



Kapsch TrafficCom

***How to plan for a sustainable future.***

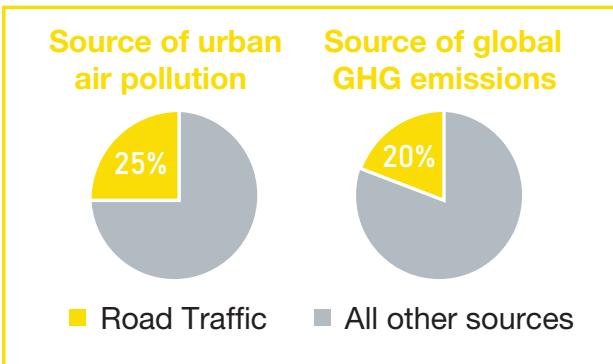
# Reducing road traffic emissions: Challenges and opportunities

The Paris Accord and the European Green Deal set ambitious targets to cut greenhouse gas (GHG) emissions but most countries are way off track. Many countries promise carbon neutrality in the next two to three decades.<sup>1</sup>

Cities play a major role in this endeavor. Currently 55% of the global population lives in urban areas. This figure will grow to 68% by 2050, which is an increase of 2.5 billion people.<sup>2</sup>

As a result, 239 cities worldwide have seen increased traffic congestion over the past ten years<sup>3</sup>, and in the European Union (EU28) alone, these traffic jams cost the economy 266 billion € (1.8% GDP) in 2016.<sup>4</sup> CO<sub>2</sub> taxes and penalty payments are further cost drivers.

Tragically, the damage done by congestion isn't just economic. Transport emissions are causing around 25%<sup>5</sup> of the global CO<sub>2</sub> emissions and are a major source for air pollution in cities<sup>6,7</sup>. Globally, almost 80%<sup>8</sup> of deaths related to particulate matter (PM) could be avoided if current air pollution levels were reduced to WHO recommendations. 25%<sup>9</sup> of urban ambient air pollution from PM<sub>2,5</sub> and 20%<sup>10</sup> of global GHG emissions stem from road traffic.



Unlike in other sectors (such as the energy sector), transportation emissions are not declining. Vehicles are becoming more efficient, but traffic volumes continue to increase.

Therefore, emissions from transportation must be reduced drastically. The Green Deal seeks a 90% reduction of these emissions by 2050.<sup>11</sup>

The climate is changing and this has an impact on everyone. Surveys show that protecting the climate is important to over 90%<sup>12</sup> of European citizens and 80%<sup>13</sup> of US citizens.

**Click here**  
to discover Kapsch  
TrafficCom's Green Vision

<sup>1</sup> <https://www.climatechangenews.com/2019/06/14/countries-net-zero-climate-goal/> (Last visited 22/2/2022)

<sup>2</sup> <https://www.smartcitiesdive.com/news/global-population-cities-united-nations-2050/523843/> (Last visited 22/2/2022)

<sup>3</sup> <https://www.tomtom.com/press-room/general/26026/tomtom-traffic-index-global-traffic-congestion-up-as-bengaluru-takes-crown-of-worlds-most-traffic-congested-city/%204Source:%20https://op.europa.eu/en/publication-detail/-/2020publication/0efedf2c-a386-11e9-9d01-01aa75ed71a1/> (Last visited 22/2/2022)

<sup>4</sup> <https://op.europa.eu/en/publication-detail/-/publication/0efedf2c-a386-11e9-9d01-01aa75ed71a1> (Last visited 22/2/2022)

<sup>5</sup> <https://www.iea.org/topics/transport> (Last visited 22/2/2022)

<sup>6</sup> [https://ec.europa.eu/clima/eu-action/transport-emissions\\_en](https://ec.europa.eu/clima/eu-action/transport-emissions_en); <https://www.sciencedirect.com/science/article/pii/S1352231015303320> (Last visited 22/2/2022)

<sup>7</sup> <https://www.sciencedirect.com/science/article/pii/S1352231015303320> (Last visited 22/2/2022)

<sup>8</sup> <https://www.who.int/news-room/22-09-2021-new-who-global-air-quality-guidelines-aim-to-save-millions-of-lives-from-air-pollution> (Last visited 22/2/2022)

<sup>9</sup> <https://www.sciencedirect.com/science/article/pii/S1352231015303320> (Last visited 22/2/2022)

<sup>10</sup> <https://www.iaea.org/reports/tracking-transport-2020> (Last visited 22/2/2022)

<sup>11</sup> [https://ec.europa.eu/commission/presscorner/detail/en/fs\\_19\\_6726](https://ec.europa.eu/commission/presscorner/detail/en/fs_19_6726) (Last visited 22/2/2022)

<sup>12</sup> [https://ec.europa.eu/commission/presscorner/detail/en/QANDA\\_20\\_330](https://ec.europa.eu/commission/presscorner/detail/en/QANDA_20_330) (Last visited 22/2/2022)

<sup>13</sup> <https://www.undp.org/press-releases/worlds-largest-survey-public-opinion-climate-change-majority-people-call-wide> (Last visited 22/2/2022)

# ITS in action

**Click here**  
for more information on  
Sustainable Mobility

Intelligent transportation systems (ITS) can help to reduce traffic demand and curb emissions.  
In a nutshell, ITS

- reduce congestion and improve traffic flow on busy roads,
- influence drivers to adapt their behavior,
- free space on roads for greener transport alternatives and
- improve air quality.

## 1 Tolling

- With tolling solutions substantial external costs such as congestion, noise and air pollution can be internalized (e.g. via implementing the Eurovignette directive).
- Distance-based tolls improve transport efficiency<sup>14</sup> and can achieve a CO<sub>2</sub> reduction of up to 20%.<sup>15</sup>
- High-occupancy vehicle (HOV) lanes are designed to reduce congestion and the number of vehicles on the road. These managed lanes often also include dynamic pricing based on current traffic congestion, which flattens the demand curve.
- Tolls that take into account the environmental performance of vehicles are powerful tools to encourage the use of cleaner vehicles.<sup>16</sup>
- Tolling helps authorities to fund infrastructure projects that improve traffic flow or reduce vehicle emissions. In fact, road charging is becoming a more important fiscal instrument due to loss in revenues of fuel taxes with rising numbers of electric vehicles.<sup>17</sup>
- Realizing the above as Free Flow systems saves 25-45% CO<sub>2</sub> emissions in comparison to plaza solutions. An NO<sub>x</sub> reduction of over 30% is possible as well.<sup>18</sup>

## 2 Traffic Management

- Stop-and-go traffic, congestion and inefficient traffic light control cause the majority of wasted fuel<sup>19</sup>. Traffic management optimizes capacity on the road network, speeds up journey times, and reduces fuel consumption and emissions such as CO<sub>2</sub> and particulate matter.
- It uses traffic data and incident management (events, accidents) in order to modify and predict traffic flows. This ensures traffic runs smoothly, prevents congestion and accidents.
- Urban traffic management reduces stop and go traffic in cities by optimizing traffic lights, which reduces CO<sub>2</sub> emissions in developed cities by 8% and in emerging cities by 15% on average.<sup>20</sup>
- Coordinated adaptive traffic system achieved a reduction of 28% travel time, 25% stops, 15% CO<sub>2</sub>, 13% NO<sub>x</sub> and 15% PM<sub>10</sub> as demonstrated in Sydney.<sup>21</sup>
- More advanced methods, involving vehicle connectivity and AI-based data processing, can reduce CO<sub>2</sub> emissions caused by congestion and inefficient traffic patterns (up to 20%).<sup>22 23</sup>

<sup>14</sup> <https://www.transportenvironment.org/wp-content/uploads/2021/07/2017%2009%2018%20Eurovignette%20Position%20Paper.pdf> (Last visited 22/2/2022)

<sup>15</sup> <https://www.sciencedirect.com/science/article/abs/pii/S0967070X16304061> (Last visited 22/2/2022)

<sup>16</sup> <https://www.transportenvironment.org/wp-content/uploads/2021/07/2017%2009%2018%20Eurovignette%20Position%20Paper.pdf> (Last visited 22/2/2022)

<sup>17</sup> <https://www.transportenvironment.org/wp-content/uploads/2021/07/2017%2009%2018%20Eurovignette%20Position%20Paper.pdf> (Last visited 22/2/2022)

<sup>18</sup> [https://www.researchgate.net/publication/245561883\\_Measuring\\_and\\_Modeling\\_Emission\\_Effects\\_for\\_Toll\\_Facilities](https://www.researchgate.net/publication/245561883_Measuring_and_Modeling_Emission_Effects_for_Toll_Facilities) (Last visited 22/2/2022)

<sup>19</sup> Energy efficient traffic management and control-the eCoMove approach and expected benefits. In 13th International IEEE Conference on Intelligent Transportation Systems (pp. 955-961). IEEE. 7 <https://ieeexplore.ieee.org/document/5625122> (Last visited 22/2/2022)

<sup>20</sup> Average value of measurements by Kapsch TrafficCom in various customer projects

<sup>21</sup> <https://www.infona.pl/resource/bwmeta1.element.wiley-ecpa-v-35-i-2-ecpa12135> (Last visited 22/2/2022)

<sup>22</sup> <https://5gaa.org/wp-content/uploads/2020/11/Environmental-Benefits-of-C-V2X.pdf> (Last visited 22/2/2022)

<sup>23</sup> <https://erticonetwork.com/wp-content/uploads/2015/09/ITS4rCO2-Report-Final-2015-09-10-submitted.pdf> (Last visited 22/2/2022)



Note: The design of a LEZ is crucial for its effectiveness. Territory covered, enforcement, exemptions granted to users, and clarity of policies<sup>31</sup> have a significant impact.

## 3 Low Emission Zones (LEZ)

- Low Emission Zones are the tool to address local toxic air pollution and cut CO<sub>2</sub> emissions.
- Around 20% CO<sub>2</sub> emission savings<sup>24</sup> and up to 32% reductions in NO<sub>x</sub><sup>25</sup> are possible.
- London reduced 20% CO<sub>2</sub><sup>26</sup>, 12% NO<sub>x</sub> and 12% PM<sub>10</sub>.<sup>27</sup>
- Milano's 'Area C' achieved a reduction of 22% CO<sub>2</sub>, 10% NO<sub>x</sub> and 18% PM<sub>10</sub>.<sup>28</sup>
- Stockholm could decrease 14% CO<sub>2</sub><sup>29</sup>, 8.5% NO<sub>x</sub> and 13% PM<sub>10</sub>.<sup>30</sup>

## 4 Demand Management

- Demand Management solutions combine the powerful components of tolling, traffic management and low emission zones in an optimized way.
- Its components signal control, routing techniques, eco-driving, traffic predictions and dynamic pricing help to smooth out the traffic demand curve during peak periods.
- Adaptive signal control and optimization with green waves (GLOSA) can achieve reduction of around 7% CO<sub>2</sub> emissions<sup>32</sup>.
- Restricting the most polluting vehicles from entering certain sections of the road network, or subjecting them to higher charges than less polluting vehicles frees up space on the roads for e.g. bus lanes or cycle lanes, thus pushing sustainable means of transport.
- The tolling component helps authorities to fund infrastructure projects that improve traffic flow or reduce vehicle emissions, such as managed lanes, public transport infrastructure, and bicycle lanes.
- Modern demand management can achieve up to 30% emission reduction<sup>33</sup>, supporting air quality and climate related agendas of cities.

<sup>24</sup> <https://www.sciencedirect.com/science/article/abs/pii/S0967070X16304061> (Last visited 22/2/2022)

<sup>25</sup> [https://www.transportenvironment.org/wp-content/uploads/2021/07/2019\\_09\\_Briefing\\_LEZ-ZEZ\\_final-1.pdf](https://www.transportenvironment.org/wp-content/uploads/2021/07/2019_09_Briefing_LEZ-ZEZ_final-1.pdf) (Last visited 22/2/2022)

<sup>26</sup> <https://www.sciencedirect.com/science/article/abs/pii/S0967070X16304061> (Last visited 22/2/2022) (Last visited 22/2/2022)

<sup>27</sup> <https://www.sciencedirect.com/science/article/abs/pii/S1352231004009513> (Last visited 22/2/2022) (Last visited 22/2/2022)

<sup>28</sup> <https://urbanaccessregulations.eu/low-emission-zones-main/impact-of-low-emission-zones#Milan> (Last visited 22/2/2022)

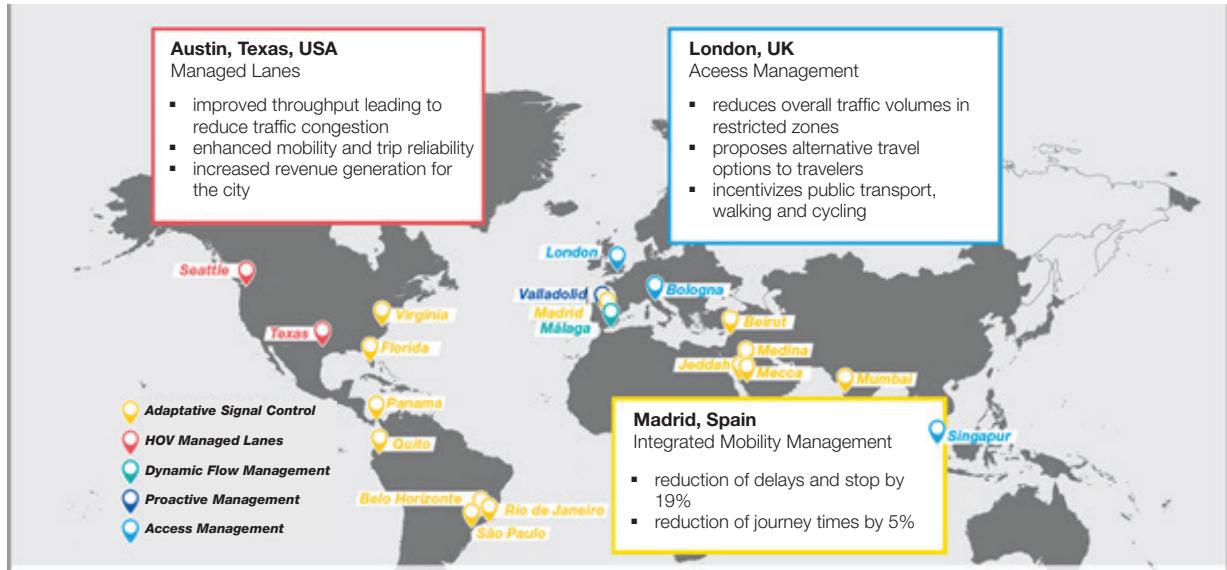
<sup>29</sup> Eliasson, J., Hultkrantz, L., Nerhagen, L., & Rosqvist, L. S. (2009). The Stockholm congestion-charging trial 2006: Overview of effects. (Last visited 22/2/2022)

<sup>30</sup> [https://f.hubspotusercontent30.net/hubfs/4056033/Johansson\\_AE\\_Congestion\\_2009.pdf](https://f.hubspotusercontent30.net/hubfs/4056033/Johansson_AE_Congestion_2009.pdf) (Last visited 22/2/2022)

<sup>31</sup> [https://www.transportenvironment.org/wp-content/uploads/2021/07/2019\\_09\\_Briefing\\_LEZ-ZEZ\\_final-1.pdf](https://www.transportenvironment.org/wp-content/uploads/2021/07/2019_09_Briefing_LEZ-ZEZ_final-1.pdf) (Last visited 22/2/2022)

<sup>32</sup> Eco Drive II Final Report to Transport Canada I2V Connected vehicle pilot project - city fleet - signalized intersection approach and departure optimization application

<sup>33</sup> Calculation by Kapsch TrafficCom



### Kapsch TrafficCom

**Kapsch TrafficCom** is a globally renowned provider of transportation solutions for sustainable mobility. Our innovative solutions in the application fields of Tolling, Traffic Management, Demand Management and Mobility Services contribute to a healthy world without traffic congestion.

We have brought projects to fruition in more than 50 countries around the globe. With our one-stop solutions, we cover the entire value chain of our customers, from components to design and implementation to operation of systems.

As part of the Kapsch Group and headquartered in Vienna, Kapsch TrafficCom has subsidiaries and branches in more than 30 countries. It has been listed in the Prime Market segment of the Vienna Stock Exchange since 2007 (ticker symbol: KTCG). Kapsch TrafficCom's about 5,100 employees generated revenues of EUR 731.2 million in financial year 2019/20.

>>> [www.kapsch.net](http://www.kapsch.net)