital (la dépréciation et les intérêts applicables à la valeur actuelle nette du stock de capital ont été ajoutés aux dépenses d'exploitation);
3. Une approche reposant sur l'inventaire des routes (démarche ascendante).

Pour les deux premières approches, nous nous sommes fiés principalement aux données tirées des comptes publics. Pour la troisième, nous avons utilisé des données du système d'information géographique (SIG) et des études techniques sur le coût unitaire de diverses routes et les coûts d'infrastructure connexes.

Afin de calculer les recettes perçues auprès des usagers de la route, nous nous sommes servis des recettes découlant des taxes et des frais propres aux usagers de la route — comme les taxes d'accise et les frais d'immatriculation. Ont été exclues de ce calcul les taxes non propres aux usagers de la route — comme la TVH imposée sur l'achat de carburant ou sur la taxe d'accise.

En outre, pour limiter le calcul aux utilisateurs de véhicules légers ou automobilistes (c.-à-d. les chauffeurs de véhicules légers à passagers comme les voitures, les minifourgonnettes et les véhicules utilitaires sport), nous avons dû évaluer l'ampleur des coûts imposés au réseau routier par ces véhicules comparativement aux véhicules lourds.

LA VENTILATION DES COÛTS ET DES RECETTES ENTRE LES USAGERS

Certains coûts, comme l'enlèvement de la neige et des débris sur les routes, ne varient pas selon le type de véhicule. Dans ce cas, les coûts d'entretien courant doivent être comptabilisés en fonction du nombre de kilomètres parcourus par véhicule (véhicule-kilomètre ou VK). D'autres coûts, comme l'aménagement et l'entretien des emprises, par exemple, varient dans une certaine mesure d'après la taille du véhicule. Les coûts doivent alors être imputés selon un coefficient d'équivalence en unité de voiture particulière (UVP). Par conséquent, un camion lourd qui fait environ trois fois la taille d'un véhicule à passagers de dimension moyenne équivaudrait à trois UVP.

Certains coûts varient selon le poids total en charge du véhicule. Par exemple, les structures de pont construites pour soutenir des camions lourds doivent répondre à des normes supérieures. Leur durée de vie est fonction du poids des véhicules qu'elles font passer au fil du temps. Par ailleurs, les véhicules sont aussi directement responsables de l'usure de la chaussée, laquelle entraîne des coûts d'entretien et, éventuellement, de remplacement du revêtement. La mesure dans laquelle un véhicule donné endommage la chaussée dépend directement du poids à l'essieu, et non du poids total en charge. Par conséquent, pour calculer les coûts associés à l'usure de la chaussée, il faut comptabiliser les coûts sur la base des charges équivalentes par essieu simple (CEES).

LA VENTILATION DES RECETTES ENTRE USAGERS

Une bonne partie des recettes perçues auprès des usagers de la route provient des taxes d'accise sur le carburant. Bien que nous ne puissions pas mesurer directement la proportion des recettes découlant des taxes sur le carburant attribuable aux automobilistes,

nous disposons, par contre, de données sur la consommation d'essence et de diesel pour usage routier. Nous avons aussi des estimations de la proportion de ces carburants utilisée par les véhicules légers. Cette information nous permet d'estimer la part des recettes découlant des taxes sur le carburant assurée par les automobilistes. Il est cependant plus difficile d'obtenir des données détaillées sur d'autres sources de recettes — par exemple les droits de permis, les frais d'immatriculation et les infractions au code de la route. Par conséquent, nous devons nous fier à des valeurs plus approximatives comme les VK ou les UVP.

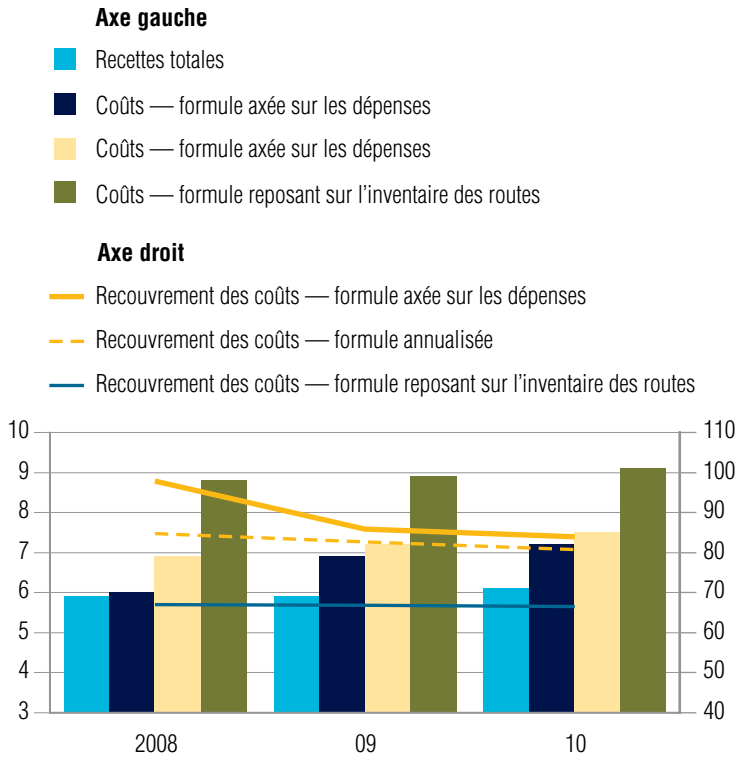
LE TOTAL DES COÛTS ASSUMÉS PAR LES USAGERS DE LA ROUTE

En prenant en considération tous les facteurs susmentionnés, nous avons estimé le recouvrement des coûts par les automobilistes ontariens pour une période de trois ans ayant pris fin en 2010, soit la dernière année pour laquelle les données nécessaires sur les coûts sont disponibles. Nos résultats sont résumés au graphique 1.

C'est à l'aide de l'approche axée sur les dépenses que le recouvrement des coûts estimé est le plus élevé (plus de 80 p. 100 en 2010). Dans les trois formules que nous avons privilégiées, le recouvrement des coûts a diminué au fil de la période de trois ans. Ce constat est attribuable aux augmentations exceptionnellement fortes des dépenses — y compris les divers programmes gouvernementaux récents de renouvellement de l'infrastructure et de relance. Il est à noter que cette estimation n'impute aucun coût aux non-usagers. En outre, les résultats ne reflètent pas le déséquilibre entre les recettes et les dépenses par ordre de gouvernement. Le gouvernement fédéral perçoit une bonne part des recettes, mais seule une partie relativement petite du réseau routier lui appartient et est entretenue par lui, tandis que pour les administrations locales, c'est la situation inverse.

Ces résultats donnent une indication du recouvrement des coûts à l'échelon provincial. Toutefois, aux fins d'élaboration des politiques, il vaut mieux comprendre le recouvrement des coûts dans le contexte des zones urbaines, voire celui d'axes et de nœuds routiers particuliers. Cela est pratiquement impossible à faire à

Graphique 1
Recouvrement des coûts en Ontario — véhicules légers
(en milliards de dollars; en pourcentage)

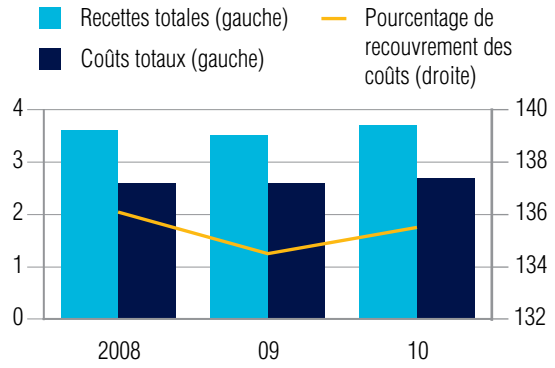


Source : Le Conference Board du Canada

l'aide des données publiques disponibles. Cependant, nous avons utilisé les données du SIG et celles relatives à l'immatriculation des véhicules afin d'estimer les coûts du réseau routier dans la région du Grand Toronto et de Hamilton (RGTH), la zone urbaine la plus vaste de la province. Ce calcul nous a permis de faire une estimation en utilisant la démarche ascendante (inventaire des routes) uniquement, démarche qui a produit l'estimation du recouvrement des coûts la plus élevée à l'échelle provinciale. Le graphique 2 résume notre estimation pour tous les usagers de la route dans la RGTH (pas seulement les automobilistes).

Ces résultats sont associés à un plus grand degré d'incertitude que l'estimation réalisée à l'échelon provincial. Toutefois, l'écart est tel que nous sommes convaincus que le recouvrement des coûts de l'infrastructure routière est beaucoup plus élevé à l'échelle urbaine et dépasse même 100 p. 100.

Graphique 2
Recouvrement des coûts du réseau routier — Tous les usagers de la RGTH
(en milliards de dollars; en pourcentage)



Source : Le Conference Board du Canada

Si on récupère davantage de coûts dans les zones urbaines que dans l'ensemble de la province, c'est essentiellement parce que la circulation y est plus dense et la consommation de carburant plus élevée, ce qui augmente les recettes par kilomètre de route par rapport aux coûts par kilomètre.

LES COÛTS NON LIÉS À L'INFRASTRUCTURE

Il y a d'autres coûts associés à la conduite comme les coûts liés à la possession et à l'entretien d'un véhicule, les coûts des accidents, les coûts de la congestion et les coûts environnementaux. Les coûts liés à la possession et à l'entretien d'un véhicule sont les plus importants (de 50 à 60 milliards de dollars environ à l'échelle provinciale). Du point de vue des politiques, ces coûts sont moins préoccupants puisqu'ils sont absorbés directement par les usagers. Mais, histoire de les mettre en contexte, ils représentent environ 0,45 $ par VK, tandis que les coûts d'infrastructure vont de 0,06 à 0,07 $ par VK. Si on devait calculer le recouvrement des coûts liés à la fois à l'infrastructure et aux véhicules (opération qui pourrait être plus utile pour comparer le taux de recouvrement des coûts à celui de la plupart des autres moyens de transport), le résultat tendrait toujours vers 100 p. 100.

Tableau 1
Coûts liés aux véhicules, d'infrastructure et sociaux
(en cents par véhicule-kilomètre (VK))

Coûts	¢/VK
Coûts liés aux véhicules	45,0
Coûts d'infrastructure	7,0
Coûts des accidents	7,0
Coûts de la congestion	2,0
Coûts des émissions de GES	1,0
Coûts des émissions de PCA	1,5

GES = gaz à effet de serre; PCA = principaux contaminants atmosphériques
Source : Le Conference Board du Canada

Les autres coûts sont plus difficiles à quantifier, mais nous pouvons nous fonder sur des études antérieures pour les calculer dans le contexte des coûts de l'infrastructure. Le tableau 1 présente des estimations approximatives de ces coûts par VK, de sorte qu'on puisse en mesurer l'ampleur par rapport aux coûts liés aux véhicules et à l'infrastructure.

Dans la région du Grand Toronto et de Hamilton, le recouvrement des coûts de l'infrastructure routière est beaucoup plus élevé à l'échelle urbaine et dépasse même 100 p. 100.

Il faut faire preuve de prudence dans la réalisation des estimations des coûts sociaux, car ceux-ci fluctuent considérablement, si bien que la moindre variation dans les hypothèses (comme la valeur de l'unité de temps dans le calcul des coûts de la congestion) peut changer fondamentalement les estimations. Bien que cela semble paradoxal étant donné leur ampleur, les coûts des accidents sont une source de préoccupation de moindre importance aux fins de l'élaboration des politiques (du moins en ce qui concerne la politique en matière d'infrastructure). S'il en est ainsi, c'est parce qu'ils sont déjà assumés en grande partie par les usagers. En d'autres termes, il n'est pas nécessaire de « facturer » les usagers pour ces coûts comme on le ferait pour les

coûts de l'infrastructure et d'autres coûts sociaux. Les coûts des émissions, par contre, sont tout simplement des coûts externes. Ils sont engendrés par le groupe des usagers de la route et absorbés par des non-usagers. D'après les estimations approximatives susmentionnées, les coûts des émissions des principaux contaminants atmosphériques (PCA) dépassent ceux des émissions de GES. Toutefois, il convient de noter que les émissions de PCA provenant des véhicules légers ne cessent de diminuer au Canada, tendance qui devrait se poursuivre à l'avenir. Par exemple, les émissions de particules (PM_{10} et $PM_{2,5}$) et de composés organiques volatils (COV) issues de véhicules légers au Canada étaient, en 2011, environ deux fois inférieures à leur niveau de 2002, et les émissions d'oxyde de soufre (SOx) diminuent encore plus rapidement.

Les coûts de la congestion sont dans une catégorie à part. Ils ne dépendent peut-être pas des usagers pris individuellement, mais, pour l'essentiel, ils sont associés de façon intrinsèque au groupe des usagers de la route. Par conséquent, même si, stratégiquement parlant, on aurait d'importantes raisons de limiter autant que possible ces coûts, ils ne devraient pas être ajoutés aux autres coûts quand vient le temps de déterminer les coûts « totaux » aux fins du calcul du recouvrement des coûts. De plus, la notion de coûts « moyens » de la congestion est peu pertinente. Les coûts de la congestion, par définition, sont marginaux et on ne peut pas en établir la moyenne à travers le temps et l'espace.

CONCLUSION

Les automobilistes en Ontario assument au moins une bonne partie des coûts qu'ils imposent à l'infrastructure routière — et dans les grandes zones urbaines, ils absorbent probablement beaucoup plus que ces coûts. Si on calcule les coûts totaux de la conduite, y compris les coûts liés aux véhicules, on constate que le recouvrement des coûts tendra à s'approcher des 100 p. 100.

Nous pourrions améliorer nos calculs si de meilleures données étaient recueillies et mises à la disposition du grand public. Ce n'est pas chose aisée compte tenu du nombre élevé d'organismes gouvernementaux participant à la mise en place de l'infrastructure routière. Toutefois, davantage d'efforts devraient être consacrés à la collecte de données, étant donné leurs incidences sur les politiques liées à l'infrastructure. Cela étant, ces résultats marquent une première étape utile vers l'obtention de réponses aux questions sur l'utilisation de la tarification des usagers aux fins de l'optimisation de l'efficience, de la production de recettes et de leur ventilation. Comme il faut souvent adopter les mêmes remèdes pour parvenir à toutes ces fins, par exemple l'instauration d'une nouvelle taxe ou de nouveaux frais, les décideurs devraient expliquer ouvertement le fondement et le but prévu de ces remèdes. Dans un prochain rapport, nous poursuivrons l'interprétation de ces résultats et les étudierons dans le contexte des principes généraux qui devraient inspirer notre politique en matière d'infrastructure.

Chapter 1

Introduction

Chapter Summary

- There is a widespread and common dislike for road congestion. But there is considerably less of a consensus on what the impact of congestion is and what to do about it.
- Part of the reason for the lack of consensus is the absence of clarity on the extent to which road users are subsidized. To begin to evaluate the potential remedies for congestion, policy-makers should have a clear understanding of the degree to which road users are, in fact, subsidized.
- This report offers new estimates of road infrastructure costs and cost recovery, using the Province of Ontario as the target of its analysis. A subsequent report will elaborate on the policy implications.

Most people agree that road congestion is a problem, but there is considerably less of a consensus on what the impact of congestion is and what to do about it. Should we build more transit or road infrastructure? Should we introduce tolls or increase fuel taxes? Should we be more prescriptive in terms of restricting the growth of residential and commercial areas?

Economists seem to agree that we have the structure of road prices wrong, and that some form of road tolls, which vary by time and place, are part of the answer. In this case, do we simply restructure the prices in order to collect the *same* amount of revenue? Or do we restructure prices and collect *more* or *less* revenue? If more, how much more do we need? And what do we do with that revenue?

This report offers new estimates of road infrastructure costs and cost recovery.

There are no simple and straightforward answers. But virtually all of these questions are related to a single presumption—that road users are heavily subsidized—and, as a result, road users do not consider the full costs of their behaviour in their individual decision-making. Part of the reason for the lack of consensus on the above questions is the lack of clarity on this original issue. To begin answering these questions, it is useful and, in fact, necessary to first quantify the extent to which road users are subsidized through the provision of road infrastructure.

This report offers new estimates of road infrastructure costs and cost recovery, using the Province of Ontario as the target of its analysis. A subsequent report will elaborate on the policy implications.

ESTIMATING ROAD INFRASTRUCTURE COSTS

How much does it cost to provide roads and bridges in Ontario? And how much do users pay? These seem like straightforward questions. After all, is someone not keeping track of all of the costs and related revenues of the road network? Unfortunately this is not the case. The fact of the matter is that the responsibility of providing road infrastructure and related services is scattered among many different jurisdictions, government departments, and the private sector. Answering these questions requires the collection of various bits of data that exist in different places along with the estimation of some key data that do not exist.

The responsibility of providing road infrastructure and related services is scattered among different jurisdictions, government departments, and the private sector.

Even after those data are collected or estimated, we are left with the task of allocating costs and revenues to light-duty vehicle users. After all, they are not the only users of the road network. Heavy commercial vehicles—such as courier vehicles, freight trucks, and buses—also make extensive use of roadways. And utilities such as gas and electricity distributors, wastewater utilities, and phone companies often make use of the same rights-of-way.

When considering the costs and revenues per vehicle-kilometre (VKT) or passenger-kilometre (PKT), the results will likely differ from the provincial figures when examining a contiguous urban area. Estimating costs at this level is even more challenging due to the lack of available expenditure data on road infrastructure by all levels of government within given urban areas. Nevertheless, it is instructive to at least have a reasonable estimate of how costs and revenues differ at the urban level than they do for the province as a whole. So, despite the data limitations, in order to provide an illustration of the extent to which road users meet the costs that they impose on the road infrastructure in urban areas, we provide an estimate of road infrastructure costs and user revenues for the Greater Toronto and Hamilton Area (GTHA).

ABOUT THIS REPORT

This report provides estimates of the cost of the road infrastructure and revenues generated from road users in Ontario. Other costs, including vehicle ownership costs and social costs such as congestion and emissions costs, are relevant for discussions on infrastructure policy. While our primary focus is on infrastructure costs, we put the infrastructure costs into context by relying primarily on previous estimates of the social costs.

Our method began by collecting available data on road expenditures, road activity, and road user revenues in the province. We then developed three distinct estimates of road infrastructure costs—one of which relies on an entirely different data set than the others. Our estimates of user revenues consisted of fuel excise taxes (but not the sales tax applied to the fuel or excise tax) as well as licensing, registration, and other government fees imposed on road users. This allowed us to develop a cost recovery ratio for road users in Ontario and for the GTHA.

Chapter 2

Road User Cost Recovery in Ontario

Chapter Summary

- In this chapter, we provide estimates of road infrastructure costs in Ontario based on three different approaches. In addition to capital costs, we include routine operating and maintenance costs, and traffic enforcement costs.
- We also estimate revenues that are collected from road users. This primarily consists of revenues from fuel excise taxes as well as revenues from other sources, such as licensing and registration fees.
- After allocating costs and revenues to light-duty vehicle users, we find that cost recovery was between 70 and 90 per cent in 2010, depending on the method used to estimate infrastructure costs. Cost recovery would be even higher if we allocated some of the costs to non-users.

In this chapter, we elaborate on our methodology and data sources that were used to determine the costs of the road infrastructure and total road user revenues in Ontario. Following this, we provide our estimates of the total costs and revenues. (See box "Caveats About Cost Recovery.") Finally, we allocate costs and revenues to light-duty vehicles.

Caveats About Cost Recovery

These estimates are based on the full road network costs rather than the marginal costs. For the purpose of developing appropriate user charges, marginal costs are generally considered to be more appropriate. Moreover, the cost estimates based on the annualized capital expenditure approach and the road inventory approach both include initial construction costs that may never need replacement, making them irrelevant for efficient pricing purposes.

As a result, while these results are instructive as a general indication of the level of subsidy at the network level, they do not explicitly tell us what the appropriate user fees should be for individual users at specific times and places.

LDVs are defined as vehicles with gross weights up to 4.5 tonnes. This includes cars, minivans, SUVs, and light pickup trucks. For the most part, these are "consumer" vehicles—vehicles that you would normally see at the local car dealership. Some of these vehicles are used for commercial purposes, particularly fleet vehicles and light pickup trucks that are used by small businesses. Most of the data available and guidance on road cost allocation suggest distinguishing users by vehicle type (rather than purpose). This is a result of the fact that the costs imposed on the road network are a function of the size and weight of the vehicle. We generally refer to LDVs or LDV users throughout the text without attempting to distinguish between consumer and commercial LDVs. It is worth noting that the bulk of LDV activity is attributed to non-commercial motorists.

COSTS AND REVENUES FROM A WHOLE NETWORK PERSPECTIVE

The cost of the whole road and bridge network in Ontario primarily consists of:

- the initial construction costs;
- major maintenance and rehabilitation costs;
- routine maintenance, such as snow clearing and removal of debris;
- policing and traffic enforcement.

The following do not include estimations of environmental and social costs, such as the cost of emissions or noise. (A rough estimate of the key social costs is provided in the following chapter.) The costs of land used for roadways are not distinguished in our estimates. However, land purchases for roads are included in the official statistics of public and private construction expenditures that we use. But, we have not inferred any cost for land that is not purchased (such as Crown land used for provincial highways). Parking costs (and related revenues) are included only if they were publically provided.

DIFFERENT APPROACHES TO COSTS

We use three different approaches to total network costs: a direct expenditure approach, an annualized capital expenditure approach, and a road inventory approach.

For this report, the Conference Board has produced new comprehensive estimates of the costs and revenues of the Ontario road network, using the most current data and methods that reflect best practices of government agencies and independent researchers worldwide. A number of assumptions and component parameters have been taken from the best recent Canadian practice, notably Transport Canada's Full Cost Investigation project. Borrowed variables are identified in the text.

The estimates of policing and traffic enforcement costs are common among the three approaches. These costs are estimated from the total policing costs in the province (all levels of government). Road and traffic policing expenditures are particularly difficult to estimate due to the lack of publically available data. According to the 2011 Ontario Provincial Police (OPP) annual report, field and traffic costs comprised $664 million of the approximately $1 billion total.[1] No breakdown is given for traffic costs specifically. But 848,104 of 5,834,629 hours worked in 2011 were from traffic personnel.[2] An estimate of traffic-related costs based on the allocation of hours worked by traffic personnel would be approximately $150 million, or just under 15 per cent of total costs. As a result, we find that an allocation of 35 per cent of total policing costs in the province is reasonable, if not an overestimate.[3] This allocation is applied not just to OPP costs, but to municipal police costs as well. Total annual policing costs in the province exceed $4 billion. The resulting allocation to the road network then is approximately $1.4 billion.

DIRECT EXPENDITURES APPROACH

This approach is based on observations of expenditures in the year that they occur, regardless of whether or not the expenditures are capital in nature. This approach is expected to be more volatile than the other approaches, due to the fact that capital expenditure programs can vary considerably from one year to the next.

While this approach is somewhat common in road cost calculations and allocations,[4] it ignores the fact that current expenditures have little relation to the current use of the road infrastructure. Current capital spending is, in fact, for servicing the demand for road use over the following 30 to 50 years, and bears no obvious relationship to the infrastructure costs imposed by current traffic. Current costs should include some reflection of the deterioration of the existing road infrastructure together with some allowance for the cost of the capital that is tied up in the current network. This leads to the two alternative cost estimations that follow.

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1 OPP, *2011 Annual Report*, 70.

2 Ibid., 72.

3 This was the mid-range estimate of policing costs that were incurred as a result of traffic enforcement that was applied for Transport Canada's Full Cost Investigation project.

4 For example, the National Transport Commission in Australia uses a pay-as-you-go model for heavy vehicle charges. The Federal Highway Administration's (FHWA) 1997 *Federal Highway Cost Allocation Study* also allocated on the basis of current expenditures.

Table 2 provides an estimate of road network expenditures by level of government. Note that the 2009 and 2010 local expenditures were estimated by inflating 2008 values by provincial consumer price index (CPI). The source survey for these data is under redesign and will not be available until 2014. This may be an underestimation due to the increase in public infrastructure spending related to stimulus programs across the province.

Approximately $10.2 billion in public road-related expenditures were made in 2010. Most of this was spent by local and provincial governments for the purpose of building and maintaining the physical road network.

Table 2
Road Network Expenditures in Ontario
(current $ billions)

Expenditures	2008	2009	2010
Federal expenditures	0.4	0.6	0.9
Provincial expenditures*	3.0	4.0	4.0
Local expenditures*	3.8	3.9	3.9
Policing expenditures	1.3	1.4	1.4
Total public	8.5	9.8	10.3
407 ETR	0.2	0.2	0.2
Total public with 407 ETR	8.7	10.0	10.4

*Provincial and local government expenditures are net of transfers from senior levels of government in order to avoid double counting.
Sources: Transport Canada Annual Report Addendum, Table G7; CANSIM Table 385-0024; 407 ETR Consolidated Financial Statements.

ANNUALIZED CAPITAL EXPENDITURES APPROACH

The annualized capital expenditure approach still counts operating expenditures—the routine things that we do every year—in the year that they are incurred. But capital expenditures—building new things or major upgrades and repairs that are meant to last several years—are "annualized" and recognized as costs only as they are "consumed."[5] The capital costs recognized in any given year are equal to the amount of the capital stock that has been depreciated, plus a cost of capital that is applied to the value of the net capital stock.

Table 3 shows the estimates of the net capital stock and annual capital costs for the Ontario road network in current dollars (government and private sector expenditures). These estimates were calculated from annual road network capital expenditures in Ontario since 1961, using an average asset life of 35 years and a real cost of capital rate of 7 per cent.[6] The capital stock was depreciated each year using straight-line depreciation. A delayed or hyperbolic depreciation method may approximate depreciation more accurately. However, the impact of the choice of the depreciation method is offset to some extent by a higher (or lower) cost of capital. In other words, a depreciation method that results in a lower depreciation cost in the current year also leaves a larger net capital stock value (and a higher cost of capital as a result). Due to the relatively negligible impact, straight-line depreciation was used for its recognizability and simplicity.

Table 3
Ontario Road Network Net Capital Stock and Capital Costs
(current $ billions)

	2006	2007	2008	2009	2010
Net stock	43.1	45.7	48.2	50.9	54.7
Depreciation	2.3	2.4	2.5	2.5	2.7
Cost of capital	3.0	3.2	3.4	3.6	3.8
Total capital costs	5.3	5.6	5.8	6.1	6.5

Source: The Conference Board of Canada.

Total capital costs in 2010 are estimated to be $6.5 billion. To provide an estimate of total road network costs, this total is added to total operating costs—including the estimate for policing expenditures. The results are presented in Table 4.

5 In government capital planning jargon, this is essentially a "net expense" approach.

6 The useful life of individual assets, including in these expenditures, will vary. For example, road surface asphalt generally lasts 18 to 25 years. The road base may last anywhere from 25 to 50 years or more. Bridges and structures typically have a useful life well in excess of 50 years. Thirty-five years was chosen as an approximate average of the asset life. The cost of capital rate is based on the Treasury Board's guidance on the discount rate for public cost-benefit analysis. A rate based on government financing costs would be considerably lower.

Table 4
Ontario Road Network Costs—Annualized Capital Expenditures Approach
(current $ billions)

	2006	2007	2008	2009	2010
Depreciation	2.3	2.4	2.5	2.5	2.7
Cost of capital	3.0	3.2	3.4	3.6	3.8
Total capital costs	5.3	5.6	5.8	6.1	6.5
Operating and maintenance (O&M)	2.2	2.4	2.6	2.6	2.7
Policing expenditures	1.2	1.3	1.3	1.4	1.4
Total	8.7	9.2	9.8	10.1	10.6

Source: The Conference Board of Canada.

Table 5
Ontario Road Network Length
(lane-kilometres)

Functional class	Lane-km
Freeway	12,585
Arterial	109,001
Collector	24,135
Local	288,685
Total	434,406

Sources: Natural Resources Canada; The Conference Board of Canada.

Total costs based on the annualized capital cost approach were $10.6 billion in 2010. This is only slightly higher than the total of $10.4 billion in expenditures (shown in Table 2), which might be considered to be an accidental convergence of the two very different methods of calculation.[7]

The capital cost calculation is sensitive to the price index that is chosen to inflate historical capital expenditures as well as the cost of capital rate. The above estimate makes use of the provincial consumer price index (CPI) as the price index. We also tested the calculation using the Ontario Ministry of Transportation's Tender Price Index back to 1992 (before CPI was applied). The use of this index resulted in total capital costs of approximately $7.1 billion in 2010, or about $600 million higher than the above estimate. On the other hand, the use of a cost of capital rate that reflects government borrowing cost would yield considerably lower capital costs. For example, the yield on current long-term government bonds is approximately 3 per cent, or 1 per cent in real terms. At this rate, the total capital cost estimate declines from $6.5 billion to just $3.4 billion.

ROAD INVENTORY APPROACH

The road inventory approach is conceptually similar to the annualized capital expenditure approach, in that it recognizes as capital costs the depreciation of the entire existing network in the current year. But rather than estimate these costs by using total expenditure data, we estimate the length of the existing stock of roads and bridges in the province. Then, we multiply that by the average annualized capital and maintenance costs by functional class of road.

Total costs based on the annualized capital cost approach were $10.6 billion in 2010, slightly higher than the total of $10.4 billion in expenditures.

The estimate of the road network inventory is derived from 2012 geospatial data from Natural Resources Canada.[8] Table 5 shows the estimate of total lane-kilometres by functional class of road. Note that resource and winter roads are not included in this total.

Estimates of annualized capital and maintenance costs per lane-kilometre of road by functional class for Ontario were derived from a component study of Transport Canada's Full Cost Investigation, which had estimated the costs from surveys of provincial and local governments.[9] Due to design standards, such as pavement thickness and road width, the capital costs of freeways are typically much higher than they are for other roads. For example, the *initial* pavement construction

7 Although, as argued by the Australian National Transport Commission, current expenditures may approximate long-run marginal costs in some cases.

8 Natural Resources Canada, *National Road Network*.

9 Applied Research Associates, *Estimation of the Representative Annualized Capital*.

Table 6
Capital and Maintenance Costs of the Ontario Road Network—Road Inventory Approach
(2003 $ billions)

Functional class	Pavement—construction	Pavement—M&R	Other—construction	Other—M&R	Routine maintenance	Winter maintenance	Total
Freeway	0.32	0.03	0.40	0.01	0.02	0.04	0.82
Arterial	1.83	0.32	2.35	0.09	0.20	0.29	5.08
Collector	0.30	0.06	0.27	0.02	0.04	0.05	0.74
Local	1.04	0.25	1.71	0.26	0.37	0.53	4.16
Total	3.48	0.66	4.73	0.38	0.63	0.91	10.80

M&R = maintenance and replacement
Note: The totals are slightly higher than the sum of each column because additional bridge structure costs are included in the total.
Source: The Conference Board of Canada.

costs of one lane-kilometre of freeway were estimated to be approximately $25,000 when annualized over its useful life.[10] For local roads, the annualized cost was estimated to be under $8,000. There is an even larger disparity in other (non-pavement) initial construction costs. Other road costs—such as rehabilitation costs and routine maintenance costs—are also typically higher for freeways, although generally to a lesser degree.

Table 6 summarizes the estimate of annualized capital and maintenance costs by functional class, in 2003 dollars.

Local roads are lower cost on average, but the entire length (lane-km) of local roads means that, in total, they are more costly to build and maintain than freeways. The network's total annualized costs are estimated to be just under $11 billion. However, this figure is not directly comparable to the previous estimates—due to the fact that the costs are in 2003 dollars. Table 7 shows the estimates of total network costs on a current dollar basis.

Table 7
Ontario Road Network Costs—Road Inventory Approach
(current $ billions)

	2006	2007	2008	2009	2010
Total capital costs	9.8	10.0	10.2	10.3	10.5
O&M	1.6	1.7	1.7	1.7	1.7
Policing expenditures	1.2	1.3	1.3	1.4	1.4
Total	12.6	12.9	13.3	13.4	13.7

O&M = operations and maintenance
Source: The Conference Board of Canada.

Total road network costs as estimated by the road inventory approach were just under $14 billion in 2010—about $3 billion higher than the annualized capital expenditure approach. The higher estimate is partly the result of the other (non-pavement) initial capital costs that are included in the road inventory approach, particularly costs with creating initial rights-of-way. A portion of these costs will not have to be incurred again in the future in order to maintain the road network, meaning that the annualized capital costs are likely to be overestimated.[11] In addition, roads that are built

10 In other words, this is the cost of the pavement when "spread" over its useful life, rather than the entire expenditure in the year that the pavement was constructed.

11 Applied Research Associates, *Estimation of the Representative Annualized Capital*, 38. Applied Research Associates notes that the "inclusion of the past initial construction costs means that the total annualized costs will not be comparable to the costs an agency may need in the future to preserve road infrastructure."

Table 8
Excise Tax Revenues From the Sale of Road Motor Vehicle Fuels in Ontario
(current $ millions)

Motor Vehicle Fuels	2007	2008	2009	2010	2011
Gasoline—federal	1,570	1,544	1,570	1,578	1,561
Gasoline—Ontario	2,308	2,270	2,308	2,320	2,295
Total gasoline	3,878	3,815	3,878	3,898	3,856
With GST/HST*	4,111	4,005	4,072	4,249	4,358
Diesel—federal	215	205	190	199	201
Diesel—Ontario	769	734	681	713	718
Total diesel	985	939	871	913	919
With GST/HST*	1,044	986	915	995	1,038
Total	4,863	4,754	4,749	4,810	4,775
With GST/HST*	5,155	4,991	4,986	5,243	5,396

*The "With HST" amounts refer to the total excise tax revenues plus the revenues from the HST on the excise tax revenues only. This does not include the revenues from the HST on the value of the fuel itself. HST was introduced in Ontario in July 2010. An average rate of 9 per cent was applied in order to estimate total GST and HST revenues in 2010. Prior to 2010, the GST rate was applied (6 per cent in 2007 and 5 per cent in subsequent years).
Source: The Conference Board of Canada, estimated from CANSIM Table 405-0002.

within a new subdivision are generally paid for by the private developer, not the municipality. So while these costs are not included in the previous approaches, an estimate of these costs is included here.[12]

At first glance, the operating and maintenance (O&M) costs would appear to be underestimated, relative to the actual O&M expenditures shown in Table 4. However, the O&M costs from Table 7 refer only to routine and winter maintenance. Major maintenance and rehabilitation costs (which amount to over $1 billion) are included in capital costs. Some of these costs would have been classified as O&M costs in the public accounts data.

12 Ideally, to be consistent on the revenue and expenditure side, we would also include a portion of revenue that developers raise through the subsequent sale of homes to cover their costs of the new road infrastructure. Availability of data prevented us from doing so. This has a negative impact on the cost recovery estimate for the road inventory approach.

CALCULATING TOTAL REVENUES

Road network-related revenues include fees and taxes that are imposed exclusively on road users. The most significant of these are the federal and provincial excise taxes that are levied on gasoline and diesel fuel that is consumed for road use. In addition, the provincial government generates revenue from licensing, registration, and other fees that are exclusive to road users.

Local governments also generate revenue from lot levies, parking, and fines. Local government data on road-related revenues are not directly available. As a result, the revenues had to be estimated based on assumptions about the share of total revenues that are road-related. Data on local government revenues from lot levies, sales of goods and services, and fines were collected from Statistics Canada.[13] Similar assumptions were adopted as those made in Transport Canada's Full Cost Investigation project for the purpose of allocating these revenues to road users.[14]

While the revenues from road fuel excise taxes are not specifically earmarked for road infrastructure, we consider them as user charges as they are unique to road users. Revenues from road fuel excise taxes were estimated by applying the federal and provincial excise tax rates to the net sales of gasoline and diesel for road use in Ontario. Federal excise taxes sit at $0.04 and $0.10 for diesel and gasoline, respectively. Provincial excise taxes are $0.143 and $0.147 for diesel and gasoline. Table 8 provides the estimate of total fuel excise tax revenues.

13 Statistics Canada, *Local General Government Revenue and Expenditures*, CANSIM Table 385-0024.

14 For the purpose of calculating municipal road-related revenues, Transport Canada estimated that 35 per cent of lot levy and special assessment revenue were road-related; 14 per cent of other sales of services was generated from parking fees; and 60 per cent of fines and penalties was generated from traffic-related fines. These shares was applied to our own estimates of revenue by category in order to estimate local government road network revenues. The exception was the share of parking fees where we used a lower estimate of 10 per cent.

Revenues From Sales Tax

Sales taxes are paid on top of excise taxes as well as the cost of the fuel itself. But we do not include sales tax revenue as road-related revenues as they are not unique to road use. In other words, if individuals reduce their expenditures on fuel and increase their expenditures elsewhere, governments would still collect sales tax on the new expenditures—the revenues are not lost.

However, while this is the general case, it does not always apply. For example, if the alternative expenditures are on urban transit, governments would not collect the sales tax revenue because urban transit services are exempt. To complicate things further, individuals who reduce their fuel expenditures by relocating to a transit-accessible area may be reallocating some of their expenditures to a mix of transit fares and housing. New homes are partially exempt from HST in Ontario (and HST is not applied on resale homes). In summary, while we do not include sales tax revenues on excise taxes or on the fuels, there is certainly an argument to be made to include a portion of it as road-specific revenue.

Total road fuel excise tax revenues in Ontario amounted to $4.8 billion in 2010 (net of the sales tax). (See box "Revenues From Sales Tax.") Table 9 provides estimates of total road-related revenues in Ontario, including provincial and local government license and other fee revenue.

Total revenues for all levels of government amounted to $7.1 billion in 2010, or $7.7 billion when including 407 ETR revenues. (See box "A Note on 407 ETR.") Of the local government revenues, those generated from fines may be underestimated. For example, according to the Toronto Police Services 2011 public budget, nearly 600,000 traffic tickets were issued through November of 2010.[15] On an annualized basis and at $150 per ticket, this would amount to about $100 million in revenue for the City of Toronto alone. This compares with the estimate of $212 million for all local governments. However, in the neighbouring Peel Region, the number of traffic infractions was just 97,309 in 2011.[16] This suggests that the City of Toronto total is

15 Toronto Police Services, *2011 Public Budget*, 31.

16 Peel Regional Police, *2011 Annual Performance Report*, 50.

Table 9
Total Road Network-Related Revenues in Ontario
(current $ billions)

	2008	2009	2010
Provincial road fuel taxes	3.0	3.0	3.0
Federal road fuel taxes collected in Ontario	1.8	1.8	1.8
Total road fuel taxes collected in Ontario	4.8	4.7	4.8
Ontario net revenues from licences and other fees	1.1	1.1	1.1
Total Ontario road fuel tax and other revenue	5.9	5.8	5.9
Local government revenues			
Lot levies	0.5	0.5	0.5
Special assessments	0.0	0.0	0.0
Parking	0.5	0.5	0.5
Fines	0.2	0.2	0.2
Total local government revenues	1.2	1.2	1.2
Total revenues—all governments	7.0	7.0	7.1
407 ETR revenues	0.5	0.6	0.6
Total w/407	7.6	7.6	7.7

Sources: Transport Canada; CANSIM Table 385-0024; 407 International Inc.; The Conference Board of Canada.

A Note on 407 ETR

407 ETR is a highway run by a private consortium in Ontario. The highway runs east–west to the north of the City of Toronto, and parallels a free route consisting of two provincial highways, Hwy 401 and the QEW. The first segment of a 36 route-km was expanded to a 69 route-km in 1998. The privatization required expansion east and west, and was completed in 2001, creating the current total of a 108 route-km and a 1,105 lane-km.[1]

The highway is by far the most significant piece of privately operated road infrastructure in the province. Any calculation of the total costs and revenues of the road and bridge network in Ontario must contend with the issue of whether or not to include it. By default, we include both the revenues and costs of 407 ETR because it is such a significant part of the road network in the GTHA. Regardless of who ultimately collects the revenues, it is undeniable that road users pay directly for the privilege of accessing the highway.

Moreover, it must be recognized that the provincial government sold the concession to a private consortium through a competitive process. When it did so, it collected the capitalized value of the expected stream of profits from users as it was forecast at the time. It would be beneficial to include this capitalized value amortized over the life of the concession, plus the ongoing operating and maintenance costs of the highway. However, we elect to include the actual revenues collected from users as the data are readily available.

1 407 ETR, *History*.

Table 10
Whole Road Network Cost Recovery Ratio
($ billions; per cent)

	2008	2009	2010
Total revenue	7.6	7.6	7.7
Total costs			
Expenditure approach	8.7	10.0	10.4
Annualized capital expenditure approach	9.8	10.1	10.6
Road inventory approach	13.3	13.4	13.7
Cost recovery percentage			
Expenditure approach	87.6	75.9	74.2
Annualized capital expenditure approach	77.8	75.1	73.2
Road inventory approach	57.3	56.7	56.6

Source: The Conference Board of Canada.

Table 11
Whole Road Network Cost Recovery Ratio—10 Per Cent Allocation to Non-Users
($ billions; per cent)

	2008	2009	2010
Total revenue	7.6	7.6	7.7
Total costs			
Expenditure approach	7.8	9.0	9.4
Annualized capital expenditure approach	8.8	9.1	9.5
Road inventory approach	11.9	12.0	12.3
Cost recovery percentage			
Expenditure approach	97.4	84.4	82.5
Annualized capital expenditure approach	86.4	83.4	81.4
Road inventory approach	63.6	63.0	62.9

Source: The Conference Board of Canada.

disproportionately high relative to the population. (The City of Toronto's population is approximately 2.5 times that of the Peel Region population.)[17]

17 According to the OPP's *2011 Annual Report*, the OPP issued over 300,000 traffic tickets. However it is not clear if or how much of this revenue is shared with the municipalities.

PUTTING IT ALL TOGETHER—TOTAL NETWORK COSTS AND REVENUES

Putting together road network costs and revenues from users allows for an estimation of a cost recovery ratio for the Ontario road network. Table 10 summarizes the estimates for each approach. Note that this estimate allocates all road network costs to all road users (making no provision for the allocation of a portion of the road network to non-users).

As noted, various other utilities—such as telecommunications, electricity, and gas service—often share the right-of-way with the road network. While municipalities in Ontario are prohibited from charging for this access, a portion of the road network costs could, in fact, be allocated to non-users in order to recognize the shared use. Previous research has suggested that the value of this access could be estimated as a share of gross revenues (perhaps 2 to 3 per cent) of the utility in question.[18] While a detailed accounting of the value of these rights-of-way for utilities is beyond the scope of this report, Table 11 shows the whole road network cost recovery ratios after a somewhat arbitrary 10 per cent of the road network costs are first allocated to non-users.

ALLOCATION OF COSTS AND REVENUES TO LIGHT-DUTY VEHICLES

The previous cost recovery ratios were calculated for the road network as a whole, without distinguishing between users. Next, we allocate road network costs and related revenues specifically for LDVs.

ALLOCATION OF COSTS

Prior to conducting our estimates, we undertook a detailed review of the road cost allocation literature. We found that the allocation of costs among users is not a straightforward task.

18 Ross, *Use of Municipal Rights-of-Way*, 7.

Table 12
Example Cost Allocation Table
(cost category)

Functional class	Pavement construction	Pavement—M&R	Other—construction	Other—M&R	Routine maintenance	Winter maintenance	Bridge—Capital	Bridge—M&R
Freeway	PCU	ESAL	PCU	PCU	VKT	VKT	Weight	Weight
Arterial	PCU	ESAL	PCU	PCU	VKT	VKT	Weight	Weight
Collector	PCU	ESAL	PCU	PCU	VKT	VKT	Weight	Weight
Local	PCU	ESAL	PCU	PCU	VKT	VKT	Weight	Weight

PCU = passenger car equivalent units; ESAL = equivalent single axle loads; VKT = vehicle-kilometres travelled
Source: The Conference Board of Canada.

Some costs, such as clearing the snow and debris from our roads, do not vary by vehicle type. In that case, we would want to allocate costs of such routine maintenance on the basis of the vehicle-kilometres travelled (VKT) per vehicle. Policing and road safety costs could also be allocated on the basis of VKTs or, more simply, on the basis of vehicle registrations.

Other costs, such as the creation and maintenance of the rights-of-way, do vary in some proportion with the size of the vehicle. Larger vehicles take up more road space and, as a result, use more capacity. Here, we should allocate costs based on passenger car equivalent units (PCU). So a heavy truck that is approximately three times the size of the average passenger vehicle would count as three PCUs.

Some costs vary according to the gross weight of the vehicle. For example, bridge structures that are built to accommodate heavy trucks must be built to a higher standard. And, the life of the structure varies according to the weight of the vehicles that it carries over time. In this case, we should allocate those costs according to vehicle weight.[19]

Finally, vehicles also cause direct wear on pavement, which generates maintenance and eventual replacement costs as a result. The extent to which a given vehicle causes wear on the pavement is directly related to axle weight and not the gross weight of the vehicle. For example, a five-axle truck with a gross weight of 40,000 kilograms will cause more damage to the pavement than a six-axle truck of the same weight. For costs associated with pavement wear, we should allocate on the basis of equivalent single axle loads (ESAL).[20]

The extent to which a given vehicle causes wear on the pavement is directly related to axle weight and not the gross weight of the vehicle.

In order to allocate costs, we would ideally have detailed data on the usage by VKT, PCUs, gross weight, and ESALs by type of vehicle for each road segment and by time of day. In addition, alignment changes and design features intended to accommodate heavy vehicles would also ideally be available by road segment. These costs could then be allocated to LDVs based on an allocation table. Table 12 provides an *illustrative* example.

The allocations would then be carried out according to the share of traffic for each unit by segment of road.

Unfortunately, data at this detailed of a level are not available. Estimates of VKT by segment of the provincial highway network are available, along with the

19 Axle spacing also matters. Engineers use a "bridge formula" that limits the amount of weight that can be borne by groups of axles. See Federal Highway Administration, *Bridge Formula Weights Calculator*.

20 There is some debate over the specific functional relationship between axle load and pavement wear. For our purposes, we accepted the engineering research that concludes that pavement wear varies with the 4th power of axle weight.

portion of the VKT by medium and heavy vehicles. Estimates of gross weight and axle loads can be derived from these data. However, this constitutes a relatively small proportion of the entire road network (in terms of length) and less than half of the total vehicle traffic.

In 2008, Applied Research Associates estimated the shares of costs allocated to LDVs and heavy vehicles (primarily trucks and buses) by jurisdiction (provincial and local government); by functional class of road; and by category of cost (initial pavement capital cost, major O&M, routine O&M, etc.). The allocated shares were estimated based on the intended and expected use of the road (based partly on alignment and design features). As a result, costs that are subject to vehicular wear (primarily pavement maintenance and rehabilitation [M&R] costs) on freeways and arterials were disproportionately allocated to heavy vehicles. However, pavement costs (both initial and M&R) for local roads were still primarily allocated to LDVs. Meanwhile, other road infrastructure costs (and routine maintenance in particular) were more heavily allocated to LDVs. Local road routine and winter maintenance costs were almost entirely allocated to LDVs, as these costs are incurred primarily to allow motorists to drive to and from their homes.

Eight-five per cent of gasoline for road use in Ontario is consumed by passenger vehicles.

This allocation is roughly similar to the example table. But rather than using observed traffic shares, it is based on anticipated traffic according to provincial and local government surveys.

Similar cost allocation methods were applied to the whole network costs as estimated by the road inventory approach. The capital and O&M percentage shares were then applied to the whole network cost estimates based on the expenditure and annualized cost approaches as well. In addition, policing costs were allocated to LDVs based on their share of total Ontario VKT (for all three cost approaches) according to the Canadian Vehicle Survey. Table 13 shows the cost allocations to LDVs for each approach.

Table 13
Allocation of Road Network Costs to Light-Duty Vehicles
(current $ billions)

	2008	2009	2010
Expenditure approach	5.9	6.7	7.0
Annualized capital expenditure approach	6.8	7.0	7.3
Road inventory approach	8.8	8.9	9.1

Source: The Conference Board of Canada.

ALLOCATION OF REVENUES

Energy use data by sector and source were used to allocate motor fuel excise taxes. For the most part, gasoline is consumed by passenger vehicles while freight vehicles consume diesel fuel. According to Natural Resources Canada, 85 per cent of gasoline for road use in Ontario is consumed by passenger vehicles.[21] Approximately 6.3 per cent of diesel fuel is consumed by LDVs. These shares were applied to the gasoline and diesel excise tax revenues and allocated to LDVs. Most of the other sources of revenue were allocated to motorists according to the LDV share of VKT.

COSTS AND REVENUES—SUMMARY OF LDVS' SHARE

The allocation of costs and revenues to LDVs allow for a cost recovery calculation for LDVs' use of the Ontario road network. Table 14 summarizes the results for the three alternate cost calculations.

21 Natural Resources Canada, *Comprehensive Energy Use Database Tables*, Table 2 and Table 3.

The cost recovery percentage is estimated to be 81 to 85 per cent according to the expenditure and annualized capital expenditure approaches (in 2010). According to the road inventory approach, the percentage is just under 67 per cent.

Table 15 provides a similar summary. However, 10 per cent of road network costs were first allocated to non-users. As a result, the total cost to LDV users is lower—with corresponding cost recovery estimates higher as a result.

SUMMARY

Despite the fact that the road network in Ontario is not subject to tolls for the most part, road users do pay a significant number of fees and charges that are unique to them. A problem for policy and infrastructure allocation decisions, however, is that the revenues that are generated from these fees and charges are not directly tied to expenditures. Related to this is the fact that the federal government collects a significant portion of these revenues but does not build and maintain a significant portion of the road network. Meanwhile, local governments find themselves in the opposite situation.

Road infrastructure costs are only part of the picture. Vehicle operating costs and social costs also contribute to the total cost of motorist activity. Moreover, the extent to which users meet their infrastructure costs may differ when considering a more confined urban area, rather than an entire province that includes sparsely populated rural areas. We turn our attention to these issues in Chapter 3.

Table 14
Light-Duty Vehicle Cost Recovery Ratio
($ billions; per cent)

	2008	2009	2010
Total revenue	5.9	5.9	6.1
Total costs			
Expenditure approach	6.0	6.9	7.2
Annualized capital expenditure approach	7.0	7.2	7.5
Road inventory approach	8.8	8.9	9.1
Cost recovery percentage			
Expenditure approach	97.8	85.9	83.9
Annualized capital expenditure approach	84.7	82.6	80.7
Road inventory approach	67.0	66.8	66.5

Source: The Conference Board of Canada.

Table 15
Light Duty Vehicle Cost Recovery Ratio—10 Per Cent Allocation to Non-Users
($ billions; per cent)

	2008	2009	2010
Total revenue	5.9	5.9	6.1
Total costs			
Expenditure approach	5.4	6.2	6.5
Annualized capital expenditure approach	6.3	6.5	6.8
Road inventory approach	7.9	8.0	8.2
Cost recovery percentage			
Expenditure approach	108.6	95.4	93.2
Annualized capital expenditure approach	94.1	91.8	89.6
Road inventory approach	74.5	74.2	73.9

Source: The Conference Board of Canada.

Chapter 3

Other Road-Related Costs and Cost Recovery in the GTHA

Chapter Summary

- In this chapter, we find that road infrastructure cost recovery is likely much higher within urban areas—such as the Greater Toronto and Hamilton Area. This is a result of higher levels of vehicle activity and higher user revenues per kilometre of road, relative to the provincial average.
- Of the total costs that are generated by light-duty vehicles, vehicle ownership and operating costs make up, by far, the largest portion. Generally, however, they are less of a concern for public policy purposes because they are paid for directly by motorists.
- Congestion costs will naturally be higher within urban areas. However, congestion costs cannot be added to vehicle and infrastructure costs in order to determine the total costs of light-duty vehicle activity. On the other hand, local air and greenhouse gas pollution costs could be considered additional.

Road network costs are only a portion of vehicle operating costs. The cost of owning and operating vehicles is much greater. These costs are exclusively absorbed by LDV users. The focus of this report is on road infrastructure costs but, in this chapter, we briefly consider total vehicle operating costs in Ontario. We do this to put the overall costs of the road network into the context of the overall cost of driving. We also briefly consider social costs, such as congestion and environmental costs, based primarily on previous estimates of these costs on a per VKT basis. Lastly, from our provincial estimates, we derive infrastructure cost recovery estimates for the GTHA.

VEHICLE STOCK IN ONTARIO AND HOUSEHOLD EXPENDITURES ON TRANSPORTATION

The Statistics Canada *Survey of Household Spending* (SHS) provides an estimate of annual household expenditures on vehicle operations and purchases. These data can be used to provide a rough estimate of total vehicle operating costs in Ontario. However, the calculation of the cost of ownership is not as straightforward. This is a result of the fact that the expenditures are based on the lease or purchase of vehicles. The annual cost of ownership would require an estimation of the value of the vehicle stock and the value of the stock that is consumed each year (depreciation and financing costs).[1]

1 Another potential problem is that expenditures on pre-owned vehicles are also included in the survey response. Ideally, only new vehicle sales would be included to avoid double counting.

Nevertheless, an extrapolation of the SHS expenditure data over all households provides at least a rough approximation of the magnitude of private automobile costs relative to road network costs. Most values are likely to underestimate the total costs of light-duty vehicles, due to the fact that they do not include commercial light-duty vehicles (the costs of which are covered by businesses rather than households). Table 16 shows the expenditures (on a household basis) for 2010 and 2011.

The SHS expenditure data over all households provides at least a rough approximation of the magnitude of private automobile costs relative to road network costs.

There are approximately 4.9 million households in the province (2011 Census). An extrapolation of the total operating costs (non-capital) over the entire population results in a total of $29.9 billion in operating costs. These costs are not entirely additional to the road network costs presented earlier, as they included user charges such as fees and licences, as well as local parking revenues. Adjusting the above to exclude household expenditures on those items results in a total of $28.2 billion (although this omits all parking expenditures, including private parking expenditures).

Where there is overlap in expenditures from the SHS and public revenue estimates, it is useful to make comparisons in order to provide some validity to the earlier estimations.

As indicated, the SHS can provide only a rough estimate of operating costs at the provincial level, particularly for the individual line items. For example, an estimate of fuel consumption can be derived from the survey data by dividing expenditures by a weighted average (by fuel type) price of fuel. Using a weighted average price of $1.25 per litre,[2] we are left with an estimate of 10.8 billion litres consumed by households. This is a lower total compared with the retail gasoline and diesel sales data, but in the right range given that commercial use LDVs would not be accounted for in the SHS.

Table 16
Average Expenditures per Household on Automobile Transportation in Ontario
($ per household)

	2010	2011
Purchase of automobiles, vans, and trucks	4,489	3,285
Accessories for automobiles, vans, and trucks	24	13
Fees for leased automobiles, vans, and trucks	587	592
Automobile, van, and truck operations	5,172	6,124
Registration fees for automobiles, vans, and trucks (including insurance, if part of registration)	122	110
Private and public vehicle insurance premiums	1,854	1,969
Tires, batteries, and other parts and supplies for vehicles	294	446
Maintenance and repair of vehicles	467	441
Vehicle security and communication services	13	15
Gas and other fuels (all vehicles and tools)	2,088	2,759
Other automobile, van, and truck operation services	41	100
Parking (excluding parking fees included in rent) and traffic and parking tickets	248	219
Drivers' licences and tests, and driving lessons	45	65
Total (purchases, leasing, and operations)	10,272	10,014

Source: CANSIM Table 203-0021.

Similarly, an alternate estimate of registration and licence fees can be derived from the SHS data. For 2011, total expenditures on registration and licensing equalled $684 million ($733 million in 2010). This compares with $1.08 billion in 2010 (from Table 9). However, the latter figure includes revenues collected from non-households as well.

Traffic and parking ticket expenditures cannot be distinguished from the SHS total expenditures on parking. Total expenditures on these items based on the SHS data were $1.07 billion in 2011 ($1.21 billion in 2010). Meanwhile, the estimate of local government revenues from the same sources used in Table 10 was $939 million in 2010. The latter does not include an estimate of expenditures on private parking, indicating that the two estimates are within a reasonable range of each other.

2 Average gasoline and diesel prices in Ottawa and Toronto in 2011. From Statistics Canada, *Average Retail Prices for Gasoline and Fuel Oil*, CANSIM Table 326-0009.

Table 17 summarizes the estimates of the key operating expenditures aggregated for all households in Ontario.

Fuel costs are not entirely additive either, as they include excise taxes. Estimation of excise taxes using an average fuel price of $1.25 (and weighting the excise tax rates by their respective gasoline and diesel consumption) in 2011 is $2.6 billion (an underestimation in part for the same reasons mentioned above related to total expenditures on fuel).

Purely on an expenditures basis, total capital costs on vehicles are estimated to be $19 billion in 2011 ($25 billion in 2010). Meanwhile, total expenditures on new vehicles were $20.1 billion in 2011 according to Statistics Canada (although this includes heavy vehicles).[3] The Canadian Automobile Association (CAA) estimates that depreciation and financing costs for typical *new* light-duty vehicles range from $4,024 to $5,982 per year.[4] Applying the mid-range annual value to the stock of light-duty vehicles in the province results in a total cost of $36.2 billion.

Total vehicle costs in the province can be expected to be about $50 billion to $60 billion, compared with $7 billion to $9 billion in road infrastructure costs.

Given that commercial light-duty vehicles are out of scope for the SHS, and that the CAA depreciation/financing estimate is based on new car values, actual LDV capital costs can be expected to be somewhere between the two estimates.

Total vehicle ownership and operating costs in the province then can be expected to be roughly in the range of $50 billion to $60 billion. This compares with roughly $7 billion to $9 billion in road infrastructure costs. Given that the vehicle ownership and operating costs are almost exclusively covered by users, any total cost recovery estimate that includes both vehicle and infrastructure costs is bound to be close to 100 per cent (even if road infrastructure cost recovery alone is well below 100 per cent).

Table 17
Total Household Automobile Operating Expenditures in Ontario
($ billions)

	2010	2011
Insurance	9.1	9.6
Fuel	10.2	13.5
Registration and licensing fees	0.7	0.7
Parking and traffic tickets	1.2	1.1
Parts, maintenance, and other	4.1	5.1
Total	25.3	29.9

Note: Estimated from the Survey of Household Spending (Statistics Canada).
Sources: The Conference Board of Canada; Statistics Canada.

The above estimates include sales tax. An estimate of HST revenues on the sales of vehicle purchases can be estimated, even if we do not count this as part of the road network cost recovery. We can assume that of the $20.1 billion of vehicles sales in Ontario in 2011, 88 per cent were sold to households (based on the 530,000 units of the total 601,000 units that were sold to households according to the Scotiabank *Global Auto Report*[5]). Vehicles sold to businesses (which are then able to write off HST as a business expense) include 46,000 LDVs and 25,000 HDVs. Assuming that the average HDV costs four times as much as the average LDV, the household share of expenditures was 78.4. As a result, total household expenditures on new vehicles would have been $15.76 billion—the resulting HST revenues being $1.81 billion.

3 Statistics Canada, *New Motor Vehicle Sales*, CANSIM Table 079-0003. An annualized capital cost estimate can be created using historical data from this series. According to the Scotiabank *Global Auto Report*, 530,000 light-duty vehicles were sold to households in Ontario in 2011, and 589,000 LDVs, overall. This compares with 601,000 total vehicles (including heavy vehicles).

4 CAA, *Driving Costs 2012 Edition*, 5.

5 Scotiabank, *Global Auto Report*, 7.

SOCIAL OR EXTERNAL COSTS

Internal costs are those that individual users pay for directly. Because individuals are directly responsible for the goods or services associated with these costs, for public policy purposes we are not directly concerned with these costs. We let the market determine prices and allow individuals to determine for themselves if the costs are outweighed by the benefits that are generated by the good or service in question.

As demonstrated above, the most significant of these costs for motorists are vehicle ownership and operating costs. Less obvious is the fact that accident costs are, to a large extent, internal as well. Aside from the obvious individual harm that they cause, road accidents also reduce economic output due to eroded human capital, so there is an obvious and important policy interest in increasing safety and minimizing these costs. But, individual motorists knowingly take the risks associated with travelling in a passenger vehicle. And, they do so only if the risks are outweighed by the benefits of travel. If there are travel alternatives that offer lower risk, individuals will prefer the alternatives, all things being equal. Moreover, motorists are required to purchase insurance policies that explicitly price the risk of the motorist causing damage to other people or property. This ensures that they meet the financial costs that they may impose on non-motorists as well.

EXTERNAL COSTS

For public policy purposes, we are more concerned with external costs. These are the costs that we generally think of as social costs or perhaps more accurately "negative externalities." Because users generate these costs as a result of their behaviour but do not pay for these costs, they do not factor them in their decision of how much of the underlying good or service to use. As a result, the benefits that they derive from the use of the good or service may be exceeded by the total costs of producing that good or service.

In the context of road use, the most significant of these costs are environmental costs that include the generation of local pollutants (criteria air contaminants) and greenhouse gases. Conventional economic theory suggests that we should charge users explicitly for generating these pollutants and use the revenues to compensate society as a whole (perhaps through a tax cut or expansion of a widely used social service).

Road infrastructure costs could also fall within this category. But as demonstrated by our analysis, road users also pay a significant amount of fees and taxes that go into general government revenues and thereby benefit society as a whole.

"IN-BETWEEN" COSTS

"In-between" costs are costs that are external to the individual user, but internal to a group of users. This third category of costs is often grouped with external costs. These are costs that a group of users of a common good or service impose upon each other but not on the rest of society. The distinction is important because while prices may be used to optimize individual users' behaviour, the revenue generated from these prices should stay within the group of users rather than be used to compensate society as whole.

Optimal pricing has more to do with the time and place that a fee is levied and less to do with the total revenues that are generated.

In the context of road use, the most significant of these costs is the cost of congestion (accident costs to some extent fall into this category as well). The cost of congestion comes in the form of the delay that is imposed on other road users. Congestion levels may be higher than what is socially optimal because road usage is not optimally priced. But optimal pricing has more to do with the time and place that a fee is levied and less to do with the total revenues that are generated. The economic theory of congestion pricing is based on achieving optimal road use, for which the use of the revenues is immaterial. However, the same principles of natural justice that suggest non-users should be compensated for suffering the effects of emissions suggest that road users who mutually suffer congestion costs should be

Table 18
Internal, External, and "In-Between" Costs

Type of cost	Examples	Pricing implications	Public cost/cost recovery implications
Internal costs	◆ Vehicle operation and ownership ◆ Accidents (some)	Determined by market forces	Not important
External costs	◆ Air pollution ◆ Greenhouse gases	Not priced by market. Could be priced by government	Added to total cost. If priced, revenue used to compensate society as a whole
In-between costs	◆ Congestion ◆ Accidents (some)	Taxes/fees could be restructured to vary by time and place	Not added to the total cost. If priced, revenue used to compensate group of users

Source: The Conference Board of Canada.

compensated as a group by revenues from congestion charges. They should not suffer the congestion and the fees. Therefore, revenue that is generated as a result of a fee imposed to reduce congestion should be used to benefit the same group of users who are imposing congestion costs upon each other.[6] (See Table 18.)

Generally, external costs are more difficult to quantify and depend heavily on methodological assumptions. For the purpose of this report, we rely on previous research to place these costs into the context of the infrastructure costs. Table 19 offers rough estimations of these costs on a per VKT basis in order to provide an indication of how large they might be relative to vehicle and infrastructure costs.

Caution must be taken with social cost estimates as they vary considerably, and small changes in assumptions (such as the unit value of time for congestion cost) can alter the estimates radically. And as discussed, for policy purposes (at least for infrastructure policy) the accident costs are less of a concern. That's because they are, for the most part, absorbed directly by users through insurance premiums and a willingness to accept the risks associated with travelling in a passenger vehicle. So while these costs are real, we do not need to "charge" users for these costs as we might want to do

Table 19
Vehicle, Infrastructure, and Social Costs
(cents per vehicle kilometre travelled)

Costs	¢/VKT
Vehicle costs	45.0
Infrastructure costs	7.0
Accident costs	7.0
Congestion costs	2.0
GHG emissions costs	1.0
CAC emissions costs	1.5

Source: The Conference Board of Canada; Transport Canada.

for infrastructure and other social costs. As well, they can't be added to vehicle operating costs (which include insurance payments). Emissions costs, on the other hand, are pure externalities. They are generated by the group of road users and absorbed by non-users.[7]

The rough estimates above show criteria air contaminant emissions costs to be above GHG emissions costs, although other recent estimates have placed the CAC emissions costs lower than shown above.[8]

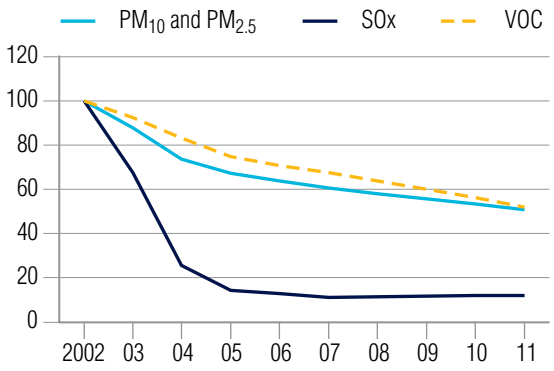
6 To some extent, motorists impose delays on bicyclists and pedestrians, and vice versa. However, virtually all of the savings from delay cost reductions typically calculated for transport appraisals are the result of motorist time savings.

7 Motorists do bear some of the costs of local air pollution as they breathe the air around them while driving. But, in many or most cases, an individual motorist would be exposed to the local pollution even if choosing another mode of travel.

8 HDR Decisions Economics, *Costs of Road Congestion*. HDR used a value of 1.2 cents/VKT based on U.S. estimates from Small and Verhoef, *The Economics of Urban Transportation*; and Kriger, Baker, and Joubert, *Costs of Urban Congestion*.

These estimates are based on emission levels from 2008. It is worth noting that CAC emissions from light-duty vehicles have been on a steady decline in Canada, as shown in Chart 3. For example, particulate matter (PM_{10} and $PM_{2.5}$) and volatile organic compound (VOC) emissions from LDVs in Canada were approximately half of their 2002 levels in 2011, while sulfur oxide (SOx) emissions have declined by 88 per cent. From 2008 to 2011, particulate emissions have decreased by 12 to 14 per cent, while VOC emissions have decreased by 19 per cent.[9] SOx emissions have increased slightly since then, as the previous declines were primarily the result of the reduction of sulphur content in gasoline, which was applied at refineries (so the recent increase followed an extremely low level by historical standards). Overall, we can expect that CAC emissions have decreased even further, with the associated costs declining as well.

Chart 3
Key Criteria Air Contaminant Emissions From Light-Duty Vehicles in Canada, 2002–11
(index 2002 = 100)



Sources: Environment Canada; The Conference Board of Canada.

PM_{10} and $PM_{2.5}$ and VOC emissions from LDVs in Canada were approximately half of their 2002 levels in 2011, while SOx emissions have declined by 88 per cent.

As discussed, congestion costs are in a category of their own. They may be external to the individual user but they are, for the most part, internal to the *group* of road users. As such, they should not be added to the other costs in order to determine "total" costs for the purpose of a cost recovery calculation. Moreover, the concept of an "average" congestion cost has little meaning. Congestion costs are marginal and really cannot be averaged across time and space.

COSTS AND REVENUES AT THE URBAN LEVEL

Estimating road network cost recovery at a smaller spatial scale could yield significantly different results. This is particularly due to the fact that much of the road infrastructure is in rural areas where the intensity of road use can be significantly lower than in urban areas.

Moreover, most of the LDV activity is urban (rather than inter-urban), meaning that cost recovery may be better discussed in the context of a common group of users using a common road network. Other reasons why it is instructive to estimate costs and revenues at a smaller spatial scale include:

- It also may be less likely that road expenditures within a contained area with generally heavy traffic are less likely to be allocated suboptimally. This means fewer suboptimal allocations that LDV users are asked to cover.
- Some of the road infrastructure in remote regions is justified on social grounds. As a result, it may be more suitable for the associated costs to be absorbed by all taxpayers, rather than strictly road users. An urban-level analysis largely removes this from the equation.

Naturally, the data challenges of arriving at this estimation are even greater than they are at the provincial level, meaning that there is also greater uncertainty with this type of estimation. Historical expenditures at the local level are not readily available, as nearly half of the expenditures on the road network are made by the provincial government. Local expenditures are scattered among various local governments. This makes it difficult to estimate costs using the annualized capital expenditure approach, in particular.

9 Environment Canada, *National Emissions Trends*.

The road inventory approach is the most convenient for this purpose. Using geospatial data, the road inventory contained within specific urban boundaries can be determined. The estimated annualized costs per lane-kilometre by functional class of road can then be applied to determine capital and O&M costs of the road network. This methodology is applied to estimate road network costs in the Greater Toronto and Hamilton Area. The GTHA is used as an example, given that it is the largest urban area in Ontario (and Canada, for that matter). It should be noted that if we were able to apply the other approaches that were used at the provincial level (the direct expenditures approach and annualized capital cost approach), we would expect to arrive at lower cost estimates.

THE ROAD NETWORK IN THE GTHA

Fourteen per cent of the Ontario road network (in lane-kilometres, not including winter and resource roads) is located within the GTHA.[10] This corresponds to just over 63,000 lane-kilometres of road. Table 20 shows the length of the road network by functional class of road.

Most of the road network in the GTHA (over 97 per cent) is paved. This is in contrast to the entire Ontario road network, where only 63 per cent of the road network is paved. As a result, the cost per lane-kilometre of local roads in particular is higher in the GTHA and is reflected in the road network costs.

ROAD NETWORK COSTS IN THE GTHA

The same approach that was used to estimate road network costs at the provincial level (using the road inventory approach) was applied for the road network in the GTHA. The unit costs per lane-kilometre were based specifically on urban Southern Ontario roads in 2003. (See Table 21.)

10 Included within the GTHA are the cities of Toronto and Hamilton as well as the regions of Durham, Halton, Peel, and York. This roughly corresponds to the Census Metropolitan Areas of Hamilton, Toronto, and Oshawa.

Table 20
GTHA Road Network Length
(lane-kilometres)

Functional class	Lane-km
Freeway	3,957
Arterial	14,708
Collector	7,435
Local	37,259
Total	63,359

Sources: The Conference Board of Canada; Natural Resources Canada.

Capital and O&M costs are then converted to current values. Policing costs are allocated based on the share of vehicle registrations. This provides an estimate of total road network costs in the GTHA, summarized in Table 22.

As stated at the outset, social costs are not included in the above analysis. It is worth noting that these costs are likely to be higher at the urban level. This is due to the fact that there is more vehicle activity and more vehicle emissions as a result. Moreover, unit criteria air contaminant costs are higher in densely populated areas.

As indicated earlier, it is difficult to estimate road network costs at the regional level using the other approaches for various reasons. However, to provide some evidence that the road inventory approach provides a reasonable estimate, we collected road expenditure and amortization data from 29 regional and municipal governments in the GTHA. Given that this estimate does not include all policing costs or any provincial road network (or 407) costs, we would expect it to be considerably smaller than the $2.7 billion estimate using the road inventory approach (which includes the provincial portion of the network that is within the boundaries of the GTHA).

Table 23 summarizes these data.

Table 21
Capital and Maintenance Costs of the GTHA Road Network—Road Inventory Approach
(2003 $ billions)

Functional class	Pavement—construction	Pavement—M&R	Other—construction	Other—M&R	Routine maintenance	Winter maintenance	Total
Freeway	0.10	0.01	0.06	0.01	0.01	0.01	0.20
Arterial	0.26	0.05	0.16	0.02	0.03	0.04	0.56
Collector	0.11	0.02	0.07	0.01	0.01	0.02	0.24
Local	0.35	0.09	0.22	0.05	0.06	0.09	0.85
Total	0.82	0.16	0.52	0.08	0.11	0.16	1.85

Note: The totals are slightly higher than the sum of each column because additional bridge structure costs are included in the total.
Source: The Conference Board of Canada.

Total reported municipal costs are approximately 1.5 billion, suggesting that the road inventory approach is indeed yielding an estimate that is within the correct range.

ROAD NETWORK REVENUES IN THE GTHA

This allocation should be considered as less precise than the similar allocation at the provincial level. The CVS data are not generally reliable at the urban level. The Transportation Tomorrow Survey estimates of VKT may be more suitable, but comparability to the CVS data at the provincial level may be suspect. As a result, allocating based on the GTHA's share of vehicle registrations is the primary method of revenue allocation for the preliminary estimates.

There are 3.7 million registered motor vehicles in the GTHA, which is 42 per cent of the total motor vehicle registrations in Ontario.[11] This share was used to allocate total revenues in the province to the GTHA. Fuel taxes would more accurately be allocated on the basis of fuel consumption, but fuel consumption data are not available at the local level. An estimate of VKT in the region, relative to total VKT in the province, could be

11 Ministry of Transportation, *Ontario Road Safety Annual Report*.

Table 22
GTHA Road Network Costs—Road Inventory Approach
(current $ billions)

	2006	2007	2008	2009	2010
Total capital costs	1.7	1.7	1.7	1.7	1.8
O&M	0.3	0.3	0.3	0.3	0.3
Policing expenditures	0.5	0.5	0.6	0.6	0.6
Total	2.5	2.5	2.6	2.6	2.7

Source: The Conference Board of Canada.

Table 23
GTHA Municipal and Regional Government Road Network Costs
(current $ millions)

	2011
Roads	825
Bridges and culverts	79
Operations	274
Winter control	221
Parking	72
Street lighting*	53
Total	1,524

*Fifty per cent of street lighting costs were allocated to the road network.
Sources: The Conference Board of Canada; The Ministry of Municipal Affairs and Housing.

Table 24
GTHA Road Network Revenues
($ billions)

Revenues	2008	2009	2010
Provincial road fuel taxes (net of sales tax)	1.3	1.3	1.3
Federal road fuel taxes collected in GTHA	0.7	0.8	0.8
Total road fuel taxes collected in GTHA	2.0	2.0	2.1
Ontario net revenues from licences and other fees	0.5	0.5	0.5
Total Ontario road fuel tax and other revenue	2.5	2.5	2.5
Local government revenue	0.5	0.5	0.5
Total all governments	3.0	3.0	3.0
407 ETR	0.5	0.6	0.6
Total government and 407 ETR	3.6	3.5	3.7

Source: The Conference Board of Canada.

Table 25
GTHA Road Network Cost Recovery
($ billions; per cent)

	2008	2009	2010
Total revenue	3.6	3.5	3.7
Total costs	2.6	2.6	2.7
Cost recovery percentage	136.1	134.5	135.5

Source: The Conference Board of Canada.

Table 26
GTHA Road Network Costs Allocated to LDV Users—Road Inventory Approach
(current $ millions)

	2008	2009	2010
Total capital costs	948	952	975
O&M	269	270	277
Policing expenditures	524	545	556
Total	1,741	1,766	1,808

Source: The Conference Board of Canada.

a suitable proxy.[12] According to an estimation derived from the 2006 Transportation Tomorrow Survey data, total LDV VKT in the GTHA was approximately 37.1 billion, or 31 per cent of the provincial total (as estimated by the 2006 CVS data). However, the TTS data is based on a household survey and does not include commercial LDV activity. If we assumed that 20 per cent of the LDV activity in the province was commercial, the GTHA's share of total private LDV activity increases to 39 per cent—close to the 42 per cent share of vehicle registrations.

On the other hand, license and registration fee revenues are more accurately allocated according to the share of vehicle registrations. Table 24 provides the estimate of road-related revenues in the GTHA using the share of vehicle registrations as the method of allocation.

GTHA ROAD NETWORK COST RECOVERY

Total revenues and total costs using the road inventory approach were combined in order to generate a cost recovery estimate for the road network in the GTHA. Table 25 shows the results.

Total cost recovery was estimated to be 135.5 per cent in 2010. This includes 407 ETR revenue and operating costs. Without 407 ETR revenue and operating costs, the cost recovery declines to less than 125 per cent.

ALLOCATION OF GTHA ROAD NETWORK COSTS AND REVENUES TO LDVS

The same method of allocation to LDV users that was used for costs at the provincial level was applied to GTHA road network costs. For each functional class and category of cost, our cost estimations were allocated to LDV users using data based on survey

12 Fuel consumption, and therefore fuel tax per VKT, may be higher in the GTHA than the provincial average due to the stop–start nature of urban traffic. Therefore, allocating fuel tax revenue by VKT may underestimate fuel tax revenue from the GTHA.

responses for local governments in Southern Ontario.[13] Policing expenditures were allocated from the provincial estimate of LDV costs, based on the motor vehicle registration shares. Table 26 summarizes the results.

LDV revenues at the provincial level were also allocated to the GTHA based on share of vehicle registrations (407 ETR revenues being an exception). The revenue allocations are shown in Table 27.

Finally, this allows for an estimate of LDV road network cost recovery in the GTHA, shown in Table 28.

LDV users appear not to cover all of the costs they impose on the road network at the provincial level; however, the story changes at the urban level.

LDV road network cost recovery was estimated to be 161 per cent. This includes 407 ETR revenue and operating costs. Without 407 ETR revenue and operating costs, the cost recovery would decline to approximately 146 per cent.

OBSERVATIONS AND METHODOLOGICAL CONSIDERATIONS

The results suggest that LDV users do not cover all of the costs that they impose on the road network at the provincial level. However, at the urban level the story changes, as road-related revenues generated from LDV users are estimated to be well in excess of annual road network costs. While the estimates are less certain at the urban level, they are more instructive and necessary for the purpose of informing congestion-related debates.

Moreover, when the road infrastructure costs are put into the context of private vehicle costs (such as the costs of vehicle ownership and maintenance), the degree of total cost recovery tends closer to 100 per cent. This is a result of the fact that the private costs per VKT far exceed the public infrastructure costs.

Table 27
GTHA Road Network Revenues Allocated to Light-Duty Vehicle Users
($ billions)

Revenues	2008	2009	2010
Provincial road fuel taxes (net of sales tax)	0.8	0.9	0.9
Federal road fuel taxes collected in GTHA	0.6	0.6	0.6
Total road fuel taxes collected in GTHA	1.4	1.4	1.4
Ontario net revenues from licences and other fees	0.4	0.4	0.4
Total Ontario road fuel tax and other revenue	1.8	1.8	1.9
Local government revenue	0.5	0.5	0.5
Total all governments	2.3	2.3	2.3
407 ETR	0.5	0.5	0.6
Total government and 407 ETR	2.8	2.8	2.9

Source: The Conference Board of Canada.

Table 28
GTHA Light-Duty Vehicle Road Network Cost Recovery
($ billions; per cent)

	2008	2009	2010
Total capital costs	2.8	2.8	2.9
O&M	1.7	1.8	1.8
Policing expenditures	161.0	159.8	160.8

Source: The Conference Board of Canada.

We reiterate that there is a degree of uncertainty with these (or any other similar) estimates. Accurate and precise activity data would be required in order to provide more accurate estimates, particularly for the purpose of cost allocation and redesigning user charges. The Province of Ontario has relatively good data on vehicle activity on provincial roads. But this only accounts for less than half of the total vehicle activity in the province. The portion of policing expenditures devoted to traffic enforcement is another source of uncertainty. Other assumptions, such as the cost of capital rate applied to the net capital stock, also have a significant impact on total costs. The accuracy of our estimates can be improved upon with access to better and more current data.

13 Applied Research Associates, *Estimation of the Representative Annualized Capital*.

While infrastructure cost recovery is higher in dense urban areas, congestion costs are likely to be significantly higher in those areas as well. However, these costs cannot be added to the total road network costs that have been estimated above, for reasons previously discussed. On the other hand, the cost of CAC emissions can be added to total costs and would likely be higher in dense urban areas.

Chapter 4

Conclusion

Chapter Summary

- Light-duty vehicle users in Ontario meet at least a large portion of the costs that they impose on the road infrastructure. In major urban areas, it likely is much more than those costs.
- These results are a useful first step toward answering the questions about the use of user charges for efficiency purposes, revenue generation, and revenue allocation.
- Because all of these purposes often call for similar remedies such as new taxes and fees, policy-makers should be explicit in the foundation and intended purpose of these remedies. In a subsequent report, we will further interpret these results and place them into the context of the broad principles that should govern our infrastructure policy.

Motorists in Ontario meet at least a large portion of the costs that they impose on the road infrastructure. In major urban areas, it likely is much more than those costs. And if we look at the total cost of driving—including vehicle costs—cost recovery will tend closer to 100 per cent. This result may or may not be indicative of the situation in other provinces. Results for other provinces could vary considerably due to different pricing and investment practices. For example, Quebec and British Columbia impose more dedicated road user taxes and fees. Meanwhile, Saskatchewan has a more extensive road network per capita than other provinces.

Improving data collection and dissemination should be an explicit policy of all of the governments that are involved in the delivery of road infrastructure.

While the picture for the province as a whole is instructive, it is more useful to relate road costs and revenues within a smaller spatial scale. For one, the Province of Ontario is home to large sparsely populated areas, where small communities rely on the road network for basic access to daily necessities. In many ways, the role and function of the road infrastructure is significantly different in those parts of the province than they are in urban areas. Striving for full cost recovery of the road infrastructure at the provincial level likely means requiring a cross-subsidy from urban motorists to rural and remote communities. Because rural and remote access is considered to be a wider societal objective, a good case can be made that any related subsidies should be funded through general government revenues.

Our calculations—particularly at the urban level—can be improved upon if better data were collected and made available to the public. Improving data collection

and dissemination should be an explicit policy of all of the governments that are involved in the delivery of road infrastructure. This is no small task given the various governments involved in the provision of road infrastructure. But, the increased transparency will help to inform the debate and subsequent policies governing the way that we deliver and pay for our infrastructure.

Our results are a useful first step toward answering the questions about the use of user charges for efficiency purposes, revenue generation, and revenue allocation. Because all of these purposes often call for similar remedies, such as new taxes and fees, policy-makers should be explicit in the foundation and intended purpose of these remedies. In a subsequent report, we will further interpret these results and place them into the context of the broad principles that should govern our infrastructure policy.

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Appendix A

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Ontarians' views on a Municipal Vehicle Registration Tax

Trillium Automotive Survey Summary

submitted by Nanos to the Trillium Automobile Dealers Association, May 2016
(Submission 2016-821)

Ontarians oppose municipalities having power to tax cars, not likely to support politicians in favour of car taxes

The majority of Ontario residents believe the timing for a new Government tax on cars is very poor. Additionally. a majority of Ontarians would be unlikely to support a politician in favour of taxing cars, or a politician in favour of giving taxing power to municipalities. If given the choice, a large portion of Ontarians would prefer to see an increase in provincial taxes on gasoline. The automobile is also seen as a household necessity among Ontario residents.

- **Two in three don't plan to lease or purchase a car** – Two thirds (66%) of Ontarians are not currently in the market or do not intend to lease a personal car in the next two years. However, almost a quarter (24%) intend to purchase a car, three per cent intend to lease a car, two per cent intend to lease and purchase a car, and another five percent are unsure.
- **Majority feel a car is a household necessity** – Ontarians largely feel that having a car is essential (83%) in a household. Nine per cent believe it is somewhat essential. On the other hand, six per cent feel a car is not essential and one per cent believe it to be somewhat not essential or they are unsure, respectively.
- **Ontarians feel the timing is poor for a new Government tax on cars** – Almost half (48%) of residents in Ontario feel that the timeliness of the new Government tax on cars is very poor. Additionally, over a quarter (28%) of residents believe the timeliness is poor. Of the 500 Ontarians surveyed, less than one in ten believe the timing is very good (2%) or good (7%). An additional six per cent are unsure.
- **Majority oppose municipalities having power to put taxes on cars** – Around three quarters of Ontarians oppose (71%) or somewhat oppose (five percent) the idea of allowing municipalities to have the power to put taxes on cars. Just over two fifths said they support (13%) or somewhat support (nine per cent) the idea, while two percent are unsure.
- **Support for politician in favour of taxing cars very unlikely –** Over four fifths of Ontarians would be unlikely (78%) or somewhat unlikely (eight per cent) to support a politician in favour of taxing cars. Six per cent say they are likely and five percent say their are somewhat likely to support a such a politician. Two percent were unsure.
- **Three in four unlikely to support a politician in favour of giving taxing power to municipalities** – Over eight in ten Ontario residents would be unlikely (74%) or somewhat unlikely (eight percent) to support a politician in favour of giving taxing power to municipalities. On the other hand, eight per cent would be likely to give a politician support in favour of giving taxing power to municipalities and nine per cent would be somewhat likely to do so. An additional two per cent were unsure.
- **Ontarians prefer an increase in provincial taxes on gasoline** – Given the choice, more than two fifths (43%) of people living in Ontario would prefer provincial taxes on gasoline be increased to pay to maintain roads, whereas 22% preferred a new tax on cars. Additionally, over a third (35%) of people are unsure of their preference.

These observations are based on a hybrid survey conducted by an RDD dual frame (land- and cell- lines) telephone random survey of 500 Ontarians, 18 years or older between April 28th and May 1st. The sample included both land- and cell-lines across Canada. The margin of error for a random survey of 500 Canadians is ± 4.4 percentage points, 19 times out of 20. The research was commissioned by the Trillium Automobile Dealers Association.

Cars in household

Source: Nanos Research, RDD dual frame random telephone survey, April 28th to May 1st , 2016, n=500 Ontarians, accurate 4.4 percentage points plus or minus, 19 times out of 20.

Age	Mean
18 to 29 (n=73)	1.57
30 to 39 (n=84)	1.94
40 to 49 (n=96)	1.92
50 to 59 (n=105)	1.79
60 plus (n=142)	1.43
Total (n=500)	1.72

Vote Profile	Mean
Liberal (n=154)	1.71
PC (n=180)	1.92
NDP (n=80)	1.48
Undecided (n=57)	1.54
Total (n=500)	1.72

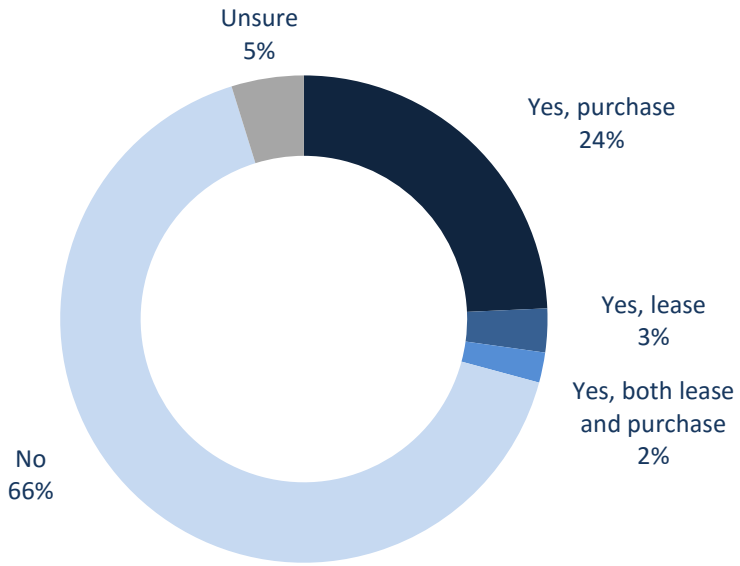
Purchase/lease intentions	Mean
Yes, purchase (n=116)	1.89
Yes, lease (n=14)	1.73
Yes, both lease and purchase (n=10)	2.06
No (n=335)	1.64
Total (n=500)	1.72

Gender	Mean
Male (n=249)	1.79
Female (n=251)	1.65
Total (n=500)	1.72

QUESTION – How many personal cars does your household have? [Open-ended]

Intent to purchase or lease a car

Source: Nanos Research, RDD dual frame random telephone survey, April 28th to May 1st , 2016, n=500 Ontarians, accurate 4.4 percentage points plus or minus, 19 times out of 20.



Subgroups	Yes, purchase
Male (n=249)	28.7%
Female (n=251)	19.9%
18 to 29 (n=73)	32.8%
30 to 39 (n=84)	24.6%
40 to 49 (n=96)	25.9%
50 to 59 (n=105)	25.5%
60 plus (n=142)	14.2%

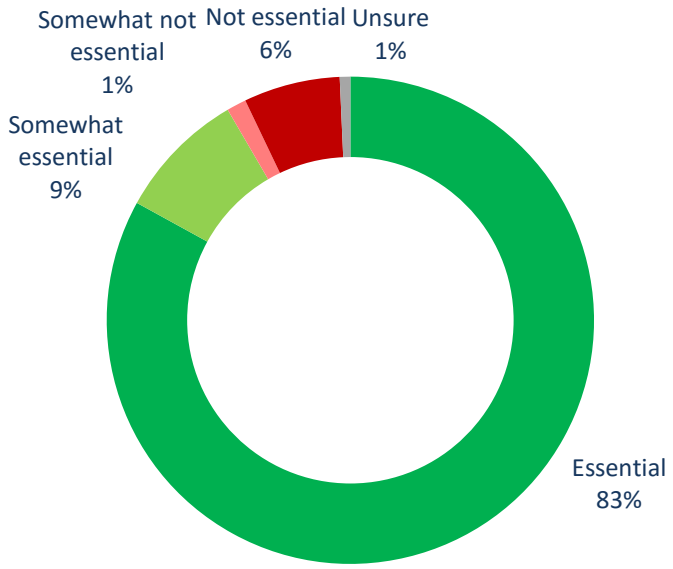
***Note: Charts may not add up to 100 due to rounding**

QUESTION – Do you intend to purchase or lease a personal car in the next two years?

Necessity of having a car in the household

Source: Nanos Research, RDD dual frame random telephone survey, April 28th to May 1st , 2016, n=500 Ontarians, accurate 4.4 percentage points plus or minus, 19 times out of 20.

Net Score
+83.9



Subgroups	Essential/ Somewhat essential
Male (n=249)	91.3%
Female (n=251)	91.9%
18 to 29 (n=73)	89.0%
30 to 39 (n=84)	93.1%
40 to 49 (n=96)	93.8%
50 to 59 (n=105)	95.3%
60 plus (n=142)	88.0%
Plans to purchase (n=116)	94.5%
Does not plan to lease or purchase (n=335)	89.7%

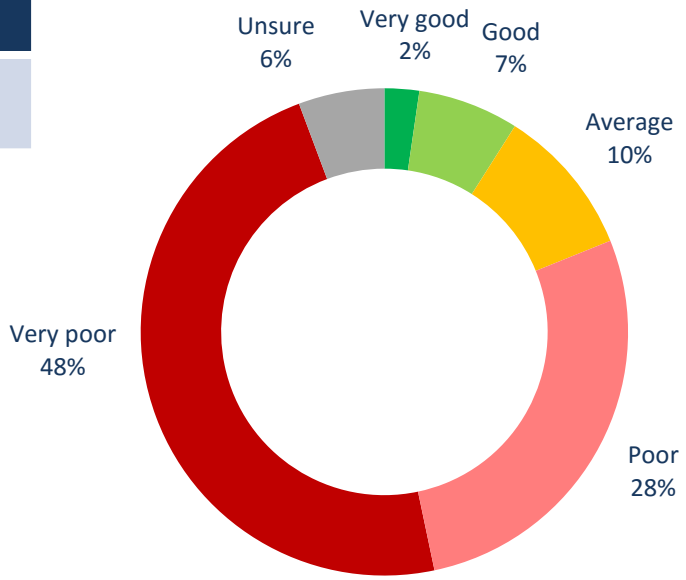
***Note: Charts may not add up to 100 due to rounding**

QUESTION – Would you say that having a car is essential, somewhat essential, somewhat not essential, not essential to your household?

Timeliness of new Government tax on cars

Source: Nanos Research, RDD dual frame random telephone survey, April 28th to May 1st , 2016, n=500 Ontarians, accurate 4.4 percentage points plus or minus, 19 times out of 20.

Net Score
-66.4



Subgroups	Poor/ very poor
Male (n=249)	77.5%
Female (n=251)	73.3%
18 to 29 (n=73)	66.8%
30 to 39 (n=84)	78.1%
40 to 49 (n=96)	76.1%
50 to 59 (n=105)	80.1%
60 plus (n=142)	76.8%
Plans to purchase (n=116)	79.8%
Does not plan to lease or purchase (n=335)	75.1%

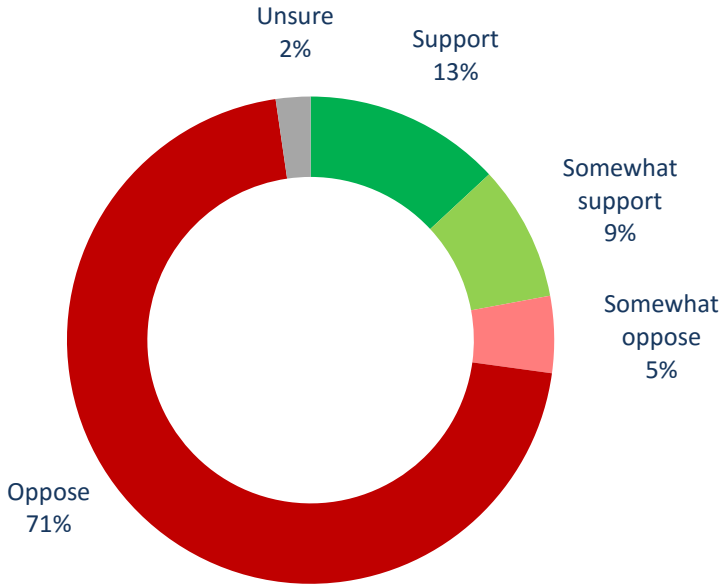
***Note: Charts may not add up to 100 due to rounding**

QUESTION – Would you say that now is a very good, good, average, poor or very poor time for the Government of Ontario to put a new tax on people's cars?

Municipalities having power to put taxes on cars

Source: Nanos Research, RDD dual frame random telephone survey, April 28th to May 1st , 2016, n=500 Ontarians, accurate 4.4 percentage points plus or minus, 19 times out of 20.

Net Score
-53.6



Subgroups	Oppose/ Somewhat oppose
Male (n=249)	77.7%
Female (n=251)	73.6%
18 to 29 (n=73)	68.6%
30 to 39 (n=84)	74.0%
40 to 49 (n=96)	69.7%
50 to 59 (n=105)	80.9%
60 plus (n=142)	84.6%
Plans to purchase (n=116)	76.1%
Does not plan to lease or purchase (n=335)	76.9%

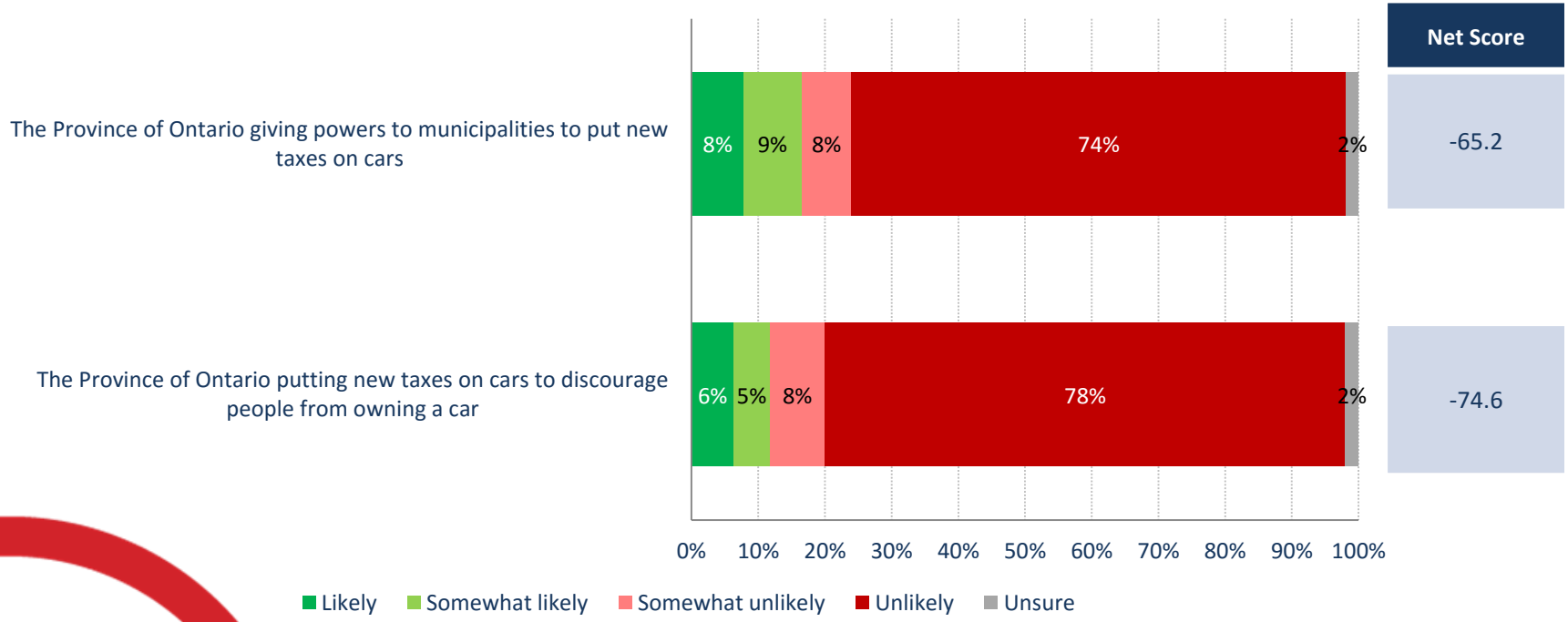
***Note: Charts may not add up to 100 due to rounding**

QUESTION – Would you support, somewhat support, somewhat oppose or oppose the following:

The Province of Ontario giving powers to municipalities to put new taxes on cars

Support for politicians that favour taxing cars

Source: Nanos Research, RDD dual frame random telephone survey, April 28th to May 1st , 2016, n=500 Ontarians, accurate 4.4 percentage points plus or minus, 19 times out of 20.



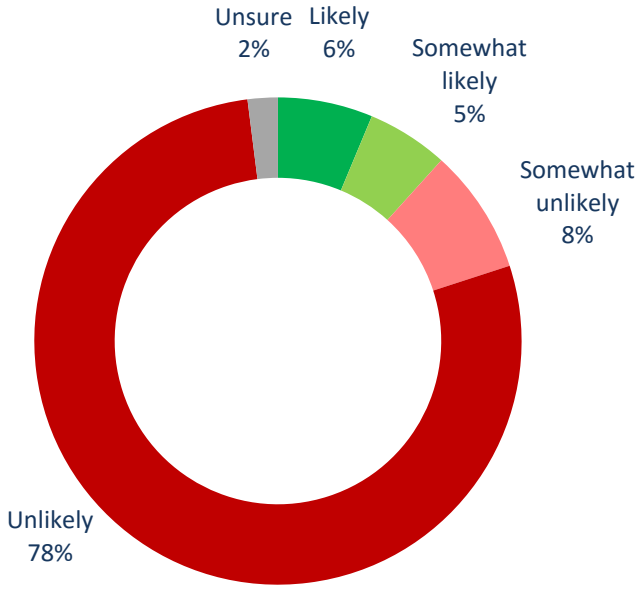
***Note: Charts may not add up to 100 due to rounding**

QUESTION – Are you likely, somewhat likely, somewhat unlikely or unlikely to support a politician that favoured the following: [ROTATE]

Likeliness of supporting a politician in favour of taxing cars

Source: Nanos Research, RDD dual frame random telephone survey, April 28th to May 1st , 2016, n=500 Ontarians, accurate 4.4 percentage points plus or minus, 19 times out of 20.

Net Score
-74.6



Subgroups	Unlikely/ Somewhat unlikely
Male (n=249)	88.6%
Female (n=251)	84.0%
18 to 29 (n=73)	82.5%
30 to 39 (n=84)	88.1%
40 to 49 (n=96)	86.4%
50 to 59 (n=105)	88.6%
60 plus (n=142)	86.7%
Plans to purchase (n=116)	92.6%
Does not plan to lease or purchase (n=335)	84.8%

***Note: Charts may not add up to 100 due to rounding**

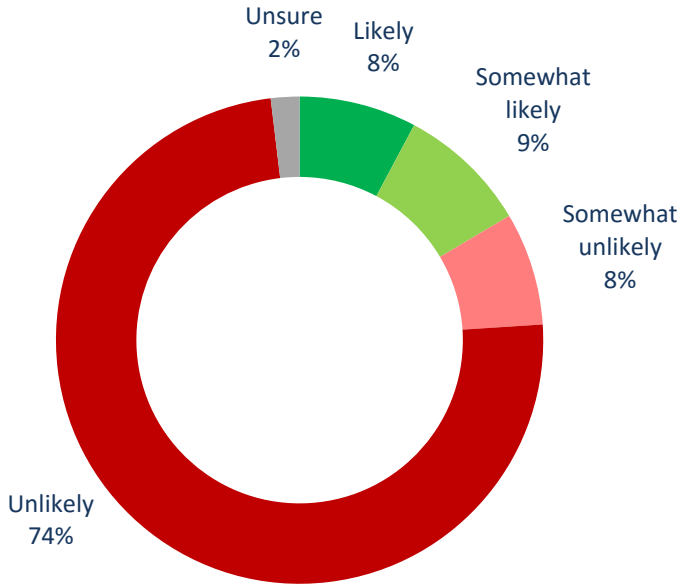
QUESTION – Are you likely, somewhat likely, somewhat unlikely or unlikely to support a politician that favoured the following: [ROTATE]

The Province of Ontario putting new taxes on cars to discourage people from owning a car

Likeliness of supporting a politician in favour of giving taxing power to municipalities

Source: Nanos Research, RDD dual frame random telephone survey, April 28th to May 1st , 2016, n=500 Ontarians, accurate 4.4 percentage points plus or minus, 19 times out of 20.

Net Score
-65.2



Subgroups	Unlikely/ Somewhat unlikely
Male (n=249)	84.3%
Female (n=251)	78.9%
18 to 29 (n=73)	80.7%
30 to 39 (n=84)	77.4%
40 to 49 (n=96)	77.0%
50 to 59 (n=105)	86.7%
60 plus (n=142)	86.0%
Plans to purchase (n=116)	81.7%
Does not plan to lease or purchase (n=335)	82.0%

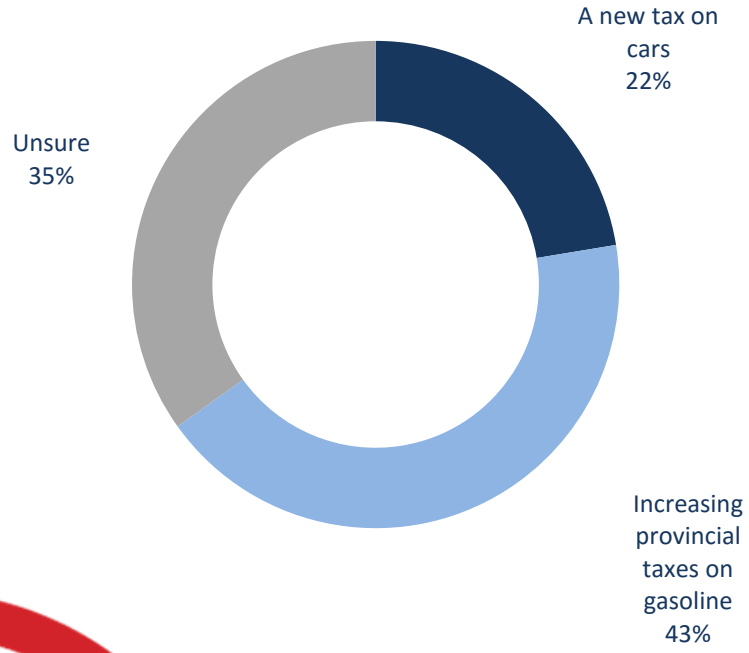
***Note: Charts may not add up to 100 due to rounding**

QUESTION – Are you likely, somewhat likely, somewhat unlikely or unlikely to support a politician that favoured the following: [ROTATE]

The Province of Ontario giving powers to municipalities to put new taxes on cars

Preferred allocation of taxes

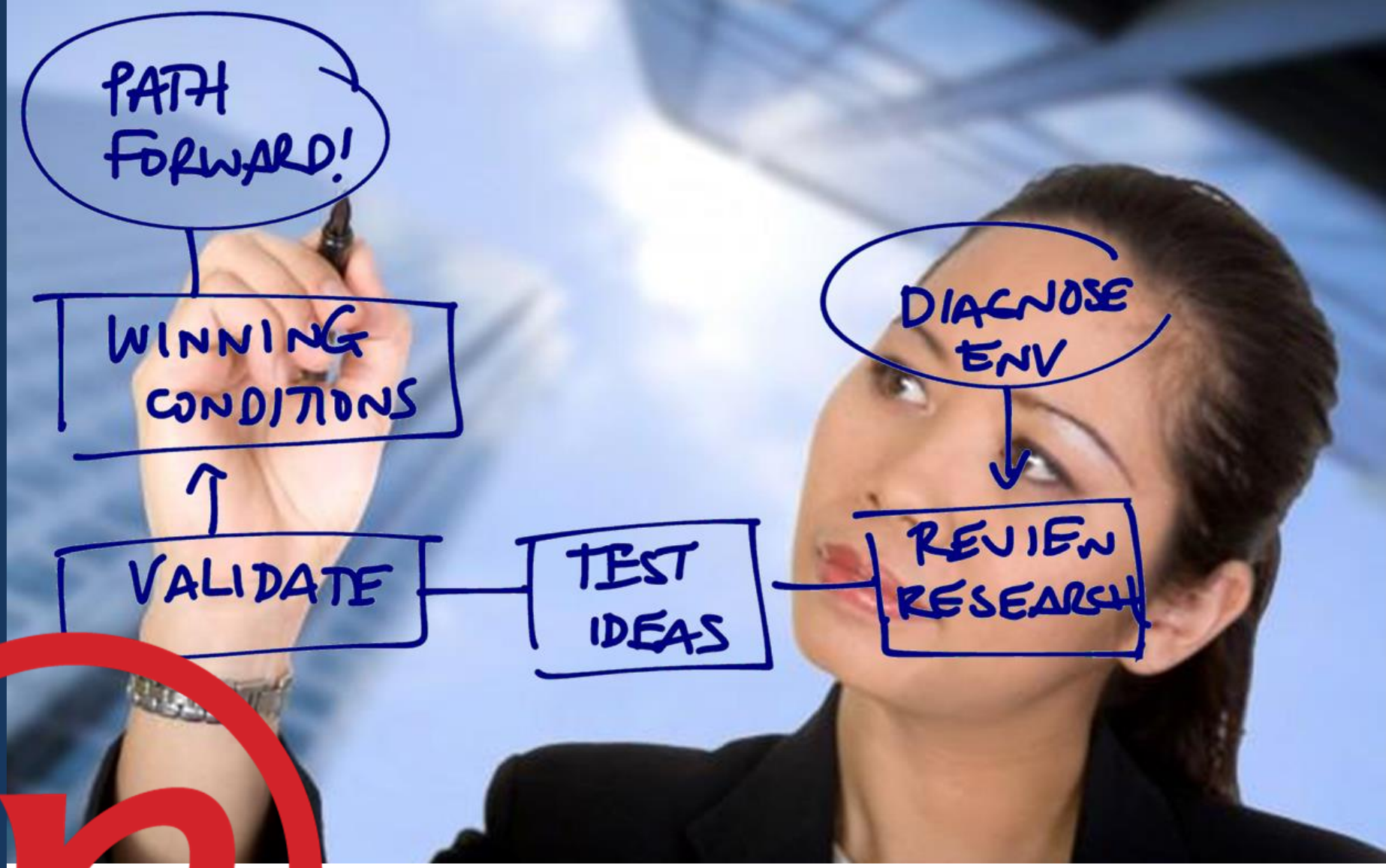
Source: Nanos Research, RDD dual frame random telephone survey, April 28th to May 1st , 2016, n=500 Ontarians, accurate 4.4 percentage points plus or minus, 19 times out of 20.



Subgroups	Increasing provincial taxes on gasoline
Male (n=249)	42.6%
Female (n=251)	42.8%
18 to 29 (n=73)	47.7%
30 to 39 (n=84)	38.2%
40 to 49 (n=96)	50.0%
50 to 59 (n=105)	42.6%
60 plus (n=142)	35.2%
Plans to purchase (n=116)	47.9%
Does not plan to lease or purchase (n=335)	41.6%

***Note: Charts may not add up to 100 due to rounding**

QUESTION – Given the choice, if the government wanted to raise tax dollars to help pay to maintain roads would you prefer that it be done through [ROTATE] a new tax on cars or by increasing provincial taxes on gasoline.



Methodology

Methodology

Nanos conducted an RDD dual frame (land- and cell-lines) random telephone survey of 500 Ontarians, 18 years of age or older, between April 28th and May 1st, 2016 as part of an omnibus survey. Participants were randomly recruited by telephone using live agents and administered a survey. The sample included both land- and cell-lines across Ontario. The results were statistically checked and weighted by age and gender using the latest Census information and the sample is geographically stratified to be representative of Ontario.

Individuals were randomly called using random digit dialling with a maximum of five call backs.

The margin of error for a random survey of 500 Ontarians is ±4.4 percentage points, 19 times out of 20.

The research was commissioned by the Trillium Automobile Dealers Association.

Note: Charts may not add up to 100 due to rounding.

About Nanos

Nanos is one of North America's most trusted research and strategy organizations. Our team of professionals is regularly called upon by senior executives to deliver superior intelligence and market advantage whether it be helping to chart a path forward, managing a reputation or brand risk or understanding the trends that drive success. Services range from traditional telephone surveys, through to elite in-depth interviews, online research and focus groups. Nanos clients range from Fortune 500 companies through to leading advocacy groups interested in understanding and shaping the public landscape. Whether it is understanding your brand or reputation, customer needs and satisfaction, engaging employees or testing new ads or products, Nanos provides insight you can trust.

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Technical Note

Element	Description
Organization who commissioned the research	Trillium Automobile Dealers Association.
Final Sample Size	500 Randomly selected individuals.
Margin of Error	±4.4 percentage points, 19 times out of 20.
Mode of Survey	RDD dual frame (land- and cell-lines) random telephone omnibus survey
Sampling Method Base	The sample included both land- and cell-lines RDD (Random Digit Dialed) across Ontario.
Demographics (Captured)	Men and Women; 18 years and older. Six digit postal code was used to validate geography.
Fieldwork/Validation	Live interviews with live supervision to validate work as per the MRIA Code of Conduct
Number of Calls	Maximum of five call backs.
Time of Calls	Individuals were called between 12-5:30 pm and 6:30-9:30pm local time for the respondent.
Field Dates	April 28th to May 1st, 2016.
Language of Survey	The survey was conducted in English.

Element	Description
Weighting of Data	The results were weighted by age and gender using the latest Census information (2014) and the sample is geographically stratified to ensure a distribution across Ontario. See tables for full weighting disclosure
Screening	Screening ensured potential respondents did not work in the market research industry, in the advertising industry, in the media or a political party prior to administering the survey to ensure the integrity of the data.
Excluded Demographics	Individuals younger than 18 years old; individuals without land or cell lines could not participate.
Stratification	By age and gender using the latest Census information (2014) and the sample is geographically stratified to be representative of Ontario.
Question Order	Question order in the preceding report reflects the order in which they appeared in the original questionnaire.
Question Content	All questions are contained in the report.
Question Wording	The questions in the preceding report are written exactly as they were asked to individuals.
Survey Company	Nanos Research
Contact	Contact Nanos Research for more information or with any concerns or questions. http://www.nanosresearch.com Telephone:(613) 234-4666 ext. Email: info@nanosresearch.com.

Tabulations

2016-821 – Trillium Automobile Dealers Association – STAT SHEET

Question - How many personal cars does your household have? * Gender

Question - How many personal cars does your household have?

Gender	Mean	Median	N
Male	1.7864	2.0000	249
Female	1.6454	2.0000	251
Total	1.7155	2.0000	500

2016-821 – Trillium Automobile Dealers Association – STAT SHEET

Question - How many personal cars does your household have? * Age

Question - How many personal cars does your household have?

Age	Mean	Median	N
18 to 29	1.5742	1.0000	103
30 to 39	1.9399	2.0000	88
40 to 49	1.9177	2.0000	106
50 to 59	1.7920	2.0000	86
60 plus	1.4305	1.0000	117
Total	1.7155	2.0000	500

Question - How many personal cars does your household have? * Purchase/lease intentions

Question - How many personal cars does your household have?

Purchase/lease intentions	Mean	Median	N
Yes, purchase	1.8912	2.0000	121
Yes, lease	1.7270	2.0000	14
Yes, both lease and purchase	2.0628	2.0000	10
No	1.6407	2.0000	330
Unsure	1.7024	2.0000	24
Total	1.7155	2.0000	500

2016-821 – Trillium Automobile Dealers Association – STAT SHEET

Question - How many personal cars does your household have? * Vote Profile

Question - How many personal cars does your household have?

Vote Profile	Mean	Median	N
Liberal	1.7103	2.0000	152
PC	1.9152	2.0000	176
NDP	1.4752	1.7533	83
Green	1.4845	1.0000	28
Other	2.4564	2.1932	3
Undecided	1.5394	1.0000	58
Total	1.7155	2.0000	500

2016-821 – Trillium Automobile Dealers Association – STAT SHEET

				Gender		Age					Vote Profile					
			Ontario 2016-04	Male	Female	18 to 29	30 to 39	40 to 49	50 to 59	60 plus	Liberal	PC	NDP	Green	Other	Undecided
Question - Do you intent to purchase or lease a personal car in the next two years?	Total	Unwgt N	500	249	251	73	84	96	105	142	154	180	80	26	3	57
		Wgt N	500	249	251	103	88	106	86	117	152	176	83	28	3	58
	Yes, purchase	%	24.3	28.7	19.9	32.8	24.6	25.9	25.5	14.2	24.7	24.8	20.7	38.8	.0	20.8
	Yes, lease	%	2.9	4.6	1.1	3.8	2.8	2.1	1.8	3.5	4.6	3.4	.0	.0	.0	2.2
	Yes, both lease and purchase	%	2.0	3.4	.7	3.8	2.4	.0	2.8	1.4	.5	2.1	2.7	3.1	.0	4.3
	No	%	66.0	57.2	74.7	55.7	62.2	68.9	65.1	75.9	65.0	65.7	75.0	51.1	100.0	62.4
	Unsure	%	4.8	6.0	3.6	3.8	8.0	3.1	4.7	5.0	5.2	4.0	1.6	7.0	.0	10.2

2016-821 – Trillium Automobile Dealers Association – STAT SHEET

			Gender			Age					Purchase/lease intentions					Vote Profile					
			Ontario 2016-04	Male	Female	18 to 29	30 to 39	40 to 49	50 to 59	60 plus	Yes, purchase	Yes, lease	Yes, both lease and purchase	No	Unsure	Liberal	PC	NDP	Green	Other	Undecided
Question - Would you say that having a car is essential, somewhat essential, somewhat not essential or not essential to your household?	Total	Unwgt N	500	249	251	73	84	96	105	142	116	14	10	335	25	154	180	80	26	3	57
		Wgt N	500	249	251	103	88	106	86	117	121	14	10	330	24	152	176	83	28	3	58
	Essential	%	83.0	85.2	80.9	80.3	87.5	83.4	87.7	78.2	90.5	100.0	100.0	79.6	74.4	84.1	90.3	74.8	71.6	100.0	74.5
	Somewhat essential	%	8.6	6.1	11.0	8.7	5.6	10.4	7.6	9.8	4.0	.0	.0	10.1	20.2	9.2	2.4	14.6	22.1	.0	11.0
	Somewhat not essential	%	1.3	2.2	.3	.0	1.4	1.0	.9	2.8	1.5	.0	.0	1.4	.0	1.4	1.1	1.9	3.0	.0	.0
	Not essential	%	6.4	6.0	6.8	8.3	5.6	5.2	2.7	9.1	4.0	.0	.0	7.8	5.4	5.4	5.0	8.7	3.3	.0	11.9
	Unsure	%	.7	.5	.9	2.8	.0	.0	1.0	.0	.0	.0	.0	1.1	.0	.0	1.2	.0	.0	.0	2.6

2016-821 – Trillium Automobile Dealers Association – STAT SHEET

			Gender			Age					Purchase/lease intentions					Vote Profile					
			Ontario 2016-04	Male	Female	18 to 29	30 to 39	40 to 49	50 to 59	60 plus	Yes, purchase	Yes, lease	Yes, both lease and purchase	No	Unsure	Liberal	PC	NDP	Green	Other	Undecided
Question - Would you say that now is a very good, good, average, poor or very poor time for the Government of Ontario to put a new tax on people's cars?	Total	Unwgt N	500	249	251	73	84	96	105	142	116	14	10	335	25	154	180	80	26	3	57
		Wgt N	500	249	251	103	88	106	86	117	121	14	10	330	24	152	176	83	28	3	58
	Very good	%	2.3	2.8	1.9	3.8	2.1	3.1	1.0	1.4	2.0	.0	.0	2.8	.0	2.5	2.0	3.0	3.3	.0	1.6
	Good	%	6.7	6.4	7.0	8.3	3.8	4.3	10.3	7.0	5.0	5.8	.0	7.2	11.4	10.1	.5	14.6	13.1	.0	2.7
	Average	%	9.9	9.7	10.0	13.8	12.5	8.2	5.7	9.1	8.5	15.0	29.0	8.4	26.4	13.0	3.7	16.0	22.0	.0	6.6
	Poor	%	27.8	25.7	29.9	25.9	24.7	27.1	34.7	27.4	27.1	32.0	24.9	28.9	15.5	35.8	21.7	26.7	9.3	35.0	35.2
	Very poor	%	47.6	51.8	43.4	40.9	53.4	49.0	45.4	49.4	52.7	39.6	46.1	46.2	46.8	32.4	69.8	31.9	45.4	65.0	42.7
	Unsure	%	5.7	3.5	7.9	7.4	3.5	8.3	2.9	5.6	4.7	7.5	.0	6.6	.0	6.2	2.4	7.8	6.9	.0	11.2

2016-821 – Trillium Automobile Dealers Association – STAT SHEET

			Gender			Age					Purchase/lease intentions					Vote Profile					
			Ontario 2016-04	Male	Female	18 to 29	30 to 39	40 to 49	50 to 59	60 plus	Yes, purchase	Yes, lease	Yes, both lease and purchase	No	Unsure	Liberal	PC	NDP	Green	Other	Undecided
Question - The Province of Ontario is giving powers to municipalities to put new taxes on cars	Total	Unwgt N	500	249	251	73	84	96	105	142	116	14	10	335	25	154	180	80	26	3	57
		Wgt N	500	249	251	103	88	106	86	117	121	14	10	330	24	152	176	83	28	3	58
	Support	%	13.1	13.6	12.5	14.6	15.3	17.7	12.4	6.3	13.0	16.7	24.9	12.4	15.2	18.1	5.3	19.7	20.8	.0	11.3
	Somewhat support	%	9.0	6.1	11.9	14.2	9.4	11.5	5.7	4.2	10.9	24.2	8.5	7.5	10.5	10.3	4.9	13.7	6.0	.0	13.0
	Somewhat oppose	%	5.1	3.5	6.6	7.2	3.5	6.3	5.6	2.8	5.7	.0	7.7	5.3	.0	4.8	4.5	9.3	8.4	.0	.0
	Oppose	%	70.6	74.2	67.0	61.4	70.5	63.4	75.3	81.8	70.4	59.1	58.9	71.6	68.9	63.9	84.8	57.3	60.2	100.0	67.4
	Unsure	%	2.3	2.6	2.0	2.5	1.4	1.0	1.0	4.9	.0	.0	.0	3.1	5.4	3.0	.5	.0	4.7	.0	8.3

2016-821 – Trillium Automobile Dealers Association – STAT SHEET

			Gender			Age					Purchase/lease intentions				Vote Profile					
			Ontario 2016-04	Male	Female	18 to 29	30 to 34	40 to 44	50 to 59	60 plus	Yes, purchase	Yes, lease	Yes, both lease and purchase	No	Unsure	Liberal	PC	NDP	Green	Other	Undecided
Question - The Province of Ontario putting new taxes on cars to discourage people from owning a car	Total	Unwgt N	500	249	251	73	84	96	105	142	116	14	10	335	25	154	180	80	26	3	57
		Wgt N	500	249	251	103	88	106	86	117	121	14	10	330	24	152	176	83	28	3	58
	Likely	%	6.3	4.4	8.3	5.3	6.3	9.5	6.6	4.2	3.7	.0	.0	7.9	4.7	7.1	4.1	9.0	16.5	.0	3.0
	Somewhat likely	%	5.4	5.6	5.1	6.8	4.5	4.1	4.7	6.3	2.0	13.4	.0	5.7	15.9	9.1	.0	9.3	11.4	.0	3.6
	Somewhat unlikely	%	8.3	6.7	9.9	15.3	6.2	8.4	4.8	6.3	11.1	9.2	12.0	7.5	3.4	12.0	5.0	9.8	.0	.0	10.8
	Unlikely	%	78.0	81.9	74.1	67.2	81.9	78.0	83.8	80.4	81.5	77.4	88.0	77.3	66.8	69.7	90.9	68.4	69.2	100.0	77.4
	Unsure	%	2.0	1.4	2.6	5.5	1.0	.0	.0	2.8	1.8	.0	.0	1.7	9.2	2.1	.0	3.4	2.9	.0	5.2

2016-821 – Trillium Automobile Dealers Association – STAT SHEET

			Gender			Age					Purchase/lease intentions					Vote Profile					
			Ontario 2016-04	Male	Female	18 to 29	30 to 39	40 to 49	50 to 59	60 plus	Yes, purchase	Yes, lease	Yes, both lease and purchase	No	Unsure	Liberal	PC	NDP	Green	Other	Undecided
Question - The Province of Ontario giving powers to municipalities to put new taxes on cars	Total	Unwgt N	500	249	251	73	84	96	105	142	116	14	10	335	25	154	180	80	26	3	57
		Wgt N	500	249	251	103	88	106	86	117	121	14	10	330	24	152	176	83	28	3	58
	Likely	%	7.8	5.7	9.8	2.8	13.9	11.6	8.5	3.5	6.7	7.5	.0	8.1	11.8	10.4	2.2	14.0	20.7	.0	2.9
	Somewhat likely	%	8.7	9.5	8.0	15.0	6.2	11.4	4.7	5.6	11.5	15.0	8.5	7.1	13.9	12.2	4.1	17.1	9.0	.0	2.2
	Somewhat unlikely	%	7.5	5.7	9.2	12.9	7.3	4.2	3.8	8.4	8.2	8.6	12.0	6.9	8.8	9.5	5.1	6.2	8.5	.0	10.9
	Unlikely	%	74.2	78.6	69.7	67.8	70.1	72.8	82.9	77.6	73.5	68.9	79.5	75.1	65.5	66.6	86.7	61.5	58.8	100.0	79.8
	Unsure	%	1.9	.5	3.2	1.5	2.4	.0	.0	4.9	.0	.0	.0	2.8	.0	1.3	1.8	1.1	2.9	.0	4.2

2016-821 – Trillium Automobile Dealers Association – STAT SHEET

			Gender			Age					Purchase/lease intentions				Vote Profile						
			Ontario 2016-04	Male	Female	18 to 29	30 to 39	40 to 49	50 to 59	60 plus	Yes, purchase	Yes, lease	Yes, both lease and purchase	No	Unsure	Liberal	PC	NDP	Green	Other	Undecided
Question - Given the choice, if the government wanted to raise tax dollars to help pay to maintain roads would you prefer that it be done through [Rotate] a new tax on cars or by increasing provincial taxes on gasoline	Total	Unwgt N	500	249	251	73	84	96	105	142	116	14	10	335	25	154	180	80	26	3	57
		Wgt N	500	249	251	103	88	106	86	117	121	14	10	330	24	152	176	83	28	3	58
	A new tax on cars	%	22.4	21.2	23.5	31.8	31.2	13.6	17.5	19.0	20.6	17.7	12.9	22.6	34.2	23.0	17.4	32.5	21.8	.0	22.8
	Increasing provincial taxes on gasoline	%	42.7	42.6	42.8	47.7	38.2	50.0	42.6	35.2	47.9	43.8	53.9	41.6	26.4	49.7	36.8	41.4	61.5	36.9	35.6
	Unsure	%	34.9	36.2	33.6	20.6	30.6	36.4	39.9	45.8	31.5	38.5	33.2	35.8	39.4	27.3	45.8	26.1	16.7	63.1	41.6