

## G) Private Vehicle Demand Management

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### 1. Introduction

While the use of private vehicles – cars, trucks, motorcycles and motor scooters – is much lower in the developing than the developed world, this is changing with existing rapid economic growth in some developing countries, and the likelihood of such growth in others. Given the much higher levels of greenhouse gas emitted from private vehicles than from mass transit and non-motorised transport, it is imperative that rates of private vehicle usage be dramatically reduced in developed countries, and prevented from reaching high levels in the developing world. This can be done in ways that enable developing cities to be better places to live and work as traffic congestion is a chronic issue for health and the economy. The switch from private vehicles to mass transit can significantly reduce overall travel levels, as explained in Chapter 2. This section deals with measures that can be taken to reduce private vehicle use, or to curtail its increase, whilst enabling transport development goals to be achieved. The measures are:

- behaviour change programs
- parking policy
- other price incentives and disincentives
- restricting areas within which private vehicles can travel
- street design and traffic calming measures
- car-pooling
- car-sharing schemes.

With the exception of car-pooling and car-sharing, these measures will only be effective in reducing private vehicle use if other means of transport – namely, public transit and walking and cycling facilities – are available when and where people need them, or if information and communication technology (ICT) can be used in place of travel.

All of these measures have been implemented in many parts of the world, and examples of their use are described in this section. In general, they have so far been applied much more in the developed than the developing world, because car dependence and its adverse consequences are much worse there. But efforts are now being made to introduce demand management measures in developing countries, and some examples are included here.

Private vehicles transport both people and goods. This section focuses on reducing the demand for passenger vehicles; freight vehicles are covered in the *Freight* section of this chapter.

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## 2. Benefits

### Economic benefits

Cities with a lower share of private transport spend less on transport overall than do comparable cities with a higher share<sup>1</sup>. Moreover, as there are many citizens who cannot afford to own private vehicles, nations and localities with a higher share of public transit can provide transport for more of their citizens. As a result, these citizens have better access to employment, education, shopping and services, all of which contribute to economic development. Reduced levels of pollution and reduced traffic accidents mean that a nation's health costs are lower, and there are fewer working days lost from illness and accidents.

### Social benefits

Reduced private vehicle use is linked to more compact and less sprawling cities, better integrated communities, lower accident rates, more equal transport opportunities, and fewer harmful effects of pollution on health. People are also healthier because they are walking and cycling more.<sup>2</sup>

### Environmental benefits

Decreased private vehicle use reduces local and global pollution of the air, land and water, including emissions of greenhouse gases. Noise and congestion are also reduced and fewer finite resources are consumed.

## 3. Greenhouse gas emissions reduction potential

Greenhouse gas reductions from private vehicle demand management are not easy to estimate but potentially large.<sup>3</sup> Elasticities of demand for car use have been calculated for fuel price changes and parking charges, so these can be used to estimate reductions in car use, but invariably these calculations use developed country data. Elasticities for fuel price suggest that a 10% increase in price will lead to a 3% decline in fuel use in a year or so, and 5% in 5 to 10 years; about half of this is due to reduced vehicle use<sup>4</sup>. It is probable that changes due to price will be very inelastic in developing cities where the alternatives to car use are dramatically more difficult (highly crowded buses, dangerous cycle roads and very busy footpaths). Thus it is even more reason to ensure that these demand management policies are introduced only if better transit, cycling or walking options are being provided at the same time. It is not possible to estimate the greenhouse gas reduction potential of the other measures considered in this section.

## 4. The implementation of particular demand management measures

### Behaviour change programs

Reductions in private vehicle use can be achieved through behaviour change programs, as described in the *Influencing Travel Choices* section of this chapter. Such programs – which can be run by government, businesses or community groups – seek to inform people about transport alternatives like walking, cycling and mass transit, and the many personal and environmental benefits these offer. Participants are then encouraged to try these alternatives out, starting with trips where the transition is easiest, for example, taking a bus to work if the bus-stop is close by, or walking the short distance to the shops or school.

Behaviour change programs can be delivered to groups of people meeting in community centres, workplaces, schools, homes or other places where people can congregate, or that can involve working

with individuals and households through home visits or phone communication. Information about transport alternatives can also be available in print and online, as well as being publicised through street signage. One very successful behaviour change program, TravelSmart, has consistently achieved reductions in car trips of 10% or more.<sup>5</sup> TravelSmart and other behaviour change programs are described in more detail in the *Influencing travel choices* section of this chapter, with information on levels of reduction of private vehicle use in different regions of the globe.

## Parking policy

Private vehicle use can be reduced by reducing the supply of parking or by raising its price.<sup>6</sup> If it is difficult or expensive to park a car, particularly for regular trips such as commuting to work, people will be more willing to consider alternatives. Whether it is for on- or off-street, public or private parking, drivers should pay at least its full market cost— because this acts as a disincentive, because there is no valid reason for governments or businesses to subsidise it, and because governments can use the funds for other transport improvements. Moreover, when governments go in the other direction and impose price controls on private parking, as they have in Beijing, Guangzhou, Hanoi and Jakarta, this inevitably suppresses supply, while inflating – rather than reducing – demand for it. Many cities in the developing and developed world charge for parking, but too often it is provided free.

In the allocation of parking space in urban localities, priority should be given to public transport, emergency vehicles, parking for the disabled, taxis, delivery vehicles and short stay parking. And at certain times of the day or week, it may be necessary to convert on-street parking into dedicated lanes for buses or bicycles. A broad plan that cities can adopt is to have a traffic-free centre, surrounded by on-street parking for the special groups just mentioned, and general parking only permitted further out. Urban planning regulations should impose maximum rather than minimum parking ratios, to restrict the number of parking spaces in a locality, and thus encourage the use of other transport modes. Very limited parking provision is a feature of Transit Oriented Developments, which are described in another section of this chapter. Large expanses of ground level parking should be avoided, as these are unattractive, use up much land, and act as a barrier between neighbourhoods. Park-and-ride facilities at transit stations are better than inner city parking, but it is better still to provide feeder bus services and good cycling routes and facilities. Park-and-ride should be avoided in high-density localities.<sup>7</sup>

Governments have the ability – through their urban planning powers, local parking regulations and their own parking provision – to determine urban parking policies, and these are an important tool in reducing private vehicle use. They need not be concerned about vocal groups demanding additional parking, or about an apparent ‘lack’ of parking spaces, as the restricting of parking will in time reduce demand for it as people switch to other transport. Kampala, Uganda, reduced its heavy congestion in the city centre with stricter parking regulations, including one hour maximum parking tickets, and also reduced road accident levels and increased city revenue, while Shenzhen, China, increased parking fees to a level that sometimes equalled half the cost of keeping a car, and saw demand for parking drop by 30%.<sup>8</sup>

## Other price incentives and disincentives

The cost of parking is just one example of the ways in which prices can be used to encourage the switch from private vehicles to more sustainable transport modes. Others include:

- **tollways** for freeways, major roads and bridges
- **vehicle registration charges**, which are universal, but can be increased to manage demand as they have been in Singapore, where registration charges are now 150% of the car’s cost

**Figure 3.30 London’s Congestion Charging Zones clearly marked on the roads**



Picture Credit: Duffman , Wikimedia Commons, [http://upload.wikimedia.org/wikipedia/commons/0/07/London\\_Congestion\\_Charge%2C\\_Old\\_Street%2C\\_England.jpg](http://upload.wikimedia.org/wikipedia/commons/0/07/London_Congestion_Charge%2C_Old_Street%2C_England.jpg) viewed 22 March 2011.

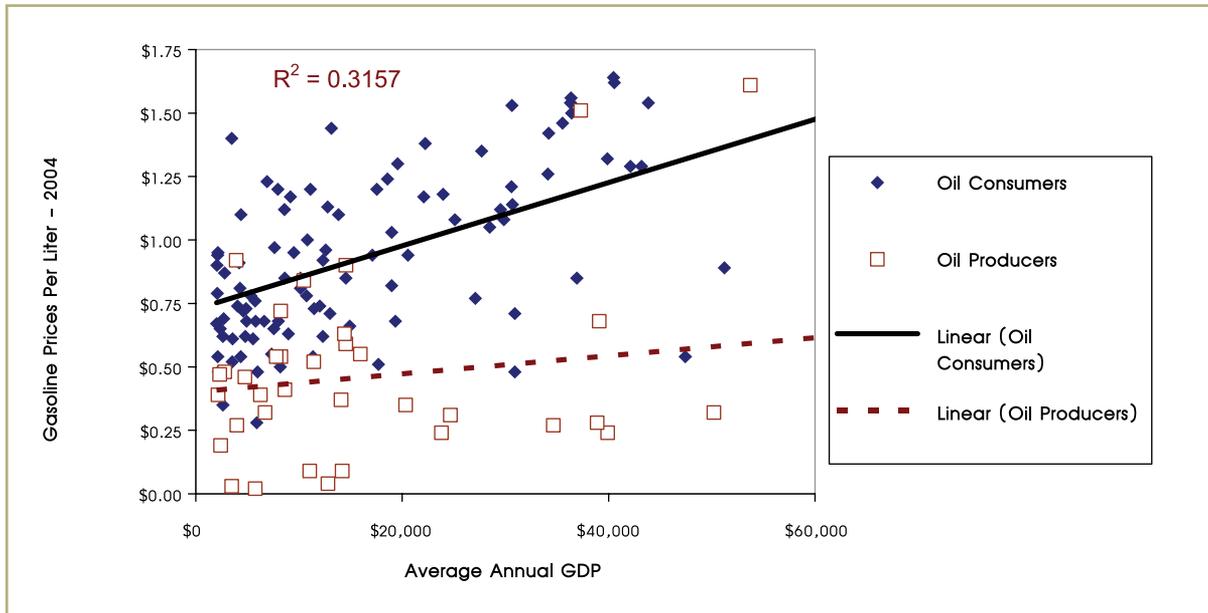
- **congestion taxes** to reduce traffic in central city areas, for example, in London, Stockholm and over a dozen other developed world cities.
- **fuel taxes**, which favour the most fuel efficient vehicles.

Congestion taxes and even tolls can vary in amount (from zero upwards) at different times of the day or week, to manage demand when it tends to be higher, and the toll or tax can be collected manually or electronically (so that, in the latter case, vehicles do not have to stop). London’s congestion tax has seen a 21% decrease in traffic, and local residents and businesses have supported it.<sup>9</sup> A similar traffic reduction followed a trial of a congestion tax in Stockholm. London exempts hybrid vehicles from the tax, while Milan exempts fuel efficient and lower emission cars, and schemes in Norway offer discounts to lighter vehicles. In Singapore the tax varies according to the time of day and the level of congestion on particular roads.<sup>10</sup> Removal of fuel subsidies in Indonesia has seen the price of petrol and diesel rise by 126%, and instead the government is offering monthly allowances to around 19 million poor families to help them with living costs.<sup>11</sup>

Increases in fuel prices do not adversely affect prosperity, as shown in the figure 3.31. Economic productivity tends to increase with higher fuel prices, indicating that substantial increases in vehicle fees can be achieved without reducing overall economic productivity.

Other taxation policies can be changed to discourage, or refrain from encouraging, private vehicle use. For example, laws that allow car travel to and from work as a tax free expense should be avoided, or if there are to be tax free travel expenses the same tax free amount should apply to all transport modes or even favour the more sustainable modes. Similarly, companies should either refrain from subsidising their employees’ travel to or from work or in their free time, subsidise all modes, or favour the more sustainable

**Figure 3.31 Per capita GDP versus gasoline prices in different countries**



Source: Todd Litman, *Are Vehicle Travel Reduction Targets Justified? Evaluating Mobility Management Policy Objectives Such As Targets To Reduce VMT And Increase Use Of Alternative Modes*, Victoria Transport Policy Institute, 12 Nov 2010.

ones. For example, they can provide transit passes or discounted tickets, and if done in collaboration with a transit agency the agency may supply these at a lower price. Policies that make car transport tax free, and company allowances covering employees’ commuting and personal car travel, also fuel inequality, because they are usually only available to the higher paid employees. The Astra Zeneca Drug Company located in Britain has 4,200 employees but only 3,277 parking spaces. They encourage the use of public transport by subsidising buses and providing an inter-site shuttle bus free to all employees. They also provide reserved parking spaces for car sharing and offer flexible working practices (ie, tele-working), as well as improved on-site facilities for cyclists. These changes have led to 17% fewer solo drivers between 1997 and 2001.<sup>12</sup>

**Restricting areas within which private vehicles can travel<sup>13</sup>**

Another way to reduce car use is to restrict the areas within which private vehicles can travel. Some cities have defined an area, usually in the city’s core, that is restricted to pedestrians and perhaps other special vehicles (such as bicycles, delivery vans, taxis and public transport). These restrictions may apply at all times or at just some parts of the day or week. Cities that have successfully implemented these measures generally have excellent transit (with public transit every five minutes or so) and high density living. The section on *The walkable locality* in this chapter describes how Curitiba pedestrianised its town centre. When Bogotá restricted car access during peak hours, there was a 28% decrease in road accidents. Bogotá’s citizens have now voted to ban private vehicles from the streets for six peak hours a day from 2015.<sup>14</sup> Calle Florida Street, Buenos Aires’ (Figure 3.32) famous shopping district, was pedestrianised in 1913, making it one of the oldest car-free zones in the world.<sup>15</sup> As well as adopting such measures in the centre of cities, they can be adopted in any urban development. The section of this chapter dealing with *Transit oriented developments* describes such areas in more detail. The Vauban neighbourhood in Freiburg, Germany, is completely car-free. A car-space can be purchased in a multi-story car park on the edge of town, but 70% of the residents have chosen not to have a car.<sup>16</sup>

**Figure 3.32 Calle Florida Street, Buenos Aires, like pedestrian streets the world over, is an attractive, multi-purpose living space, and not just a walking route**



Picture Credit: Luis Argerich.

An alternative to keeping cars off the roads altogether in certain localities, is to simply restrict the road space available to them. For example, a road carrying two or three lanes of motorised traffic in both directions might be redesigned to provide one lane each way for private vehicles, with the rest of the space being taken up by transit lanes, cycle ways, expanded pedestrian areas or roadside planting. All cities introducing Bus Rapid Transit systems with dedicated lanes have done this. Another option is to turn the whole road into a shared transport zone, that is, an area with very low speed limits and less demarcation between pedestrian, cycle and vehicle space.

### **Street design and traffic calming measures<sup>17</sup>**

Related to these ways of reducing private vehicle traffic within urban areas are overall street design techniques and the ‘calming’ of traffic. A range of measures can be introduced to make transport safer, to ensure that different travel modes (such as walking and cycling) have fair access to transport space, and to ensure that different kinds of motorised vehicles use the right roads for the distances they are travelling. Bogotá removed kerbside parking to widen footpaths, and erected barriers to stop cars driving onto them.<sup>18</sup> A part of this process involves traffic calming: making changes to roads which – through a range of physical and psychological devices – cause vehicles to travel more slowly, more safely, and with greater consideration for local residents, pedestrians, cyclists and public transit users. The St George Street Revitalization project in Toronto, Canada, aimed to calm traffic on a busy thoroughfare. It implemented a ‘road diet’ (reducing the number of car lanes from four to two), improved pedestrian and cycling safety and amenities, and made the area more attractive as well. As a result, speed and road accidents decreased.<sup>19</sup> Traffic calming and other road design measures are described more fully in the *Traffic management* section of this chapter. Although they are not designed primarily to reduce car and other private vehicle use,

they do have this effect, and they therefore deserve to be included as a part of the range of demand management measures that should be considered.

### **Car-pooling**

People who regularly travel along a similar route to the same workplace, school, university or other destination can car-pool, that is, travel together in the same car and thus save money and reduce fuel use and car emissions. They can either take turns travelling in each other's car, or travel in one person's car with the others paying petrol money. Parents driving their children to school can take turns driving other children as well. Car-pooling works best when people already know each other or have something in common such as their school or workplace. They will need to ensure that they can agree on matters like times of travel, punctuality, and smoking and music in the car. Workplaces and schools can encourage employees or students to consider this arrangement. Car-pooling appears to be mainly practised in developed countries,<sup>20</sup> but there is no reason why it should not also be practised in the developing world.

### **Car-sharing schemes**

Car-sharing schemes are cooperative or commercial arrangements enabling people who sign up as members to use cars within the scheme. These cars are parked at various publicly accessible points in a locality, and members – who may be individuals or businesses – pay for the time they use the vehicle and the distance travelled, as well as joining and annual fees. Car-share provides additional mobility for those who mostly rely on walking, cycling and public transport and don't need frequent car access.

In fact, the average privately-owned car spends 95-97% of its life parked and only 3-5% on the road travelling.<sup>21</sup> If a car's use is shared across a number of users, then many of its costs are also shared. In addition, car users and local communities need to allocate less space for parking and, with more frequent use of vehicles, they are changed over more often and members get to use the most recent, efficient, environmentally sustainable models. Moreover, members of these schemes don't need to drive more than necessary in order to 'justify' a large investment – as private owners may feel they have to do – and members are also less likely to drive simply out of habit, instead of taking other transport modes.

Car use is booked and members have a special key, card or code number to access the vehicle. Car-sharing schemes work best if they make use of computer facilities, the internet and smart cards. This enables them to have online booking, on-board computers, car access through smartcards, wireless reporting and monitored, automated billing. While this may seem like a big investment in technology, it is not nearly as big as the investment in multiple cars and parking spaces that those members would be making if they were private car owners. Local councils usually provide the schemes with guaranteed parking, often free or at lower rates, because the councils benefit from the reduced pressure to provide parking spaces, and because they want to support more sustainable transport.

There are now many successful care sharing schemes around the world, in Europe, the US, Canada, Australia and Asia. One scheme in Singapore is linked to a residential development, with a ratio of one vehicle for every forty residents.<sup>22</sup> Zurich has 10,000 members of car-sharing schemes – about 2.3% of its population.<sup>23</sup> Further information on such schemes and on similar arrangements can be obtained online.<sup>24</sup>

## **5. Costs and sources of finance**

Each of the above policies require some expenditure to implement but nothing like the large infrastructure projects that characterise the other measures discussed in transport policy. Furthermore they can be

**Figure 3.33 Many local councils provide car share schemes with dedicated parking spots**

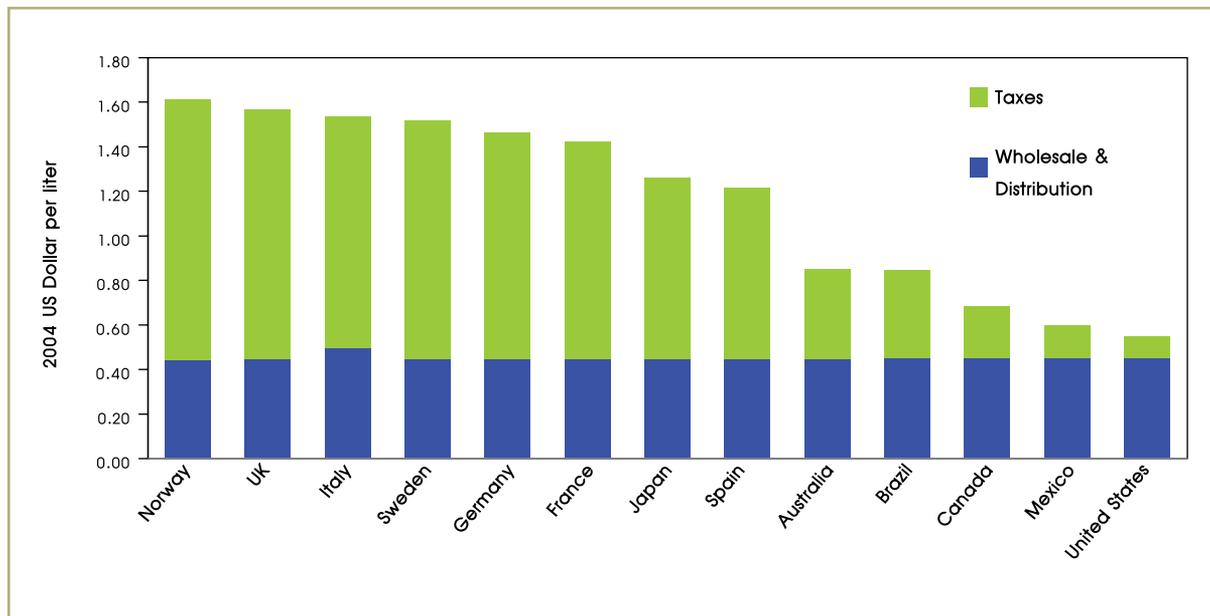


Picture Credit: Sarah G.

made either to raise revenue or to at least cover costs. Fuel taxes remain one of the major sources of government income to enable wealth to be created and distributed for long term projects. As shown in the Figure 3.34 the amount of fuel tax charged varies enormously and in the high taxing nations like Norway is set aside for long term infrastructure projects.

## 6. Conclusion

Reducing private vehicle use, or curtailing its growth, is vitally important if our world is to reduce levels of greenhouse gas in the atmosphere. Examples from around the world demonstrate that it *can* be achieved. It is generally only achieved when other transport options are good, and when travellers are helped to realise that they don't have to be dependent on cars or other private vehicles to get around. As this section has described, this can come about through information and education, through price mechanisms, through the way streets are designed and used, through parking policies, and through measures to encourage the sharing of cars. Localities that have taken these measures come to realise that reducing greenhouse gas output is just one of many benefits that can follow.

**Figure 3.34 Transport fuel prices across countries**

Source: Based on data from Todd Litman, *Appropriate Response to Rising Fuel Prices: Citizens Should Demand, "Raise My Prices Now!"*, Victoria Transport Policy Institute, 15 March 2010, <http://www.vtpi.org/fuelprice.pdf>, viewed 23 Feb 2011.

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