UNTAPPED ROAD CAPACITY:

We can save $9 billion in one city alone with a small increase in ridesharing

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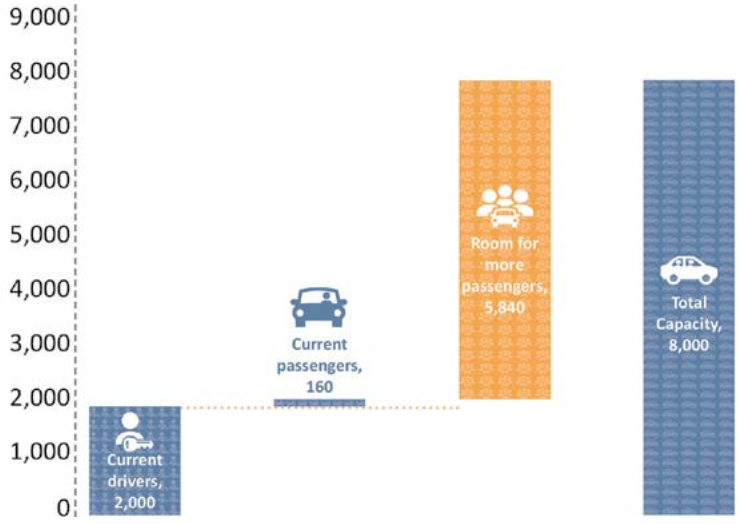
So why aren't we looking to these kinds of simple solutions to make better use of existing infrastructure?

The simple answer: large scale investments in new urban rail transit lines or highway expansions are sexier than far less costly but equally effective solutions designed to get more efficient use of the existing transportation system. Carpooling and ridesharing more broadly are among those solutions.

It is often said that we have little or no excess road capacity in our large urban areas. But this ignores the fact that there is plenty of capacity available in the thousands of cars that use the road network each day (three to four seats each on average) as they drive side-by-side – often from similar origins and destinations.

For example, a typical highway lane can accommodate about 2,000 vehicles per lane-hour. Assuming four seats per car, this translates to available capacity of 8,000 passengers per lane-hour. Current usage levels indicate drivers and passengers on highways in Canada's four largest cities account for about a quarter of this capacity at best, which means that we are leaving plenty of capacity on the table.

There is plenty of road capacity in Toronto and other cities



There has been little research to date that has compared the value of increasing productivity of the existing infrastructure in this way, relative to the value of building new infrastructure and using that infrastructure in the same way we always have. This briefing note takes one example of a productivity enhancing initiative, increasing the automobile occupancy rate through carpooling, and illustrates the potential cost savings associated with doing so.

Current automobile occupancy rates are low

Census Metropolitan Area	People per Car
Toronto	**1.08**
Montreal	**1.05**
Ottawa	**1.07**
Vancouver	**1.11**

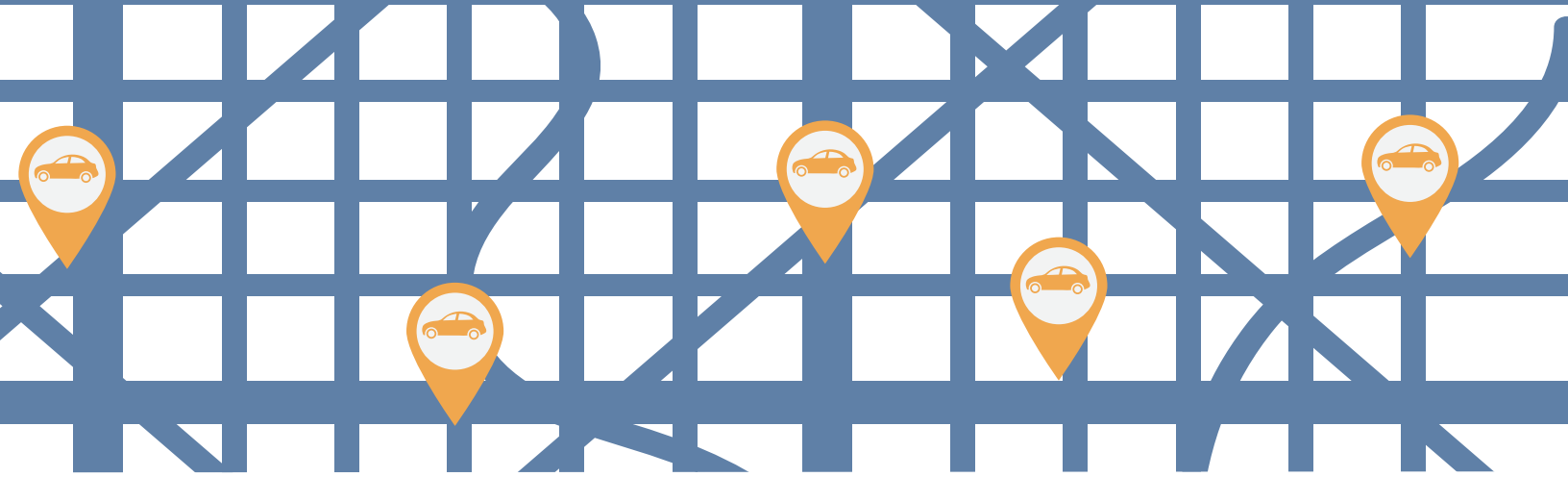
Average vehicle operating costs

The average automobile operating and infrastructure costs per vehicle kilometre travelled (VKT) are approximately $0.60[1] (not including the cost of negative externalities, such as CO2 emissions). Average public transit costs per passenger kilometre travelled (PKT) are generally lower, but not substantially so when factoring in transit system capital costs (in the range of $0.30 to $0.50 or more per PKT[2]). Furthermore, incremental expansions to transit have generally proven to be costlier than total average cost, suggesting that we are unlikely to substantially reduce direct costs through mode shift from auto to transit.

Increasing the automobile occupancy ratio, however, is costless in terms of hard infrastructure. The main costs associated with increasing this ratio relate to time and convenience factors, and perhaps some increase in VKT associated with coordinating pickup and drop off locations.

Mobile phone and other technology has and will continue to substantially reduce these costs. Companies like Uber (through Uber Pool) have shown that complete strangers are willing to share rides if they are able to save on fares and the experience is seamless and effortless. Companies like Google (through its subsidiary Waze) have launched pilots that extend this concept to regular commuters.[3]

[1]CAA estimates that vehicle operating costs per kilometre range from $0.45 to $0.65 per VKT depending on the vehicle model and amount of usage (see CAA, Driving Costs). The Conference Board of Canada estimates that road infrastructure costs in Ontario average approximately $0.07 per VKT (see Gill and Lawson, Where the Rubber Meets the Road).
[2]CPCS analysis of transit system data, particularly OC Transpo.
[3]Yu, Google's Carpool Pilot with Waze Offers Lessons For Innovative Executives.



Potential carpooling cost savings are large

Using the average costs and total peak VKT/PKT figures above we can estimate what the potential gross cost savings are related to a given increase in the automobile occupancy ratio (before considering time and convenience costs, along with whatever other policy tool or technology is used to increase the ratio).

Taking Toronto as an example, daily morning peak VKT total approximately 25 million. Using the auto occupancy ratio above, this implies total morning peak PKT of about 27 million. Increasing that ratio to 1.20 would decrease VKT to 22.5 million. Assuming a similar amount of savings in the afternoon peak, the daily VKT reductions are in the order of 5 million.

Using the average costs per VKT noted above, the gross cost savings per day are $3 million. Or on an annual basis (assuming 250 work days) the savings are $750 million. By discounting these savings over a 20 year period at a rate of 5%, the net present value of **savings are over $9 billion in Toronto alone.** And if we were to include the cost savings from reducing negative externalities and reducing congestion, the gross savings would be much greater.

Increasing capacity utilization can deliver more bang for public investment buck

Given the large potential cost savings related to increasing the automobile occupancy rate, it is obvious that we are not currently achieving the right balance between investments in hard infrastructure and investments in softer solutions that would achieve our mobility and other objectives through other means.

Recently announced federal infrastructure investment plans, along with the creation of a federal Canada Infrastructure Bank, provide an opportunity to think differently about getting more from related investments – by seeking better utilization of existing infrastructure as a condition of investment in new capacity. This can be done through the use of incentives for smarter, productivity-enhancing initiatives, like carpooling. The Canadian Smart Cities Challenge announced in the 2016 Fall Economic Statement provides one opportunity to pilot some of these incentives.

Conclusion – Achieve more from infrastructure investment by creating the right incentives

How can federal investment do this? To start, it can create incentives for efficient infrastructure use by favouring projects that are designed to make better use of existing infrastructure. But to be even more bold and effective, it can "pay for performance": by **allocating funding based on achieving specific and measurable outcomes**, rather than on arbitrary funding formulas.

Using the example of carpooling, funds can be promised to urban areas **after** they achieve specified increases in their automobile occupancy rates, while being agnostic about how they achieve those rates. Local governments could then finance projects or seek private partners to implement and finance projects designed to increase automobile occupancy rates, whether they be hard solutions like carpooling lots and High Occupancy Vehicle (HOV) lanes (which alone have not generally been effective), demand management tools, by better pricing infrastructure use, or technological solutions, such as Uber Pool.

As long as the rules are clear (how auto occupancy will be measured and how much will be paid for each increment), the private sector will be willing to finance such solutions if it feels that it can achieve the targets at a cost that is lower than the prospective payments.

While this briefing note focuses on the specific example of carpooling, the game-changing potential of the Infrastructure Bank and more infrastructure funding in general goes far beyond increasing carpooling rates. Now is the time to generate debate and discussion about how we can leverage the creation of the new Infrastructure Bank and increased funding committed to infrastructure more generally to create the right incentives to increase the productivity of our infrastructure.

The paper is a follow up to the initial briefing note "Getting More from Federal Transportation Infrastructure Investment", prepared by the self-styled and unappointed Advisory Council on Transportation Infrastructure Investment. It provides a specific example of the potential value of better utilization of existing infrastructure.

Questions on this paper can be directed to Vijay Gill, Assistant Vice President with CPCS, vgill@cpcs.ca, +1 647 479 9801