

Traffic management simulation tool

Smart solution 10

Smart traffic management



Estimated impacts

15%

reduction in CO₂
emissions

38,5%

reduction of time
delay in traffic

27,5%

Reduction in traffic
density (vehicles per
km)



Barcelona

Technical partners

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What is it?

A theoretical model for a traffic management tool to assist traffic managers in urban areas when making decisions on congestion avoidance. Applying a so-called Macroscopic Fundamental Diagram (MFD) can offer significant benefits in diminishing the entry of vehicles to congested areas thereby reducing the traffic density and increasing the traffic flow. The theoretical approach can also be used to assess other policy areas, such as air quality.

What did GrowSmarter do?

In contrast to the other measures in GrowSmarter, traffic management through MFD was primarily a research initiative rather than an empirical demonstration. The implementation phase consisted in building the model to simulate a city district. District @22 was chosen in Barcelona, as it has recently experienced fast growth and therefore needs a change in traffic flows to adapt to new needs.

Barcelona's Department of Mobility provided the research group CENIT – Center for Innovation in Transport – the data required to introduce all traffic lights into the model, along with the direction of the flow of each street and the number of lanes. Data collection at 22 points in the network enabled traffic light optimisation to enable improved traffic flows. Application of this model indicates how to alleviate congestion with resultant positive impacts in terms of e.g. reduced energy consumption and emissions.

Lessons learnt

This kind of system requires a homogenous network to function optimally, whereas many cities have multiple networks operating in parallel (meaning some traffic lights can be operated from a central control, whereas others require manual adjustment by technicians on site). Changes to traffic management systems in one district inevitably result in up- or downstream impacts observed elsewhere.

As traffic patterns vary a lot due to differences in street design and traffic flows, smaller areas should be studied in order to obtain meaningful results.



Upscaling & replication potential

Depending on data availability, the tool could be used in other cities with congestion problems after validation for the city of Barcelona. An emission reduction by 15% can be achieved according to the simulation results and additional benefits include reduction of accidents as well as improved air quality. The County of Barcelona sees these results as promising and is planning to replicate use of the tool.

How did the measure work?

Technical feasibility



Obtaining data needed for the model has been challenging. Data were needed from multiple entities and in some cases, there was a lack of willingness to share the data. The validation procedures can also be a challenge.

Economic feasibility

Difficult to verify the economic feasibility, since it is a theoretical measure.

Replication potential



An important feature is that the area to start the MFD must be no more than 10 km². From here, if you study the area where you want to apply the solution, replication can be feasible.