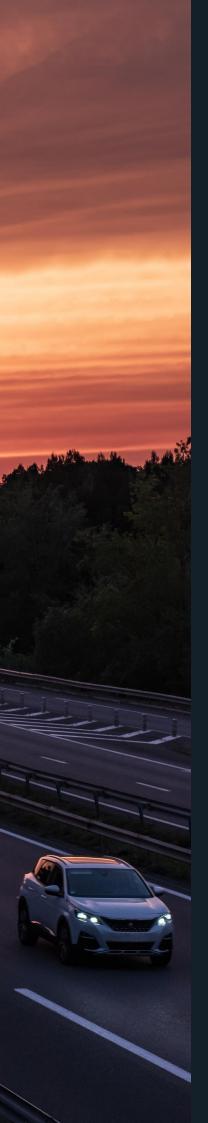


White paper
Carpooling, a way to decarbonize road mobility in smart cities & metropolitan areas!



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Introduction

It is now a reality, Lyon (the second largest metropolitan area in France) has open its high occupancy vehicle lane (HOV). This is the second example in France after the dedicated lane on the A48 in Grenoble (French Alps) on the APRR (private motorway concessionaire) network. The Lyon reserved lane has been deployed on the M6-M7 corridor. It is located in the left lane, and is recognizable by the dynamic panels displaying, when activated, a diamond-shaped symbol. But do reserved lanes on urban motorways are an optimal infrastructure to promote carpooling?

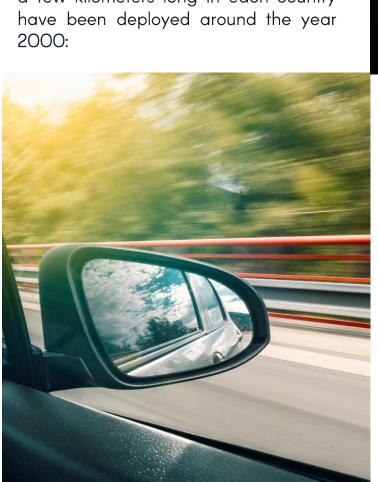
The carpooling lane: a dual means of action to manage road traffic

HOV complete a range of measures available to operators to manage the traffic and share the network multiple transport modes. On urban motorways, distinguish: lanes we dedicated for public transport, permanent and generally positioned in place of the old emergency lane; the auxiliary lanes, which can be activated operator's request temporarily allow all vehicles access to the emergency lane during a peak in heavy traffic; reversible lanes, when a lane can be assigned to one or the other direction. Other more traditional measures exist: variable speed limits, activated in particular during summer periods; ramp metering, regulating the entrance ramps on a motorwayby using traffic lights. In addition to existing traffic management HOV measure, lanes are a tool to integrate new transport modes such as carpooling into existing infrastructure at marginal cost.

Where does the concept of reserved lanes come from?

The concept of HOV has emerged very early in US cities in the 1960s. These lanes were quickly open to buses to increase their use. The goal is to reduce congestion, make travel times more reliable and improve air quality. "Commuters" are the target, more and more numerous in large US cities. Most of projects have been developed rather with the widening of motorways than by tacking a lane among existing ones. The USA has a very large network of approximately 5,500 km of HOV lanes.

In Europe, the examples are scarcer. Some emblematic projects with HOV of a few kilometers long in each country have been deployed around the year 2000:





United Kingdom (1998), Norway (2001), Sweden (2000), Austria (1999). Spain (Madrid and Barcelona, 2012) had a more proactive policy, with the establishment of HOV lanes separated by a concrete barrier, almost a dedicated infrastructure.



The beginnings of reserved lanes in France: building a unified approach

In France, the principle has been studied by the government since a law promulgated in 2016 (Law on ecological transition for areen arowth). Cerema, the main public engineering the field institution in of infrastructure, developed a technical doctrine on the topic, and published several technical guides. The principle is to reserve the left lane, on structuring road links with at least three traffic lanes and dedicate it to the sole use of carpoolers and vehicles with very low pollutant emissions. If the road link is facing strong congestion - typically at morning and evening rush hours carpoolers can avoid traffic jams by using the HOV lane, and therefore they save time compared to other drivers on standard lanes. The savings in travel time offered by HOV is a key lever to encourage the transfer toward more frequent carpooling habits.

Existing roads and highways + carpooling: a virtuous couple

So why promoting carpooling? This is a simple evidence: it is good for the planet and for the community's wallet! When the roads are saturated, they are no longer able to handle all the traffic with the immediate consequence of recurring congestion.

Carpooling means allowing the same amount of people to travel but with fewer private motorized vehicles.



By offering better travel times (the direct consequence of reserved lanes), it helps to boost carpooling and to increase its share carpooling in all modes of transport. Recurring congestions are directly reduced, while facilitating the mobility of citizens. Moreover, by relying on the existing road infrastructure to open HOV lanes, it avoids the overconsumption of scarce resources: available public space, energy resources and budgetary resources to finance works. The very light installation required by the reserved lane is also an accelerator in its commissioning.

We could speak in that case of "optimal allocation of resources": existing roads or highways, smart deployment, fewer cars, ewer traffic jams, these are less CO2 emissions and fine particles in the already too much polluted air of our cities.

How to inform the decision-making process?

Relevant sites for implementing HOV have to answer multiple criteria. The obsession of decision-makers is the "empty lane" syndrome. It has a serious consequence: to generate more congestion than the pre-existing one. Indeed, if the HOV does not attract enough carpoolers, the overall flow capacity of the infrastructure decreases mechanically due to the empty lane. This can cause a new traffic jam. Its bottleneck often is at the beginning of the reserved lane, and it leads to the deterioration of carpoolers travel times.

The challenge for decision-makers and stakeholders is therefore to





encourage carpooling as much as possible, for maximum use of the reserved lane, and the initiation of a virtuous circle in favor of carpooling that will benefit everyone. Because of the impact of such a decision (opening a new HOV lane) the provision of simulation tools to test and evaluate the different possible scenarios, to project into the future situation and to anticipate the new configuration are essential to inform the decision-making process.







Carpooling and Covid-19: a paradox?

At first glance, in the context of the current pandemic crisis where physical distancing is required, carpooling seems to be not so appropriate. Paradoxically, it is the right time to deploy and open these new offering. The Covid-19 health crisis has reduced the overall use of road networks during peak periods, a direct consequence of the increase in teleworking, among other things.

Thus, some parts of the road networks which could have been completely saturated with an HOV, find themselves in an optimal area of employment. This is the case with the Lyon's HOV: its opening was a success and did not create any severe additional congestions that traffic and mobility engineer had forecasted.

With the gradual resumption of traffic habits, the system will naturally find its overall balance through the well-known trade-off game of the route-choice behavior of motorists to minimize their travel times.

Wishing to discover how Neovya Hubsim is supporting decision-making in carpooling reserved lanes projects?

https://www.neovya.com/neovya-hubsim