Autonomous vehicles are no longer a thing of science fiction. In the near future, autonomous electric vehicles will become the primary form of transport in our cities. This change has significant implications for transport infrastructure and road congestion.

The cost of road congestion in Australian capital cities is predicted to grow from $16.5 billion in 2015 to $30.0 billion in 2030. Autonomous vehicles could have two divergent impacts on this trend. A scenario with privately owned autonomous vehicles would significantly exacerbate congestion in our cities. In contrast, the introduction of autonomous ride sourcing has the potential to ease the burden of congestion.

We know from hard won experience that it is not possible to build our way out of congestion with more and wider roads. Instead, the autonomous era demands an intelligent and proactive response from policy makers. We need to act now to avoid jeopardising the productivity and liveability of our cities.

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**Autonomous vehicle scenario modelling**

To understand the traffic impacts of autonomous vehicles, KPMG applied its proprietary Land Use and Transport Interaction (LUTI) model to Melbourne as a case study. All results in this report refer to a typical weekday morning peak period in 2046.
Scenario one: A recipe for gridlock

The introduction of autonomous vehicles combined with a continuation of private car ownership will stoke congestion. This is because autonomous electric vehicles will make car travel cheaper, easier and more convenient. This will lead to more and longer car trips and more car travel in inner areas.

KPMG analysis shows that this could lead to a 29% increase in average car trip time and a 23% increase in average car trip distance. This will contribute to a significant increase in demand for road infrastructure and exacerbate congestion.

Lower vehicle operating costs will further encourage long distance travel. Electric vehicles are far cheaper to run and maintain than petrol vehicles. Even today, running an electric vehicle in Australia is estimated to be 56% cheaper than a petrol vehicle. In the future, with rooftop solar and battery storage, the cost of running electric vehicles may reduce even further.

More car travel in inner areas

Today, the cost and hassle of parking is a significant disincentive to driving to inner city locations in our major cities. With autonomous vehicles, this disincentive will no longer exist. As more people choose to drive, this will mean more road congestion in our inner areas.

An autonomous vehicle will drop you exactly at your destination. The vehicle will continue on to a cheaper parking area or service fare paying passengers, earning income for the vehicle owner.

More car trips

Today, only adults with a valid driver license and access to a car can operate vehicles. Others must rely on lifts from family and friends, public transport, walking and cycling. With autonomous electric vehicles, this barrier to driving will no longer exist. This will lead to an increase in the number of trips taken.

Longer car trips

Today, long driving trips are associated with fatigue, boredom and frustration. With autonomous vehicles, people will be able to sleep, work, consume entertainment or relax during travel. This will cause people to accept longer travel times, particularly on freeways where the ride will be smooth and comfortable.

Figure 1: Average trip time by car, weekday morning peak, 2046

<table>
<thead>
<tr>
<th></th>
<th>Average time per trip (mins)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business as usual</td>
<td>10</td>
</tr>
<tr>
<td>Private autonomous</td>
<td>15</td>
</tr>
<tr>
<td>Autonomous ride</td>
<td>-7%</td>
</tr>
</tbody>
</table>

Source: KPMG analysis.
Scenario two: A better way to move

The introduction of autonomous electric vehicles provides an alternative to car ownership. In this scenario, people would rely on autonomous ride sourcing services for daily travel. These services will be like today’s Uber and taxi services, but with no driver. This would be equivalent to a car share service like Flexicar or GoGet that comes to you.

KPMG analysis of this scenario estimated a 7% reduction in average car trip time and a 9% reduction in average car trip distance. This would lower the demand for road infrastructure, ease the burden of congestion in our cities and make our transport systems more efficient and productive.

A smaller, more productive fleet

Car ownership involves high upfront costs such as financing, registration, maintenance and insurance. With autonomous ride sourcing, these costs are shared among a large pool of users. As a result, the vehicle fleet would be much smaller and more intensively used. In contrast, privately owned cars are idle for 96% of their life on average.

These efficiencies would reduce the cost of daily transport for consumers. KPMG estimates that an autonomous ride sourcing service would cost $8-10 per half hour of travel compared to $34 for an equivalent service with a driver. At this price, the annual cost of car travel for a typical Melbourne household would be cut by nearly half from $11,000 to $6,000-$7,000.

More efficient use of road space

When people make the decision to purchase a car, they commit to the high upfront costs that come with car ownership. Once those costs are incurred, the additional perceived cost of each trip is low, estimated by KPMG at $2.10 per half hour of city travel.

Autonomous ride sourcing has no upfront costs, saving the user thousands of dollars per year. However, the cost per trip is higher than if the car was privately owned, estimated at $8-$10. Because each individual trip costs more, people have greater incentive to walk, cycle or use public transport. This will lead to a decrease in road congestion. It will also increase demand for modes that use space more efficiently than cars and promote public health, including public transport, walking and cycling.

How should we respond?

Governments must begin taking action now to safeguard the liveability and productivity of our cities in the autonomous era. KPMG recommends the following actions to policy makers:

- Consider autonomous electric vehicles in our infrastructure planning and investment decision making processes. This includes the take-up of autonomous ride sourcing services and the implications for travel behaviour and land use.
- Implement road pricing reform as a matter of priority to manage demand for car travel, and as a policy lever to encourage ride sharing.
- Address regulatory hurdles to the mass adoption of autonomous vehicles.
- Encourage an eventual transition from private ownership to ride sourcing and car sharing for daily travel. This includes promoting business models that provide these services. Governments must also ensure high quality alternatives to car travel are available, including public transport, walking and cycling.
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