Summary

From 2000 to 2010, time loss due to traffic jams and delays on the main road network increased by 49 percent. The primary causes for this time loss were changes in the number of available jobs, population growth and car ownership rates. If new roads had not been constructed, roads widened, and rush hour and lanes and traffic management systems implemented, journey time loss would have been 16 percent higher. Until 2000, yearly changes of time loss due to traffic jams and delays were approximately equal to yearly changes of total traffic volumes, but in subsequent years changes of time loss have become more difficult to predict.

The development of journey time unreliability – that is, the extent to which a journey is longer than expected – largely corresponds to that of journey time loss. From 2001 to 2007, journey time unreliability on the main road network increased sharply; however, from 2007 to 2010, the situation improved. One part of journey time unreliability is a direct consequence of extreme journey times. The main road network therefore remains insufficiently robust for handling consequences stemming from incidents and from situations with relatively high amounts of traffic.

In recent years, numerous analyses focused on explaining the reasons for traffic jams and delays on the main road network. In this study, KiM Netherlands Institute for Transport Policy Analysis examined aspects of accessibility from the perspective of car drivers: journey times, journey time loss, journey time reliability and extreme long journey times. Some of this study's findings were previously published as part of the Mobility Report 2011.

Time loss due to traffic jams sharply increased from 2000 to 2010
From 2000 to 2010, time loss due to traffic jams and delays on the main roadway network increased by 49 percent. Journey time loss increased by 55 percent from 2000 to 2008, and decreased by 10 percent in 2009, but then increased again in 2010 by 6 percent, owing to economic recovery.

Time loss due to traffic jams and delays accounts for one part of the total journey time. In 2010, journey time loss accounted for approximately 9 percent of the total journey time.
In 2010, journey times increased by 13 percent, as compared to 2001, a fact primarily due to journey distances increasing by 11 percent. During this period, the average journey time per kilometre increased by 2 percent.

That journey times increased less (+13%) than journey time loss (+49%) is, firstly, due to the fact that journey time loss accounts for but a small percentage of the total journey time. The second reason for this is that journey time is not only determined by journey time loss but also by journey time gains, which occurs because, for example, new journeys are often undertaken on routes where, and at times when, it is possible to travel quickly. Consequently, the average journey time decreased.

Many factors influence journey time loss
Many factors influence the amount of time lost due to traffic jams and delays. Moreover, certain influences have a greater impact in one year than they do in another year. Major differences can also occur per road section or per region. Consequently, between 2000 and 2010, the largest journey time loss occurred in the Amsterdam region (the northern area of the Randstad), which accounted for one-third of all journey time loss on the entire main road network.

Changes in the number of available jobs, population growth and car ownership rates per municipality were the key driving forces behind the increase in journey time loss from 2000 to 2010, resulting in an increase of 47 percent. If new roads had not been constructed, roads widened, and rush hour lanes and traffic management systems implemented, journey time loss would have been 16 percent higher. Other influential factors impacting journey time loss during this period were:

- developments in fuel prices (-4%);
- weather, accidents and (road) construction works (+4%);
- lowered tax rates for home-to-work travel (+6%);
- reduced speed limits and route controls (+6%);
- other factors (+6%).

Effect of road use regulations dependent on area
Policy measures to use the capacity of roads more effectively played an increasingly important role in policy. During the period 2000 to 2010, ramp-metering installations and dynamic route information panels were introduced in many locations. The effects that these road use regulations had on journey time loss were largely dependent on the characteristics of the traffic and of the infrastructure. These characteristics determined whether the regulations were more or less effective than the average. For example, ramp-metering installations and dynamic route information panels situated in areas of light traffic resulted in, on average, approximately 0 to 2 percent less journey time loss, while in heavy traffic areas the decrease in journey time loss was approximately 10 percent. Dynamic route information panels situated at urban ring roads influenced a smaller area than at other locations. When situated at urban ring roads, the panels led to an average of approximately 7 percent less journey time loss, while at other sections of the road network the journey time loss was on average 10 percent less.

This information allows for improved estimations of the effects of investments in road use regulations.

Journey time loss more difficult to predict
Until 2000, yearly changes of journey time loss due to traffic jams and delays nationally were approximately equal to yearly changes of traffic volumes; however, in recent years, the relation between developments in national traffic volumes and journey time loss are no longer so clear. From 2000 to 2008, journey time loss nationally increased at a faster rate than traffic volumes. From 2008 to 2011, journey time loss was in flux: a decrease in 2009 (-10%), an increase (+6%) in 2010, and again a decrease in 2011 (-18.5%). These fluctuations are even more striking in that traffic volumes in 2009 and 2010 remained relatively constant, yet once again increased in 2011 (+3.5%).

The reason for these fluctuations can be found in the use of the main road network. In the period 2000-2008, road use increased to the point that the main road network's maximum capacity was reached in certain locations and at certain times. A minor change in local traffic volumes or distribution could result in major fluctuations. The 29 percent increase in the number of kilometres travelled for home-to-work travel during this time period played a key role. Simple rules of thumb, which relied on developments in national traffic volumes to estimate changes of journey time loss on the main road network, are no longer valid.

Unreliability of journey times
In addition to journey time loss due to traffic jams and delays, drivers also had to contend with the unreliability of journey times, which is defined as the extent to which a journey takes more or less time than a person expected. At issue here is the structural, daily variation in journey times, as well as minor and major incidental disruptions.

From 2001 to 2010, the development of journey time unreliability largely corresponded to that of journey time loss. From 2001 to 2007, unreliability levels increased by approximately 30 percent. The years 2007 to 2009 saw a decrease of 10 percent, but in 2010 unreliability again increased by 6 percent.

In 2010, the degree of unreliability on the entire main road network was approximately 74 million hours.

Extreme journey times increase less
One aspect of unreliability pertains to extreme long journey times, which are not only the consequences of incidents, such as traffic accidents and extreme weather conditions, but also of incidental high traffic volumes, for which the network has proven to be insufficiently robust. Extreme journey times are defined as the extra journey time of 20 percent of longest journey times on a particular route. In 2010, 60 percent of the amount of unreliability consisted of these extreme journey times. From 2001 to 2010, extreme journey times increased less than total unreliability, yet car drivers were under the impression that extreme journey times had increased more, which is consistent with the psychological principle that extreme situations have greater impacts than smaller deviations.

The factors influencing the development of time loss due to traffic jams and delays have approximately the same effects on the development of journey time unreliability and the development of extreme journey times. The main exceptions to this are route controls, sometimes in combination with speed limit reductions. This has indeed led to more journey time loss, but has reduced the unreliability of journey times and extreme journey times.

Cost of reliability
This report presents the measured effects of policy measures on the extent of journey time reliability on the main road network. KiM expects soon to publish a second study that objectively determines the cost of unreliability, which will allow for improved substantiation of the effects that investment decisions have on journey time unreliability.