

City Congestion

Why congestion charges alone are only a short term fix

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Abstract

Some large cities across the globe have defined congestion zones in central business and tourist areas, and implemented congestion charges. Many more cities have considered these charges and rejected them due to public pressure, and more are still considering congestion charges. Congestion has many economic, social, and health implications. This paper explores why congestion is bad for cities: how congestion charges has not proved to be the answer to long term congestion relief; and an alternative to increased congestion fees.

1. Introduction

Major cities around the globe find themselves casualties of their own success. These cities have reversed then trend of people deserting cities that was evident 20 years ago. Cities have reinvigorated themselves, made the city more appealing to the public, and now see a large influx of people to live and work in the city. Many of these people wanting to live and work in cities are young, active, and affluent. They have been attracted by cultural and social benefits of city living. City amenity is now a major focus if cities are to retain this attraction, and retain these people. However, as cities have prospered, and people have returned to the city, the demands upon city infrastructure have also increased. These new city citizens (cityzens) want parks, cycle ways, pedestrian zones, outdoor eating and dining, fast and frequent public transport. And they want this with clean air; clear of pollution, clear of pollution, and clear of noise.

A major factor that can adversely affect city amenity for our new cityzens, is traffic congestion. Public car congestion, and congestion from commercial delivery vans and trucks bringing in those very supplies our cityzens require and demand. Food for their apartments they cook in, food for the restaurants they dine in, clothes they want to wear, office supplies for where they work, equipment for the events they want to attend. These all need to be transported to the city, and garbage from what is left over transported out of the city.

More than just city amenity, governing bodies are concerned with citizen health. Studies have proven that dangerous levels of nitrogen dioxide (NO₂) does cause deaths. And a major contributor to NO₂ levels are the emissions from vehicles, and specifically diesel powered commercial vehicles. Governing body legislation in some countries requires cities to comply with defined NO₂ levels (e.g. European Union air pollution limits), or face prosecution.



2. Congestion charges are the answer!

In an attempt to reduce the number of vehicles in cities, to reduce congestion, and reduce pollution, and increase amenity, some cities have implemented congestion zones. These are typically central business and/or high rise residential areas. And frequently the mechanism used to control a congestion zone is a congestion charge, being a fee for vehicles which enter the controlled area. The theory being that a fee levied against a private vehicle will encourage the use of public transport, and when levied against commercial vehicles, will encourage the consolidation of goods into fewer vehicles. In line with the objective of reducing pollution, most congestion charge areas have explicit exemptions for lower emission vehicles (electric, LPG, CNG, electric hybrid).

The effect of congestion charges has been positive. In those cities where a congestion charge has been implemented, an immediate reduction in the number of journeys into the controlled zones has been measured, and a corresponding drop in NO₂ and CO₂ in the air.

On the face of it, congestion charges are successful. It has also raised considerable tax revenue for those cities. But as public and commercial vehicle owners factor the congestion charges into their everyday activities, the positive effect of congestion charges begins to erode. Commercial operations absorb or pass on these charges to their customers, and the supply chain adjusts to accommodate this fee into commercial models.

Eventually, the initial positive impact of the congestion charge begins to erode, and congestion returns. This is evident from the January 2017 report from the Transport Committee of the London Assembly (part of the Greater London Authority), titled London Stalling – Reducing Traffic Congestion in London. In this report Caroline Pidgeon, Chair of the Transport Committee, states “The current Congestion Charge is no longer fit for purpose”.

The report elaborates:

“However, congestion has begun to increase sharply again, and not just in central London but across the capital. Traffic has slowed down and road users are spending longer stuck in delays. Buses have become so unreliable that usage has begun to fall, after many years of growth. The causes of this change are complex and multiple, as our investigation has identified.”

3. Where have congestion charges gone wrong?

Congestion charges attempt to encourage or influence behaviour, rather than directly control. Where this happens, cities are tempted to raise the congestion charge to compensate. The Congestion Charge in London has increased more than 100% in the 10 years it has been active, and yet congestion is still a huge issue, choking the city’s economy, not just its inhabitants.

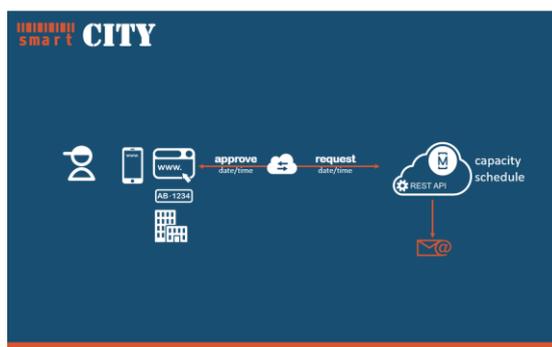
Congestion charges are also a political hot potato, as they are universally unpopular with the public and commercial enterprise. In fact in 2008, New York dropped the proposal to introduce a congestion charge, due to public pressure. Therefore governing bodies would rather avoid a congestion charge at all, or if not possible, then not have to increase charges to further encourage traffic behaviour. Having seen congestion rise and rise, and congestion charges rise and rise, the cynical tax paying public can see further increases in congestion charges as “just another money grab”.

4. Avoid the “money grab” and take direct control of congestion

Why not control the entry of traffic to congestion zones directly? Define the number of vehicles allowed to enter the city? Whilst this may not be practical (or popular) for private motor vehicles, it is both possible and practical for commercial vehicles. It will also have an impact upon both pollution and congestion levels, as commercial vehicles typically emit more polluting gases, and are a substantial percentage of total traffic.

Commercial vehicles entering a congestion zone must already be registered with the city authority, registering vehicle license plates and facilitating fee payments. As vehicles with license plates registered to a company pass through the congestion zone boundary, a fee is recorded against the company congestion charge account.

To control the number of commercial vehicles allowed to enter a congestion zone, a process whereby commercial vehicle dispatchers can be required to request entry, and granted authority, to the congestion zone in advance of actual arrival to the zone perimeter. A city is able to extend existing congestion charge systems to define the number of entry slots available, using commercially available booking services. And be able to shape the number of allowed number of commercial vehicle entries by time of day. Perhaps the city would like to reduce the number of commercial vehicles entering the congestion zone during peak public commute periods. The city may want to shape the number of entries by the type of commercial vehicle, allowing more ‘eco-friendly’ vehicles, and reducing slots for less ‘eco-friendly’ vehicles.



If a company dispatcher, or driver, is unable to get the entry time they want, the booking service would be able to offer alternate times, where entry slots are available.

5. Enforce congestion controls

How would a city enforce this prior booking control mechanism?

Each of the congestion zone systems implemented is based upon recognising the vehicle that is entering the controlled area. Most often, this is an automatic license plate recognition (ALPR, or automatic number plate recognition – ANPR) system, with digital cameras capturing the license plate, and software algorithms recognising the captured image.

The license plate then links to a vehicle and a congestion zone account.

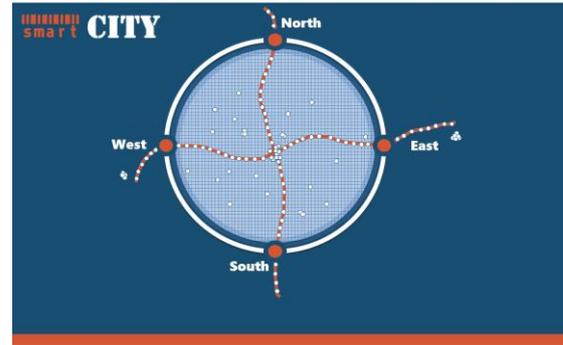
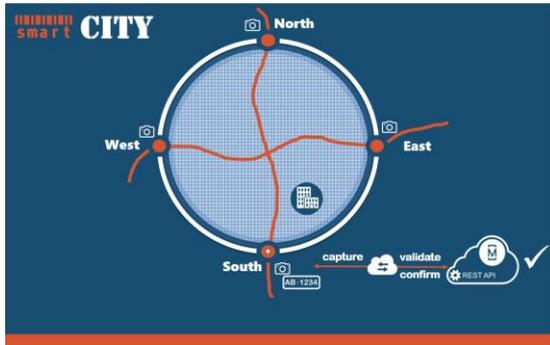


By simply adding another step to this process, the prior booking control mechanism can also be enforced.

At the time of passing through the controlled area boundary, and charging the company account, the congestion system can also cross reference the booking service – Did this vehicle have a booking in this timeframe (e.g. 15 minute period either side of the approved entry time)? If so, then the vehicle entry is both authorised and compliant. If the vehicle entering the congestion area is either not authorised (no booking), or not compliant (booked, but not in time window), then a non-compliance process may be commenced.

This non-compliance process may include a higher punitive congestion fee (e.g. 10 times

higher than the standard fee for unauthorised, or 5 times higher for non-compliant), that will significantly encourage compliance to the booking control approach. Only penalising those that do not comply, not taxing everyone.

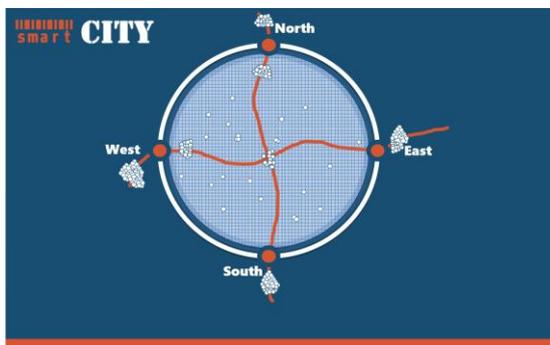
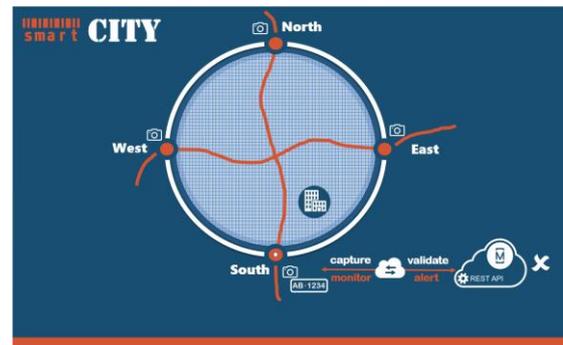


The reduction in congestion translates through to a reduction in idling and queuing time, and logical reduction in noxious polluting exhaust fumes.

6. Why does direct control work?

The effect of controlling the entry times of commercial vehicles is to control the number of commercial vehicles on the road network in the congestion zone, and those feeder roads leading to the controlled area. Without this control, and tasked to deliver goods to a city destination, a driver will typically think “It is always congested going into the city, and so I better head in there early”. An issue with this thinking is that all the other drivers making deliveries into the city are thinking the same way. And so they create their own reality, with waves of commercial vehicles attempting to enter the city area at the same time, causing congestion leading to the congestion zone, and in the congestion zone.

An important additional benefit may also be available to those cities which have concerns about public safety. If an unauthorised vehicle enters the congestion (and security) zone, an immediate alert may be triggered to security or police authorities of a possible security breach, allowing surveillance and/or response service procedures to commence.



With a timed entry slot to the city, these waves (or swarms) of commercial vehicles become spaced, like orderly columns of ants.

7. Does the tech stack up?

The technology to control and enforce authorised entry to city congestion zones exists today, and is commercially available. Fast and secure communication in real time between systems means that booking systems can accept bookings and respond to entry validation queries almost instantaneously. This technology is based upon industry standard services which allows different services to interact in a coordinated manner in real-time, such as RESTful web services which are powering the Internet of Things (IoT).

Conclusion

Congestion charges have been a valuable first step in learning how city congestion can be reduced, and how long the benefits of a congestion can be expected to be retained, with erosion of the benefits commencing when the community absorbs the financial cost into everyday operations. Direct control of vehicles entering a congested area is required to set and control an absolute volume of traffic in a congestion zone in order to maintain lower traffic levels, lower pollution levels, and improved city amenity.