ROAD SAFETY OBSERVATORY

NATIONAL INTERMINISTERIAL

Speed observatory
(Mainland France)

Results for the year 2020

September 2021

Observatoire national interministériel de la sécurité routière

ONISR

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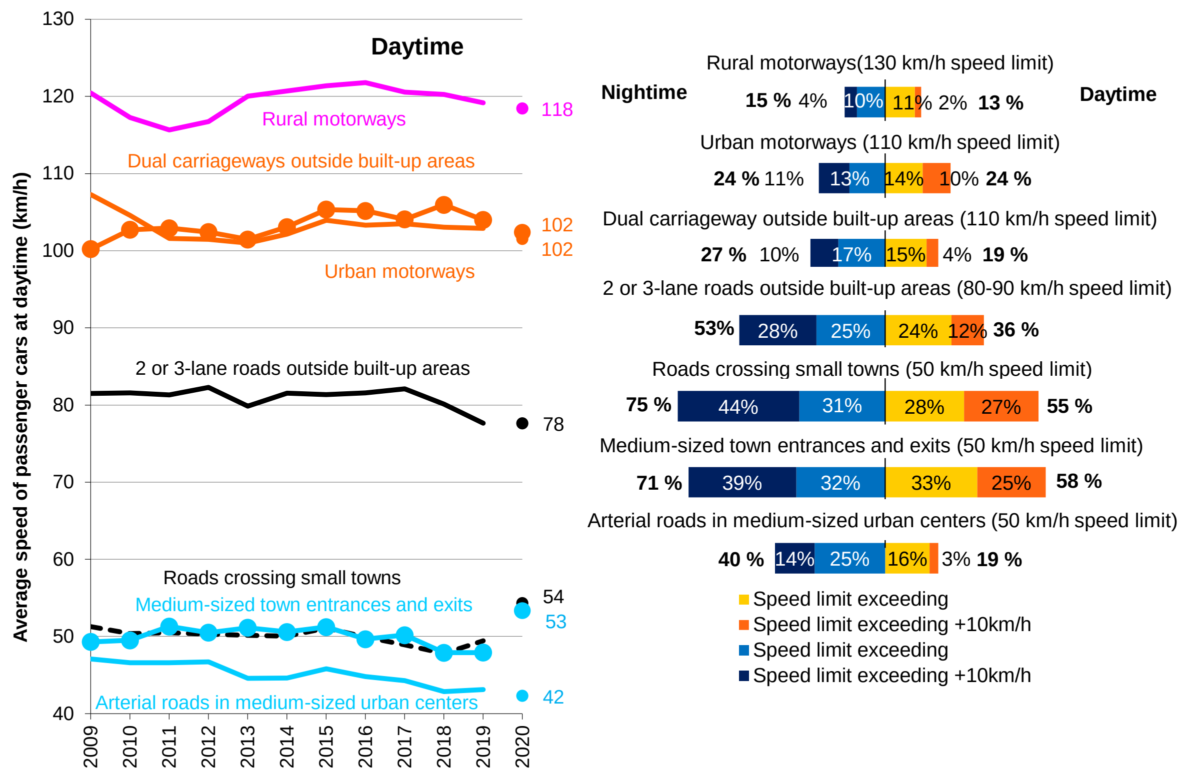
Summary

The year 2020 is a special year statistically, on the one hand because of the Covid-19 pandemic which made it impossible to carry out part of the measurements normally carried out during the first part of the year, and on the other hand because of the change of methodology in the collection of speed data. The number of collection points has been reduced from 215 to 135, but the data are much more exhaustive.
The average speed of passenger cars measured during the day on 2x2 or 2x3 lane networks has been re-evaluated downwards (-0.8 km/h on connecting freeways, -1.4 km/h on alternate freeways, -1.6 km/h on dual carriageways outside urban areas). On two-way roads outside built-up areas, the average speed remains stable (77.8 km/h, +0.1 km/h compared to 2019), but it has been significantly increased on built-up areas. On roads crossing small towns, the average speed has increased from 49.5 km/h to 54.3 km/h (+4.8 km/h) and by 5.4 points on roads entering or leaving medium-sized towns (from 47.9 to 53.3 km/h). On the other hand, arterial roads in the center of the average urban area have speeds more similar to those observed in 2019 (42.3 km/h, -0.8 km/h compared to 2019).

In general, the following trends can be observed:
- on **two- and three-lane roads**, average speeds stabilized compared to 2019 after two consecutive years of decline.
- the average speed **has been re-estimated significantly forwards** on roads in small towns and on arterial roads in medium-sized towns.
- the **rate of exceeding the speed limit** is particularly high on roads in small town crossings and on medium town entrances and exits.
- **nighttime speeds are higher than daytime speeds** (except on rural motorways), with greater differentials on networks in built-up areas and on two-way roads outside built-up areas.
- for all networks, daytime speeds are **higher on weekends than on working days**.
- except in built-up areas, the **average speeds of HGVs** have been re-estimated downwards.

Average speeds of passenger vehicles and rates of exceeding the speed limit in 2020 by type of network



Key indicators of good traffic behaviour 2020

Key Performance Indicators (KPI) – European Commission definition

Rate of compliance with the maximum authorized speed and average speeds practiced, passenger cars

Network	Compliance % with the speed limit		Average speed (km/h)	
	Daytime	Nighttime	Daytime	Nighttime
Rural motorways (130 km/h speed limit)	87.0 %	85.4 %	118.4	116.4
2 or 3 lane roads outside of built-up areas (80-90 km/h speed limit)*	64.4 %	47.4 %	77.8	84.3
Arterial roads in medium-sized urban centers (50 km/h speed limit)	80.8 %	60.3 %	42.3	48.3

*The speed limit varies according to local decisions, see method on page 16

Rate of compliance with the maximum authorized speed and average speeds practiced, HGVs

Network	Compliance % with the speed limit		Average speed (km/h)	
	Daytime	Nighttime	Daytime	Nighttime
Rural motorways (130 km/h speed limit)	94.7 %	94.1 %	83.0	83.8
2 or 3 lane roads outside of built-up areas (80-90 km/h speed limit)*	68.1 %	52.8 %	75.0	78.8
Arterial roads in medium-sized urban centers (50 km/h speed limit)	93.4 %		38.0	

1. Introduction

Since the 1980s, the ONISR has had a service provider carry out speed measurements and observations of road user behavior on a set of observation points on the mainland road network.

For technical reasons, this system was interrupted between 2013 and 2015. During this period, Cerema (Center for studies and expertise on risks, environment, mobility and development) carried out speed measurements on a sample of measurement points representative of the observatory panel. Larger-scale measurements were resumed in 2016 after a substantial change in the panel of observation points as well as minor changes in the methodology. Since 2020 the methodology of the observatory has changed as well as the number of measurement points, going from 215 to 135 for a much larger observed population.

The speeds measured by the observatory **do not claim to be absolutely representative** of traffic on the entire French road network. On the other hand, it is considered that their evolution over time is representative of the general evolution of behaviors, in other words that these observations have a **relative representativeness**, under the condition that the panel of observation points is stable over time. The results of the speed observatory are therefore intrinsically linked to the panel of measurement points that feed it. For the year 2020, the results are more difficult to compare with the previous years because of the change of methodology and part of the panel.

The substantial modification of the panel at the beginning of 2016 made it necessary to transcribe the previous results to express them according to principles allowing their comparison with the results of the years from 2016. A history of average speeds by type of network and by category of vehicle has thus been reconstructed for the period 2009-2015.

This note presents by type of road network the results for the year 2020, day and night, as well as the history of average speeds since 2009, for the categories of vehicles having been the subject of at least 200 observations during the year: passenger vehicles and heavy goods vehicles.

Appendix 1 summarizes the number of vehicles observed in each category by type of network.

Appendix 2 presents in detail the methodology used for speed measurements and data processing, the changes made compared to the system in force until 2012, the approach implemented over the period 2013-2015 and the principles used to reconstitute a relevant history of results over the period 2009-2015.

Appendix 3 shows the maximum authorized speeds (speed limit) for heavy goods vehicles, used as assumptions for calculating the rates of exceeding the speed limit.

Impact of the Covid-19 pandemic on observations:

The Covid-19 pandemic and related measurements led to shift the observations conducted during the first measurement wave of the year. Usually carried out between March and June, this one was in 2020 carried out on the period May-July.

In particular, the number of points observed on connecting and urban motorways was greatly reduced due to the restrictions.

Light good vehicles and motorized two-wheelers were not measured in 2020.

2. Rural motorways (130 km/h speed limit)

Things to remember

- **Average passenger car speeds declined** for the fourth year in a row.
- The rural motorway network is the only network where **nighttime** passenger cars speeds are **lower than daytime** speeds.
- On average, passenger cars speeds are **higher on weekends**, both during the day and at night.
- Despite the higher average daytime speeds, **the rate of passenger cars exceeding the speed limit** is higher at night. These are the lowest rates of the networks observed.
- The average **speed of HGVs** has been revised downwards. It is lower during the day.

Number of vehicles observed in 2020

Passenger cars		Heavy good vehicles	
Daytime	Nighttime	Daytime	Nighttime
534 068	96 281	67 105	33 766

Observations

Despite the change in methodology, a similar trend to that observed since 2016 for passenger cars is observed on the rural motorway network, with a -0.8 km/h (118.4 km/h) decrease in the average speeds driven, down for the fourth year in a row.

The rates of daytime passenger cars exceeding the speed limit on rural motorways are the lowest of all the networks observed with 13% exceeding the speed limit, and 2% exceeding the speed limit +10 km/h.

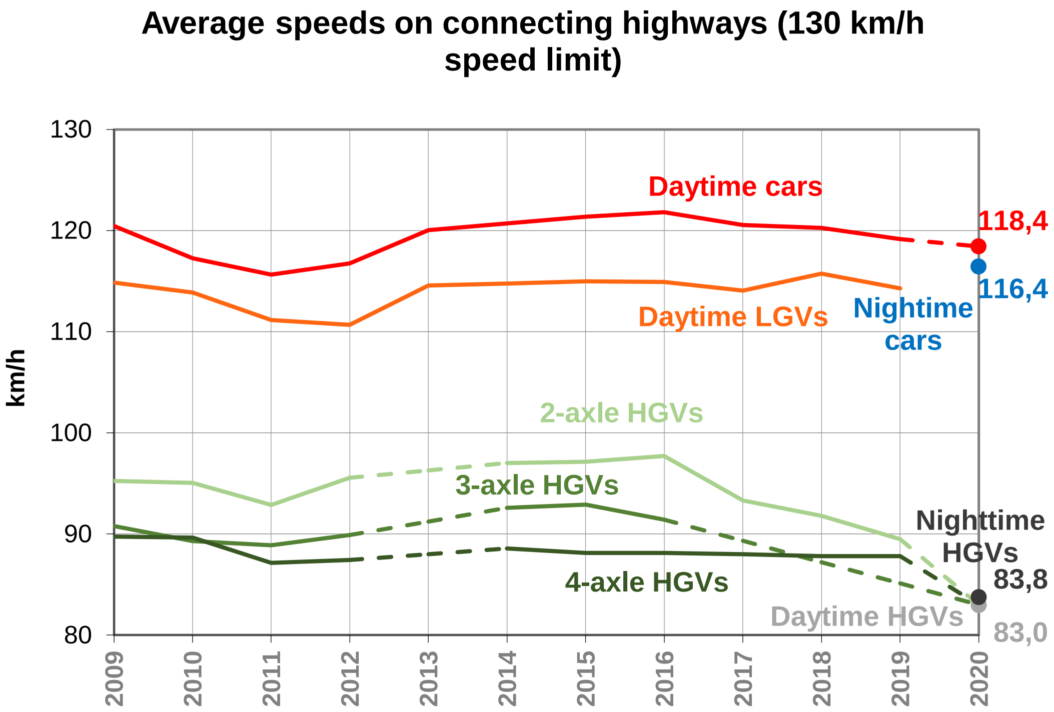
At night, rural motorways are the only network for which the observed passenger cars speeds are lower than those of daytime, with an average of 116.4 km/h. On the other hand, speeds are more spread out, and the rate of exceeding the speed limit is higher with 15% of passenger cars above 130 km/h and 4% above 140 km/h.

The average speed of passenger cars is also higher on weekends during the day (119.0 km/h vs. 118.1 km/h) and at night (116.7 km/h vs. 116.2 km/h).

The speeds of HGVs (length > 9m) have been revised downwards: 83.0 km/h on average during the day (83.8 km/h at night) compared to 87.8 km/h in 2019 for HGVs with 4 or more axles and up to 89.5 km/h for HGVs with 2 axles.

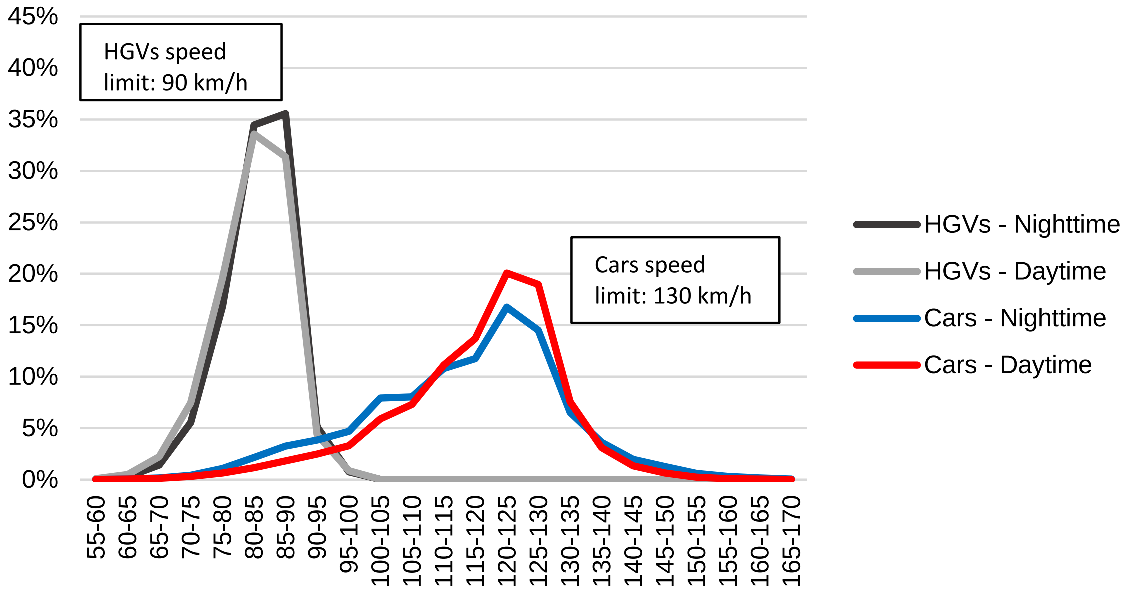
The rate at which HGVs exceed the speed limit remains low on this network, both during the day (5%) and at night (6%).

Evolution of average speeds, 2009-2020



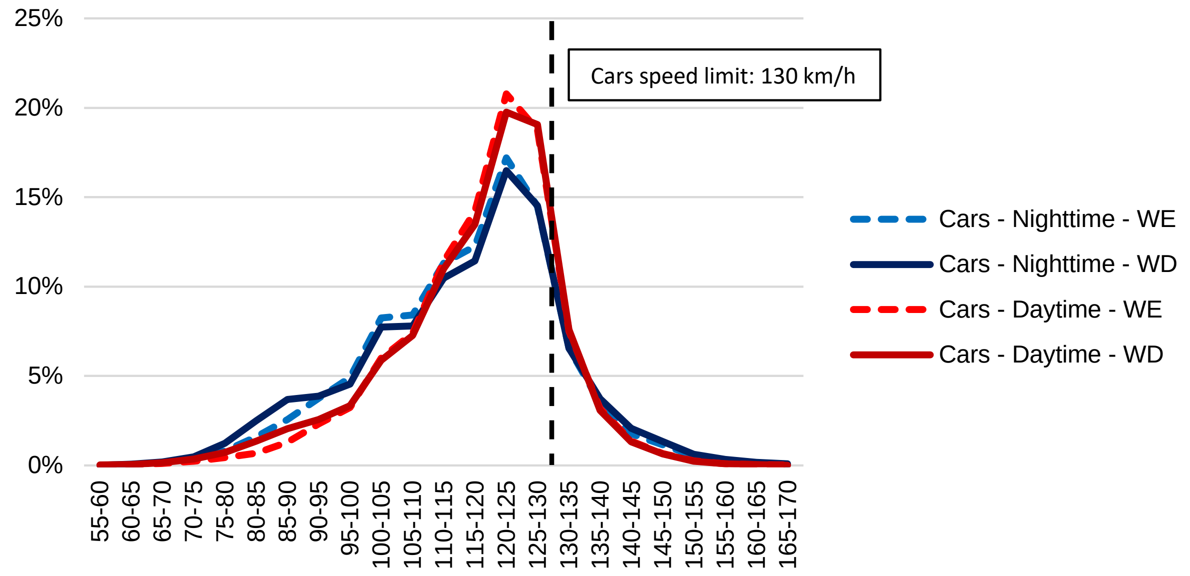
NB : No LGV speed measurements in 2020

Distribution of passenger car and HGV speeds, 2020

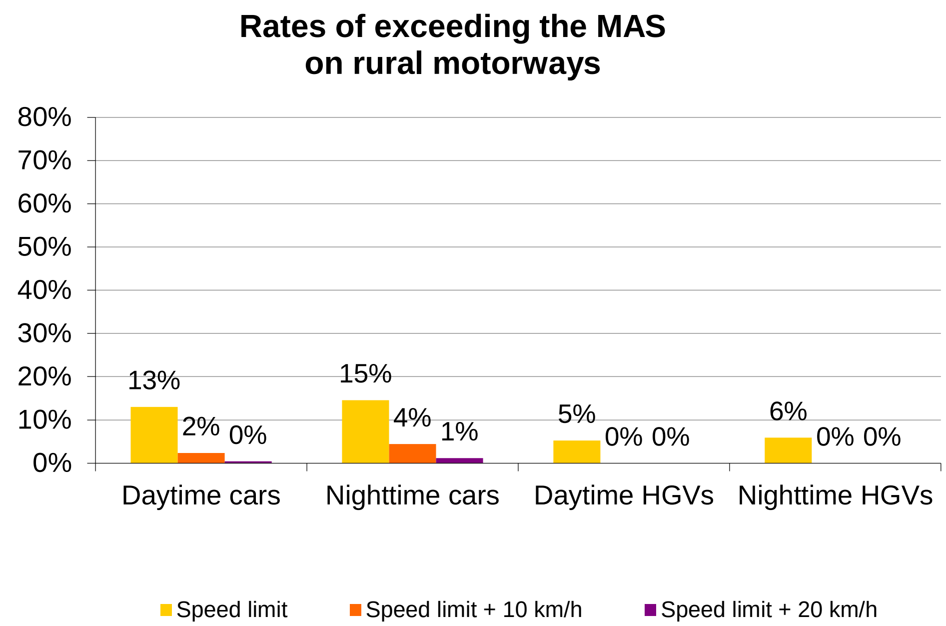


Speed limit applicable to HGVs: see Appendix 3.

Distribution passenger car speeds, 2020



Rate of exceeding the speed limit in 2020



Speed limit applicable to HGVs: 90 km/h (see Appendix 3).

3. Urban motorways (110 km/h speed limit)

Things to remember

- **Average passenger cars speeds are down** 1.4 km/h from 2019.
- **Nighttime** passenger cars speeds are similar to **daytime** speeds. The same is true for the rates of exceeding the speed limit.
- On average, passenger cars speeds are **higher on weekends**, both during the day and at night.
- The average **speed of HGVs** has been revised downwards. It is higher during the day.

Number of vehicles observed in 2020

Passenger cars		Heavy good vehicles	
Daytime	Nighttime	Daytime	Nighttime
284 926	106 093	40 638	23 803

Observations

With the change in methodology in 2020, the average speed of daytime driving has been revised downwards: 101.5 km/h in 2020, a decrease of 1.4 km/h.

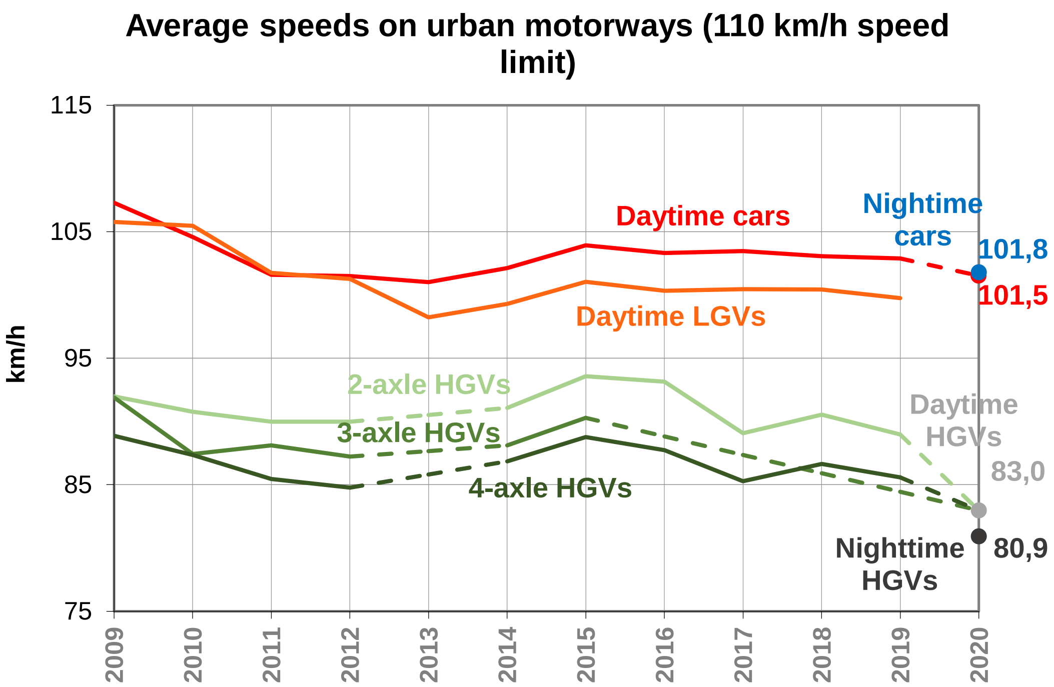
The speeds of nighttime vehicles are very similar to daytime speeds: 101.8 km/h on average. Similarly, the rates of exceeding the speed limit are almost identical during the day and at night: 24% of vehicles travel above the speed limit, and around 10% above the speed limit +10 km/h.

On average, passenger car speeds are higher at weekends, both during the day (103.7 km/h vs. 100.6 km/h) and at night (102.1 km/h vs. 101.7 km/h).

Daytime HGV speeds have also been revised downwards: 83.0 km/h on average in 2020 compared to 85.6 km/h for HGVs with 4 or more axles in 2019 and 89.0 km/h for HGVs with 2 axles. At night, HGV speeds are 2.1 km/h lower (80.9 km/h).

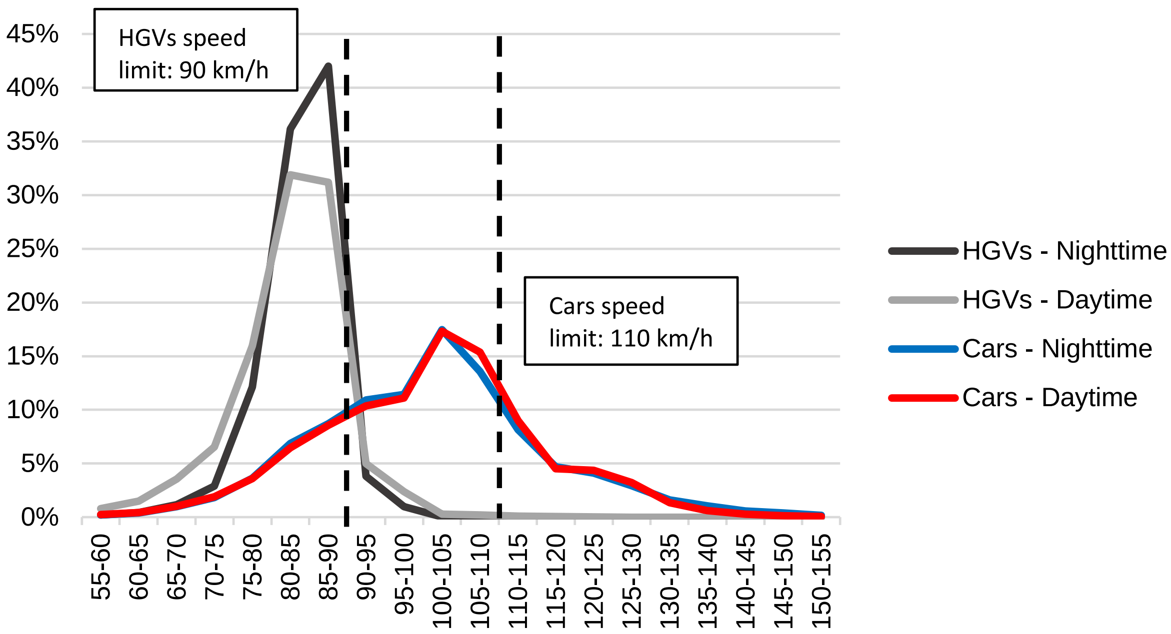
The rate at which HGVs exceed the speed limit is 8% during the day and 5% at night.

Evolution of average speeds, 2009-2020



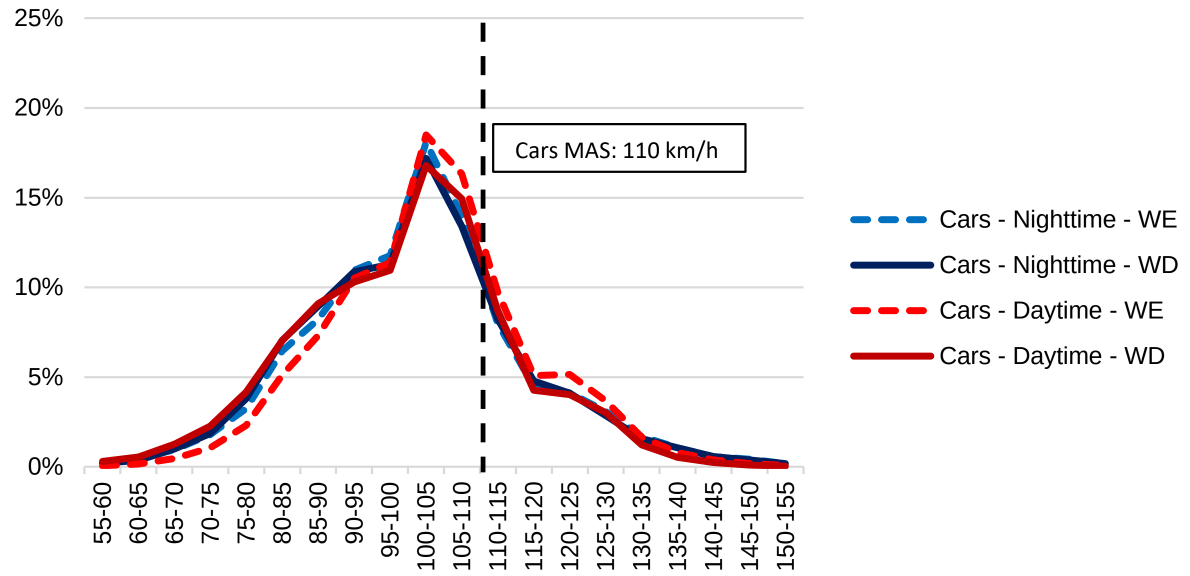
NB : No LGV speed measurements in 2020

Distribution of passenger car and HGV speeds, 2020

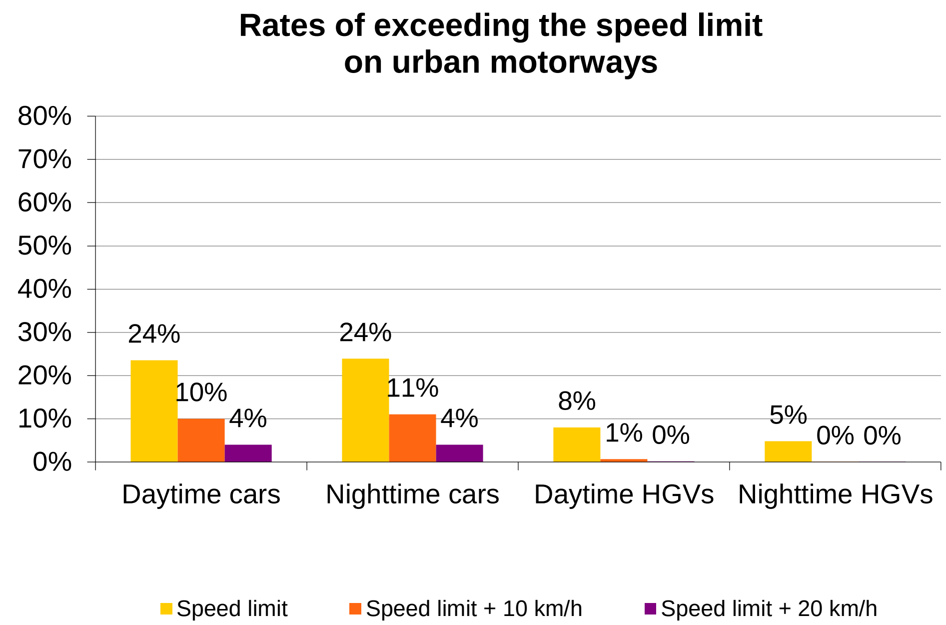


Speed limit applicable to HGVs: see Appendix 3.

Distribution passenger car speeds, 2020



Rate of exceeding the speed limit in 2020



Speed limit applicable to HGVs: 90 km/h unless otherwise specified (see Appendix 3).

4. Dual carriageways outside urban areas (110 km/h speed limit)

Things to remember

- **Average passenger car speeds are down** 1.6 km/h from 2019.
- **Nighttime** speeds are **higher than daytime** speeds for both passenger car and HGVs.
- On average, passenger cars speeds are **higher on weekends**, both during the day and at night.
- The **rates of exceeding the speed limit** are higher than on urban motorways at night, but lower during the day.
- The average **speed of HGVs** has been revised downward.

Number of vehicles observed in 2020

Passenger cars		Heavy good vehicles	
Daytime	Nighttime	Daytime	Nighttime
568 904	100 147	76 761	24 164

Observations

In 2020, the average speed of passenger cars on dual carriageways outside urban areas during the day has been revised downward: -1.6 km/h for an average speed of 102.4 km/h.

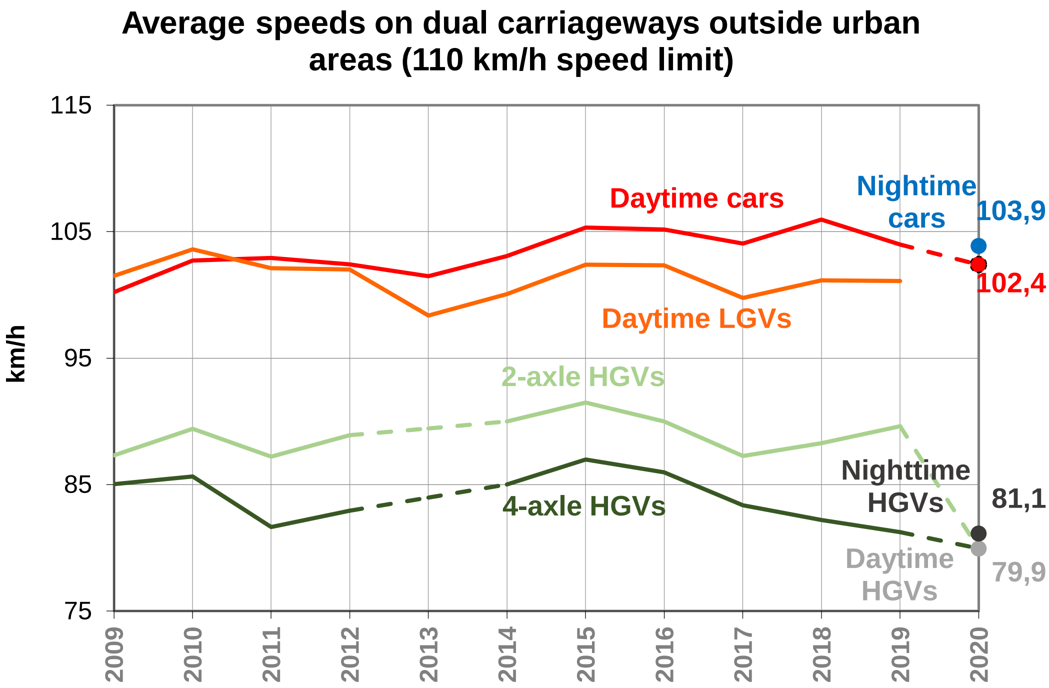
At night, the speed of passenger cars is significantly higher by 1.5 km/h (103.9 km/h). The speed differential between day and night on this network is more pronounced than on the motorway network, both for average speeds and for overtaking rates: they are lower during the day (19%, 4% at +10 km/h), but higher at night (27%, 10% at +10 km/h).

As for the motorway networks, the average speed of HGVs is higher at weekends than during the week: 103.2 km/h compared to 102.1 km/h during the day, 104.5 km/h compared to 103.6 km/h at night.

The average speed of HGVs during the day has been revised downwards: 79.9 km/h during the day compared to 81.2 km/h for HGVs with 4 or more axles and 89.6 km/h for HGVs with 2 axles in 2019.

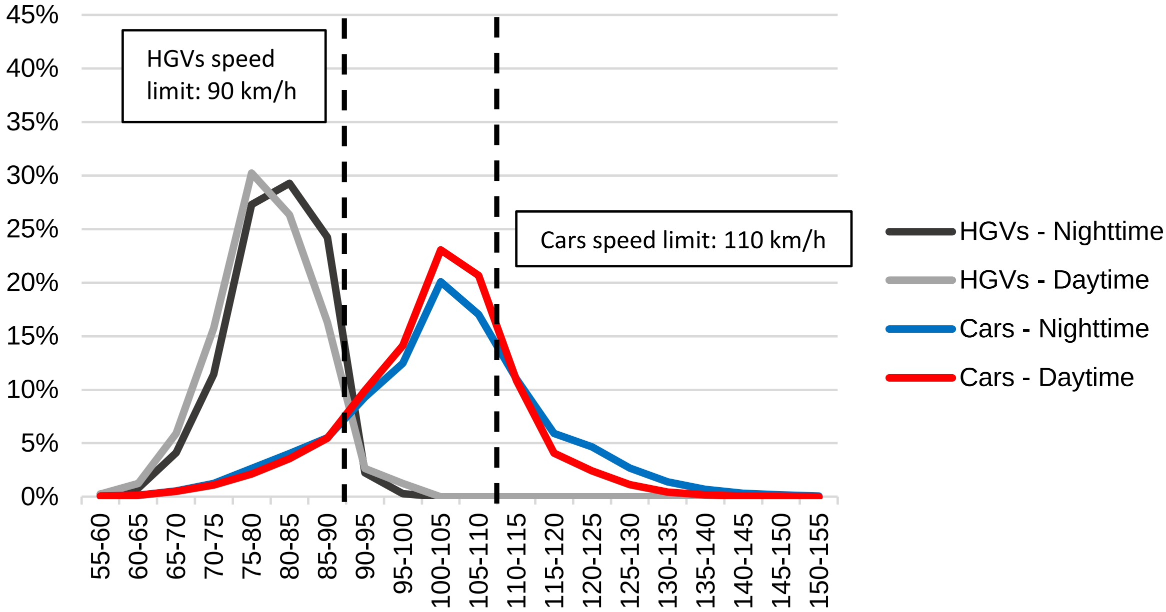
The rates at which HGVs exceed the speed limit are marginal: 4% by day and 3% by night.

Evolution of average speeds, 2009-2020

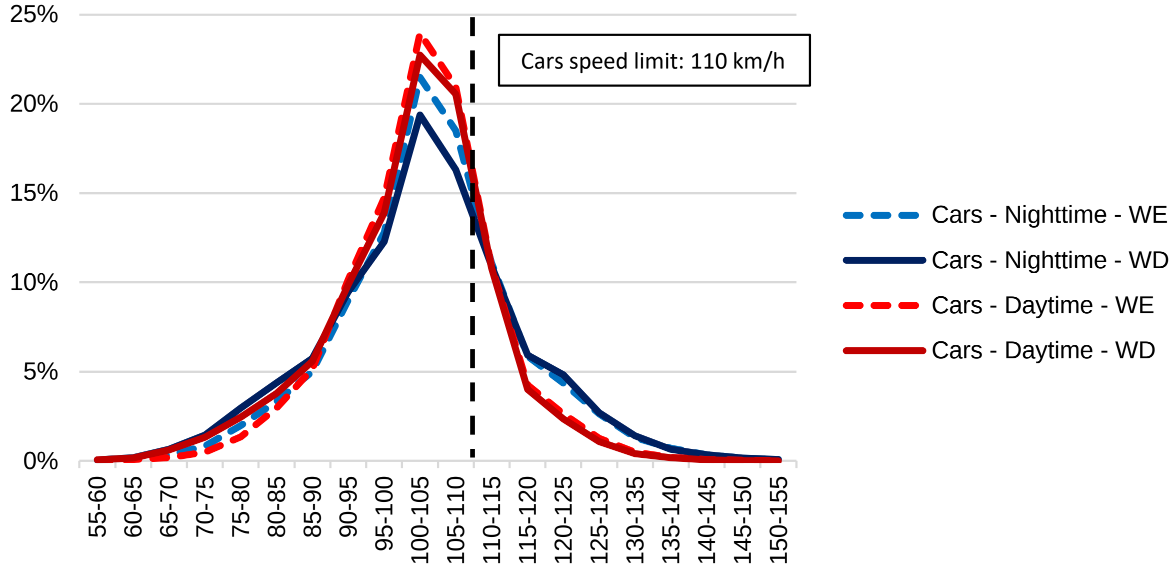


NB : No LGV speed measurements in 2020

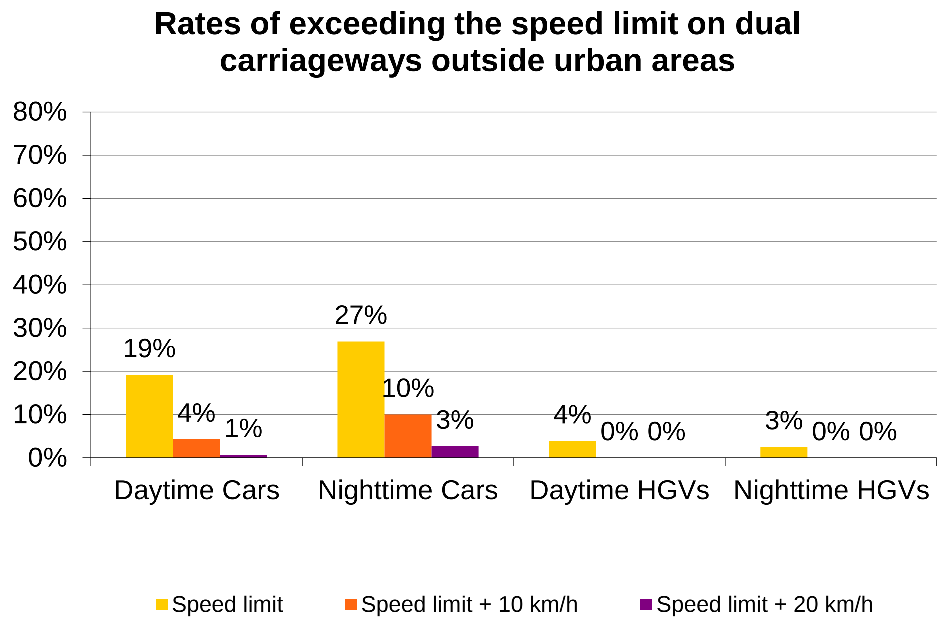
Distribution of passenger car and HGV speeds, 2020



Distribution passenger car speeds, 2020



Rate of exceeding the speed limit in 2020



5. 2 or 3 lane roads outside built-up areas (80 km/h speed limit, sometimes increased to 90 km/h)

On December 23, 2019 the promulgation of the **law on the orientation of mobilities** (LOM law) introduced the possibility of returning to 90 km/h as of January 1, 2020 on two-way roads outside built-up areas for sections under the jurisdiction of the president of the departmental council. During the year 2020, 28 departments have chosen to increase the speed limit to 90 km/h on all or part of their network. The calculation of average speeds for the year 2020 was therefore made with the 80 km/h and 90 km/h speed limits combined.

In order to obtain figures as close as possible to reality, the choice was made to apply to the 80 or 90 network a weight equal to the share of departments that they represented on June 30, 2020 (half of the year) in the number of departments in metropolitan France.

For example, **the average speed on the whole network is calculated as follows** :

$$S_{av} = \frac{10}{96} * S_{av\ 90} + \frac{86}{96} * S_{av\ 80}$$

With $S_{av\ 90}$ and $S_{av\ 80}$ respectively the average speeds on the 90 and 80 km/h networks.

Things to remember

- **The average** passenger cars **speed** of daytime driving **has stabilized** after two consecutive years of decline. On the network with a speed limit of 80 km/h, the average speed continues to decrease (-0.8 km/h).
- The average speed of **night-time** passenger cars is 6.5 km/h higher than **during the day**.
- On average, passenger car speeds are **higher at weekends than during weekdays at daytime, but lower at night.**
- Speeds on the 90 km/h network are **higher** than on the 80 km/h network **by 9.3 km/h on average** during the day.
- The average **speed of HGVs** has been revised downwards.

Number of vehicles observed in 2020

Passenger cars				Heavy good vehicles*	
80 km/h speed limit		90 km/h speed limit		Jour	Nuit
Daytime	Nighttime	Daytime	Nighttime		
804 276	51 924	64 343	3 159	65 717	9 029

*For heavy good vehicles, a 80 km/h speed limit is considered regardless of the network.

Observations

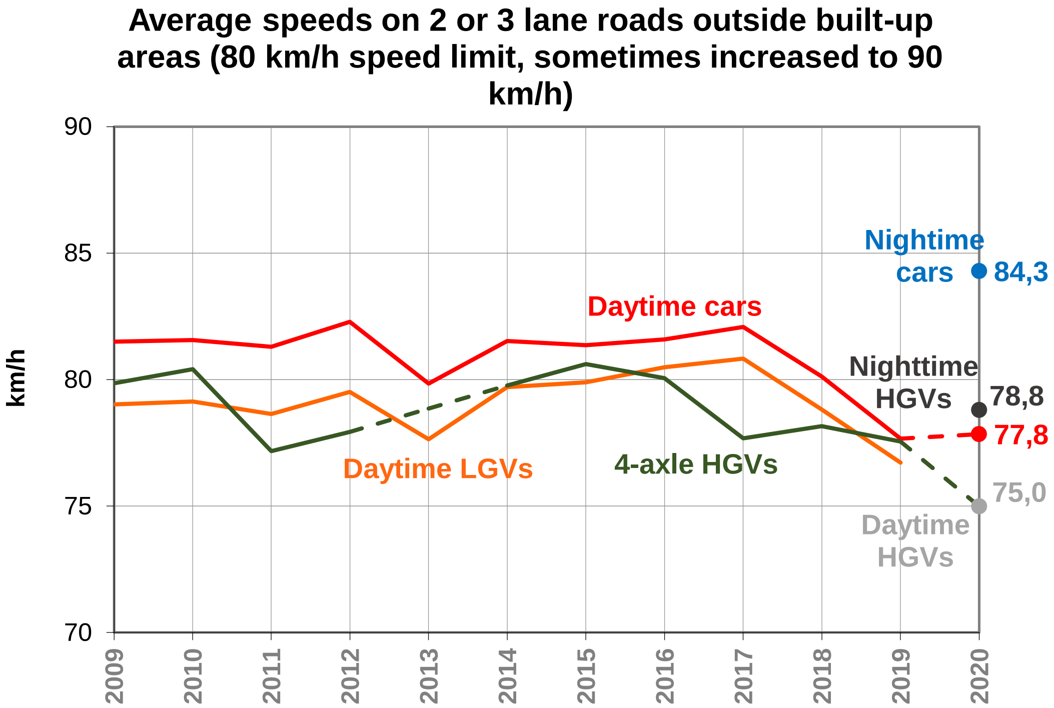
Thus, we observe an average of speeds practiced by passenger cars during the day that remains stable compared to 2019 (77.8 km/h versus 77.7 km/h in 2019). At night, the speeds practiced by passenger cars are significantly higher with an average of 6.5 km/h higher (84.3 km/h).

The rate of exceeding the speed limit is 35% during the day and 51% at night.

The average speed of passenger cars is higher at weekends than during the week during the day (78.7 km/h vs. 77.5 km/h), but lower at weekends than during the week at night (83.2 km/h vs. 85.0 km/h).

The average speed of HGVs during the day has been revised downwards: 75.0 km/h during the day compared to 77.6 km/h in 2019 for HGVs with 4 or more axles. As with passenger car, the average speed is higher at night (78.8 km/h). The rates of exceeding the speed limit are higher at night (47% of HGVs above 80 km/h) than during the day (32%).

Evolution of average speeds, 2009-2020



NB : No LGV speed measurements in 2020

For more details on the evolution of speeds between May 2018 and June 2019, and on the exceedance of the speed limit, it is necessary to refer to the results of the Cerema speed observatory set up to evaluate the measure. These results are presented in "Lowering the speed limit to 80km/h - Final assesment report - July 2020" (available in English version).

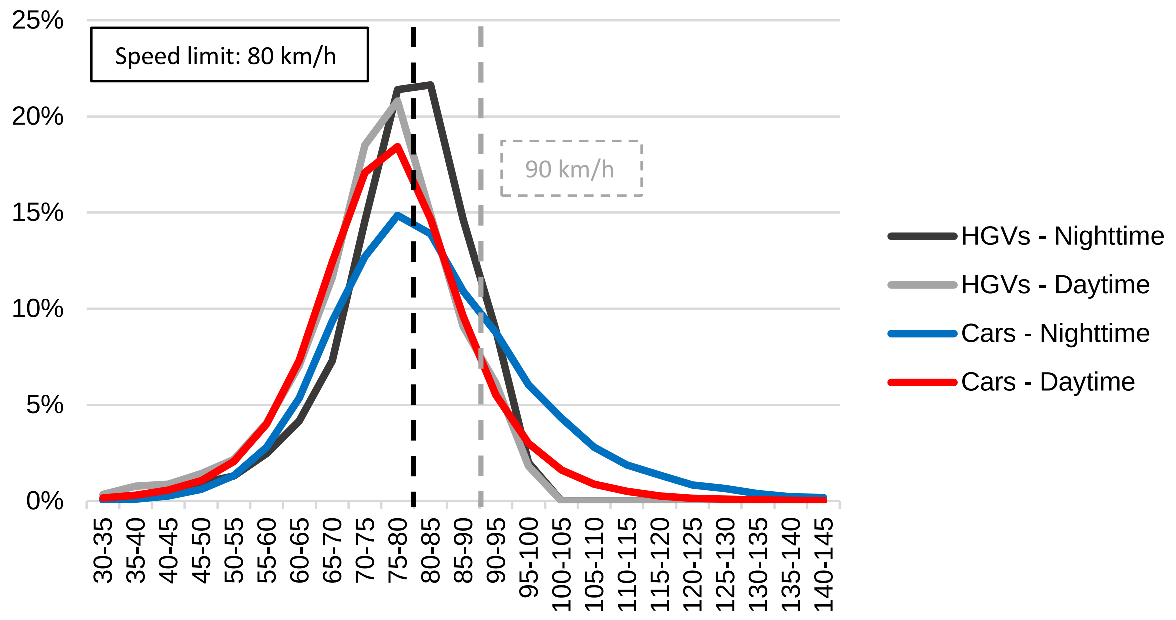
https://www.cerema.fr/fr/centre-ressources/boutique/abaissement-vitesse-maximale-autorisee-80-kmh

Average speed of the passenger cars according to the applied speed limit (in km/h) :

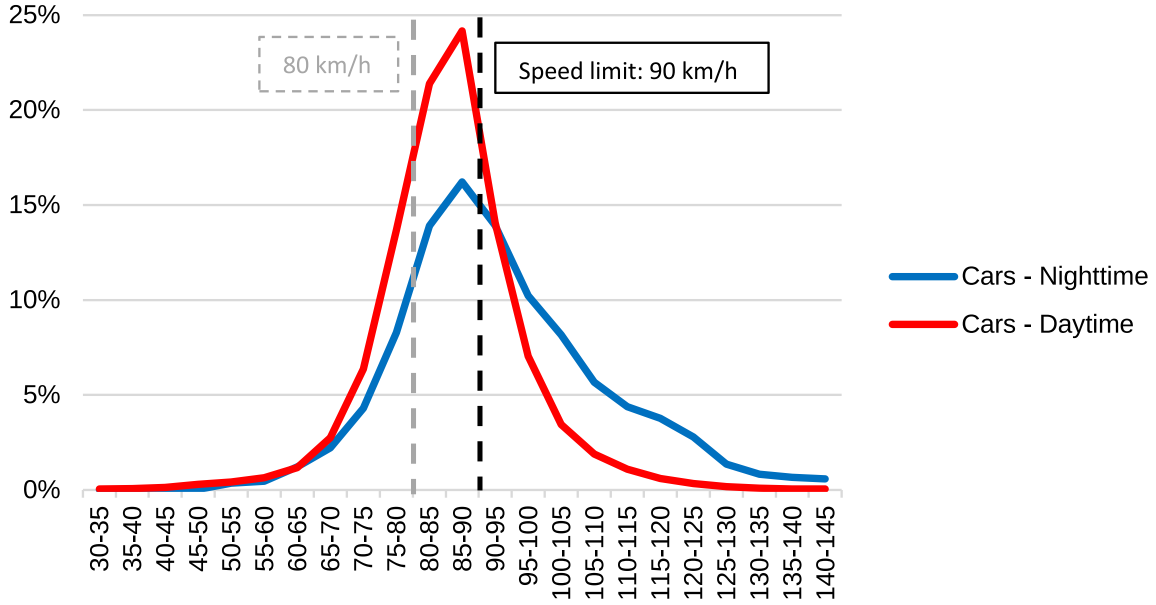
80 km/h speed limit		90 km/h speed limit	
Daytime	Nighttime	Daytime	Nighttime
76,9	83,2	86,2	94,1

There is a difference of about 9.3 km/h between the 80 km/h network and the 90 km/h network during the day. At night, this difference is even more marked: 11.0 km/h more on the 90 km/h network.

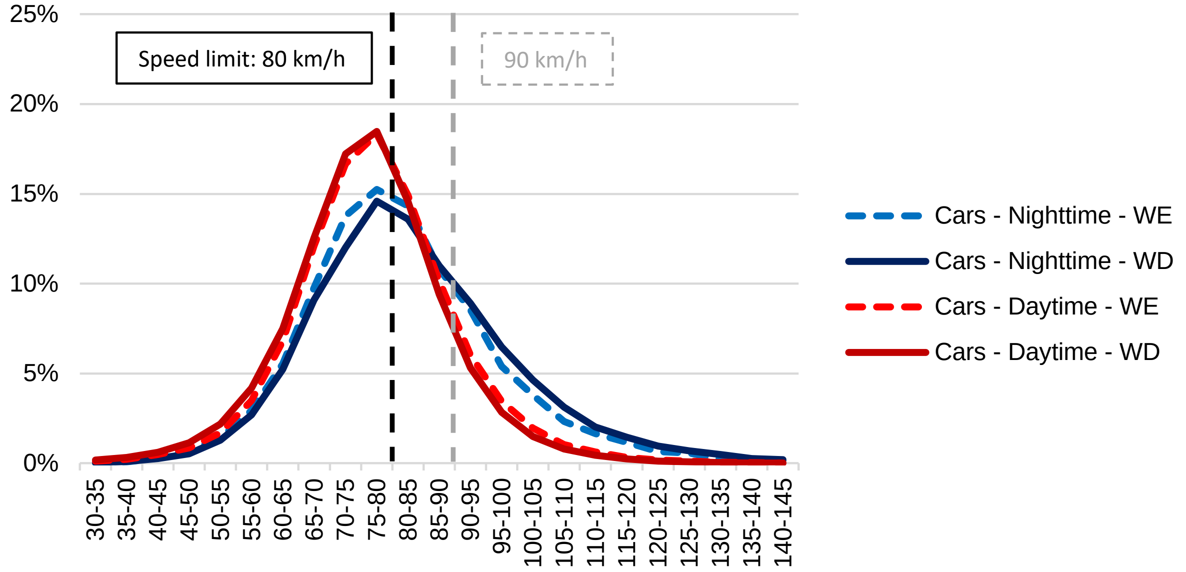
Distribution of passenger car and HGV speeds, 80km/h speed limit, 2020



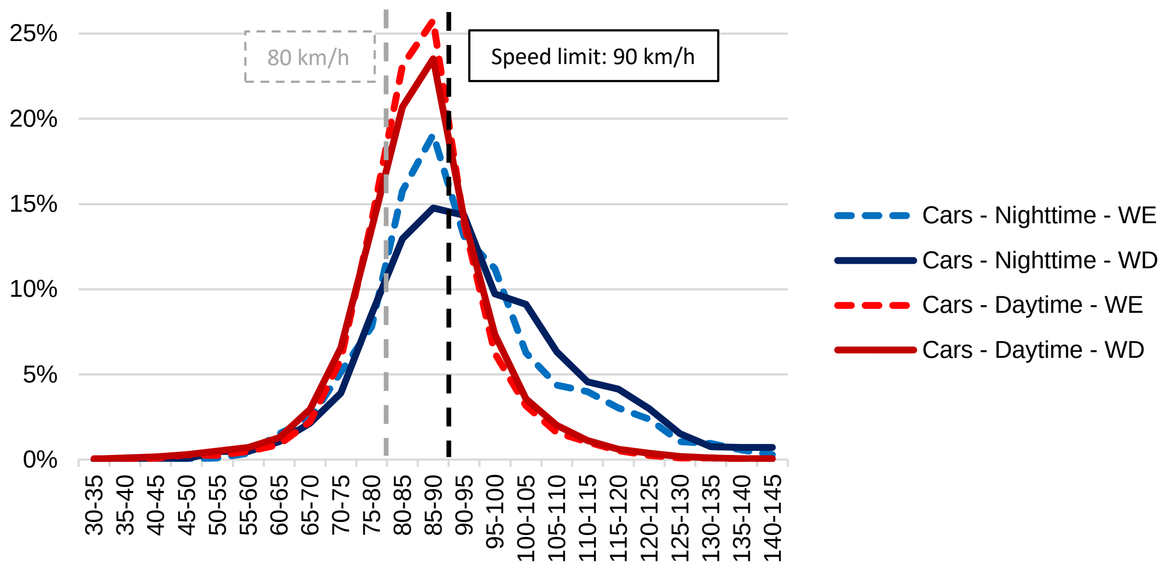
Distribution of passenger car speeds, 90km/h speed limit, 2020



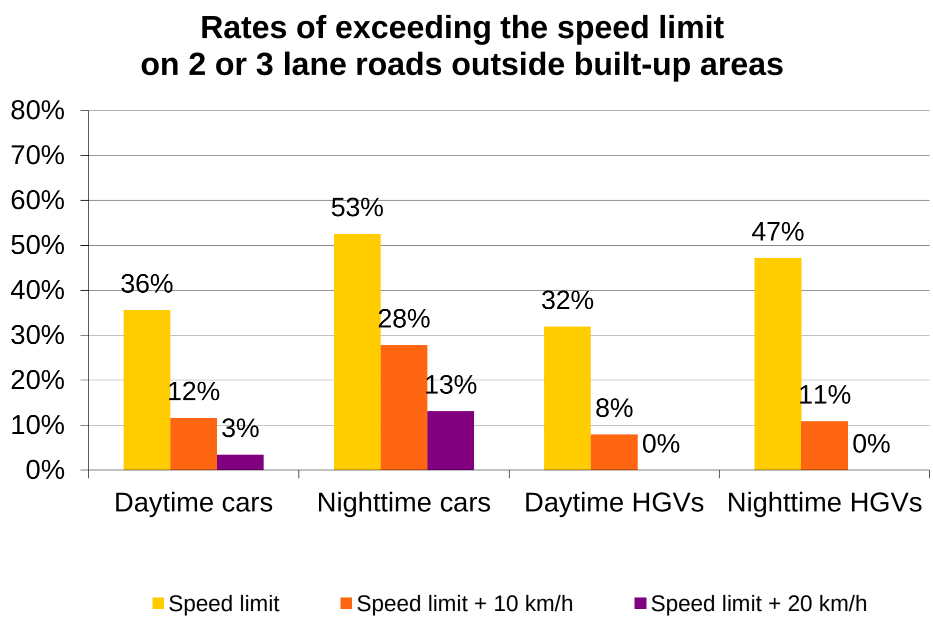
Distribution of passenger car speeds, 80km/h speed limit, 2020



Distribution of passenger car speeds, 90km/h speed limit, 2020



Rate of exceeding the speed limit in 2020



*Figures for 80km/h speed limit and 90km/h speed limit networks, using the method described on page 16

Rate of exceeding the speed limit by passenger cars according to the speed limit applied:

	80 km/h speed limit		90 km/h speed limit	
	Daytime	Nighttime	Daytime	Nighttime
Speed limit exceeding	36 %	53 %	29 %	53 %
Speed limit + 10 km/h exceeding	12 %	28 %	8 %	29 %
Speed limit + 20 km/h exceeding	4 %	13 %	2 %	15 %

Exceeding the speed limit by passenger car users remains more frequent when the speed limit is 80 km/h.

6. Roads crossing small towns (50 km/h speed limit)

Things to remember

- The **average passenger car speed** has been re-evaluated at nearly 5 km/h above the 2019 figure.
- The small town road network has the largest difference between nighttime and daytime speeds: the **daytime** average is 7.2 km/h above the **nighttime** average.
- On average, passenger car speeds are **higher at weekends than during weekdays at daytime, but lower at night.**
- The highest **rate of** nighttime passenger cars **exceeding the speed limit** is on roads through small towns: 3 out of 4 vehicles are above it. This rate is also very high during the day (55%).
- The average **speed of HGVs** is back to the level observed in 2016 and 2017.

Number of vehicles observed in 2020

Passenger cars		Heavy good vehicles	
Daytime	Nighttime	Daytime	Nighttime
249 662	15 622	12 724	1 658

Observations

As a result of the change in methodology in 2020, the average daytime speed of passenger vehicles has been significantly increased from 49.5 to 54.3 km/h (+4.9 km/h). This increase can be attributed in particular to the discretion of the speed measurement device (box on a stand at the roadside) in comparison with the old device, where a vehicle was parked at the roadside.

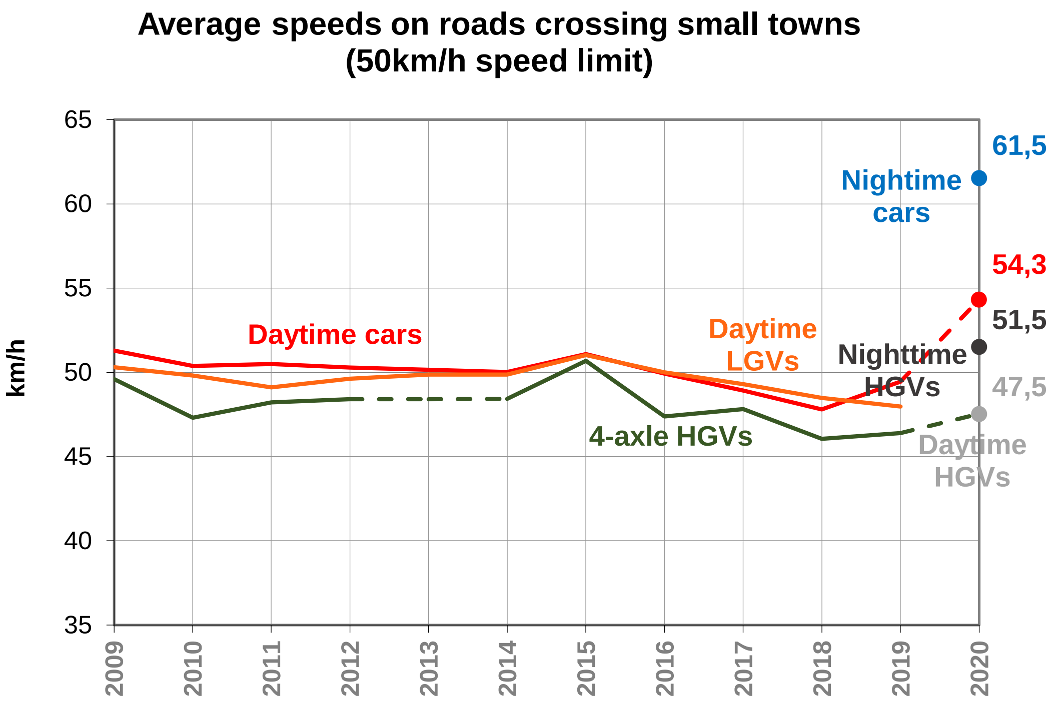
This is the network with the largest difference in average passenger car speeds between day and night (61.5 km/h at night, 7.2 km/h more than during the day).

On average, passenger car speeds are higher at weekends than during the week during the day (55.6 km/h vs. 53.8 km/h), but lower at weekends than during the week at night (60.7 km/h vs. 62.0 km/h).

The rates of nighttime passenger car exceeding the speed limit are very high: 3 out of 4 vehicles exceed the speed limit, and 44% are above 60 km/h. During the day, the rate of exceedance is 55% for passenger cars, including 27% above 60 km/h.

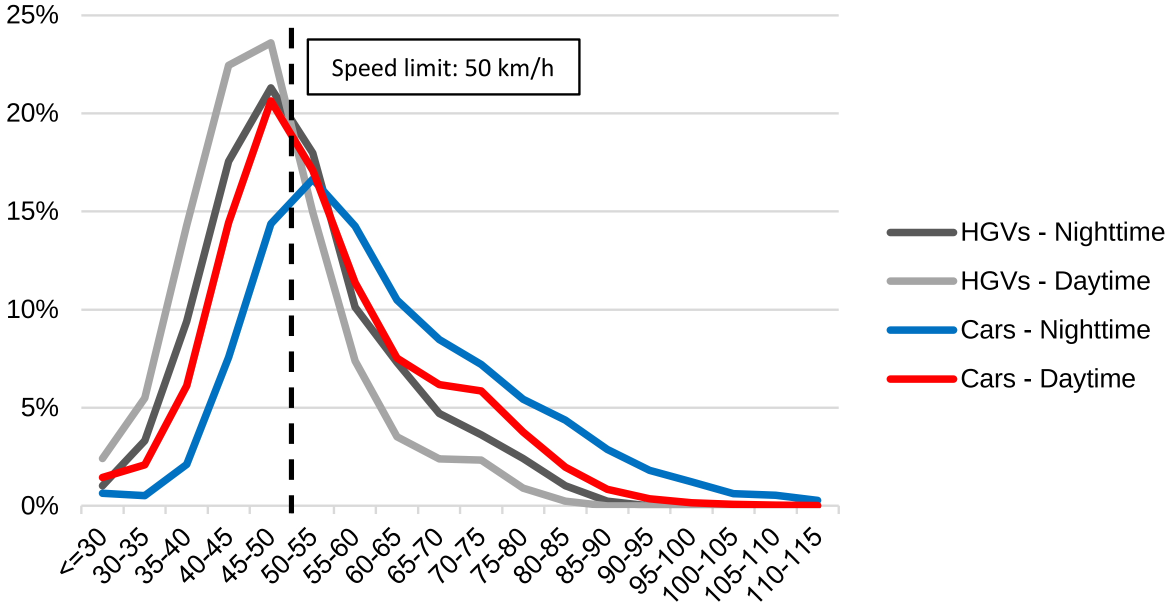
The reassessment of HGV speeds shows an average close to those observed for HGVs with 4 or more axles in 2016 and 2017 (47.5 km/h in 2020). The rates of HGVs exceeding the speed limit are also significant, with nearly one in two vehicles above the speed limit at night (47%) and nearly one in three during the day (32%).

Evolution of average speeds, 2009-2020

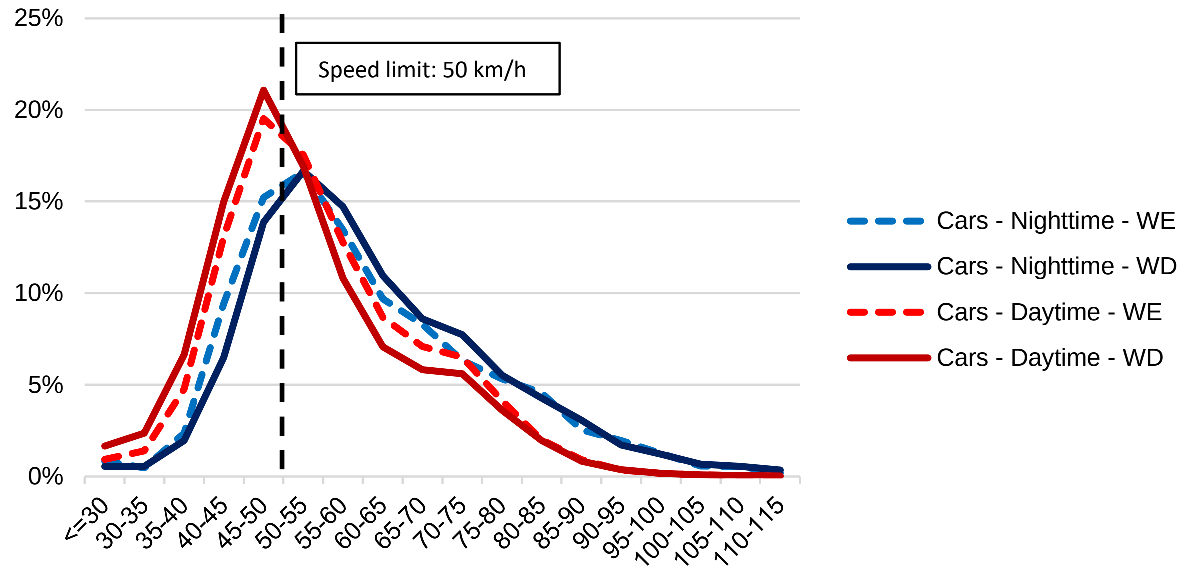


NB : No LGV speed measurements in 2020

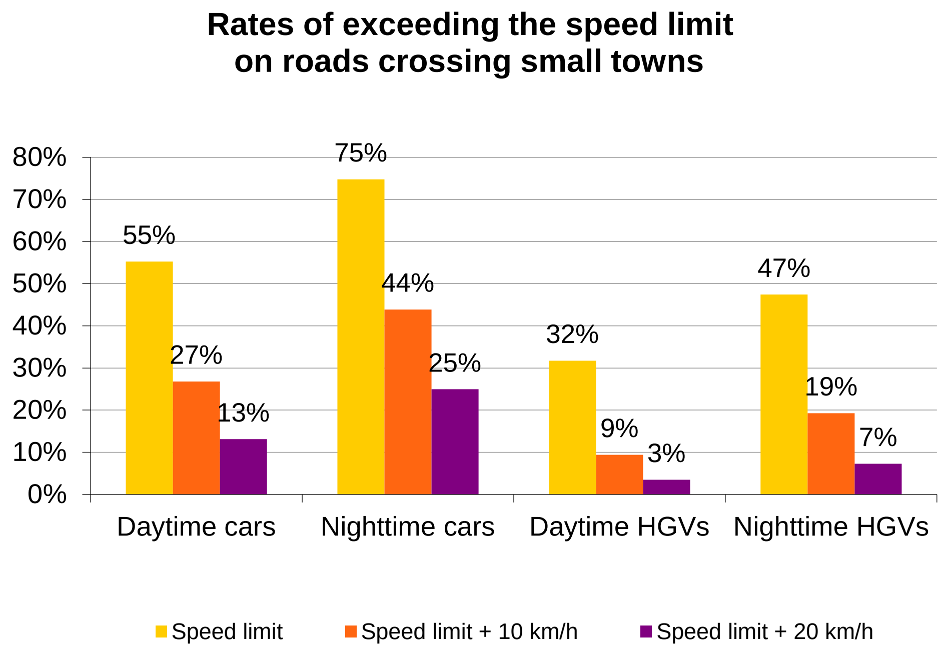
Distribution of passenger car and HGV speeds, 2020



Distribution passenger car speeds, 2020



Rate of exceeding the speed limit in 2020



7. Medium-sized town entrances and exits (50 km/h speed limit)

Things to remember

- The **average passenger car speed** has been re-evaluated at nearly 6 km/h above the 2019 figure.
- On average, passenger car speeds are **higher at weekends than during weekdays at daytime, but lower at night.**
- The highest **rate of exceedance of the speed limit** by HGVs during the day (58%) is on the medium-sized entrance/exits to urban areas. It is also the only network where the rate of daytime HGVs exceeding the speed limit is higher than that of passenger cars (59%).
- The roads at the entrances and exits of medium-sized towns are the only ones for which the average daytime speed is **higher for HGVs** than for cars.

Number of vehicles observed in 2020

Passenger cars		Heavy good vehicles	
Daytime	Nighttime	Daytime	Nuit
173 789	10 483	6 576	526

Observations

As a result of the change in methodology in 2020, the average daytime speed of passenger vehicles has increased significantly from 47.9 to 53.3 km/h (+5.4 km/h). As on roads through small towns, this increase can be attributed to the discretion of the speed measurement device compared to the old device.

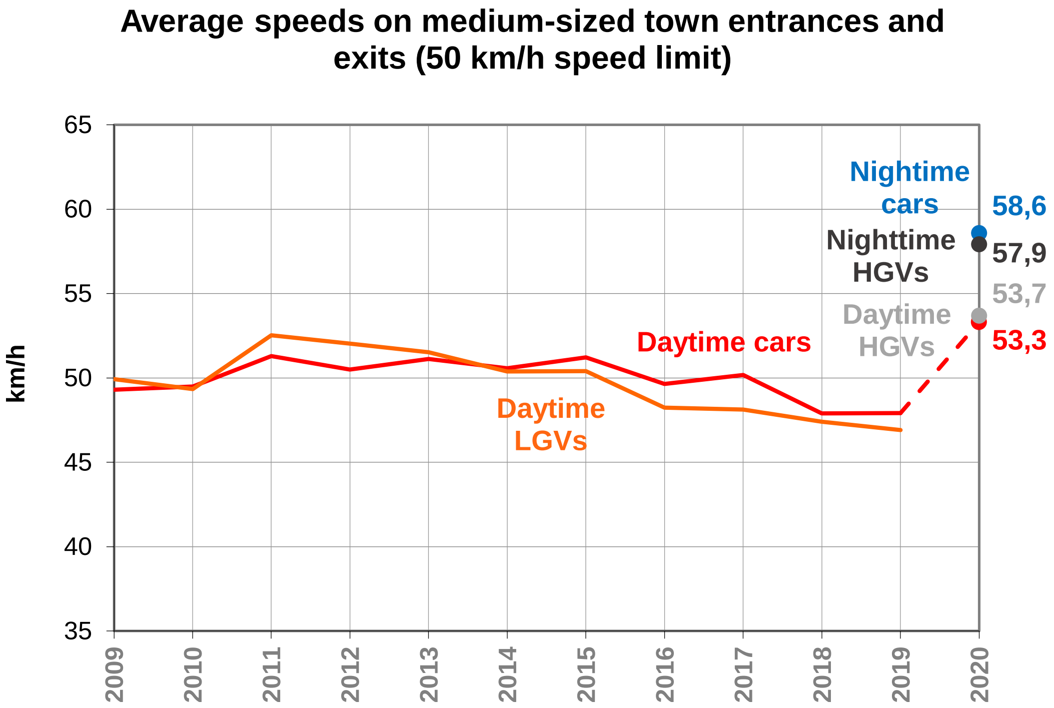
There is a large difference between nighttime passenger car speeds and daytime speeds. The average speed during the day is 5.3 km/h higher than at night (58.6 km/h).

On average, passenger car speeds are higher on weekends than during the day (54.6 km/h vs. 52.9 km/h), but lower on weekends than at night (57.2 km/h vs. 59.4 km/h).

Roads at the entrances and exits of medium-sized towns are the network where the rate of passenger cars exceeding the speed limit during the day is the highest: 58% of passenger cars drive above 50 km/h and 25% above 60 km/h. At night, 71% of passenger cars exceed the speed limit, 39% of which exceed 60 km/h.

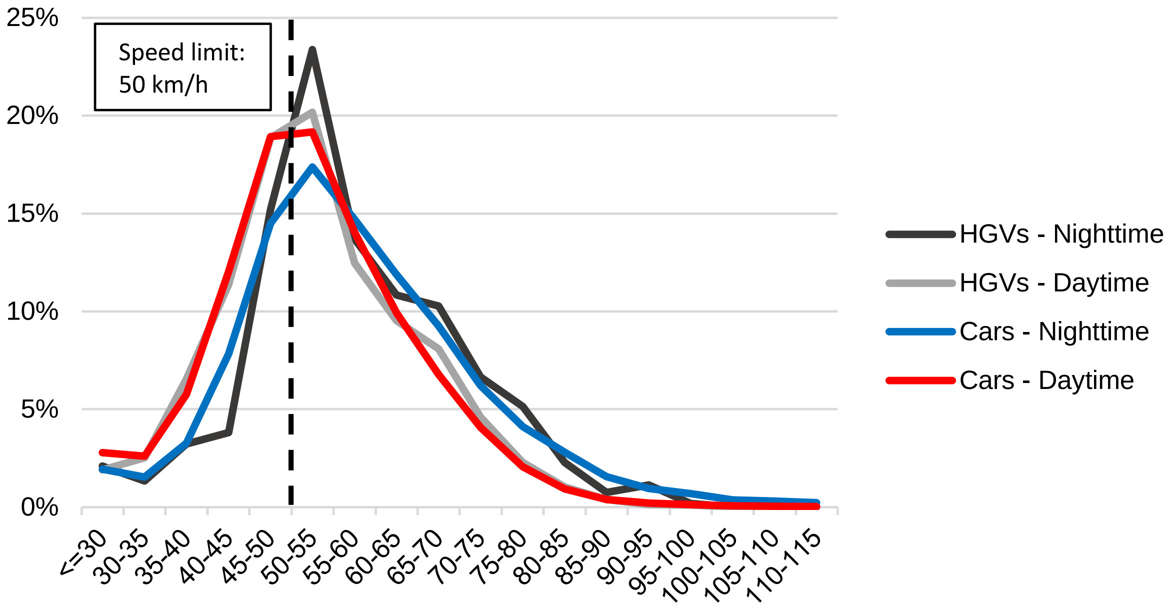
This network is the only one of those observed where the average speed of HGVs during the day is higher than that of passenger cars (53.7 km/h, 0.4 km/h higher than passenger cars). The rate of exceeding the speed limit is also higher (59% vs. 58% during the day, 74% vs. 71% at night).

Evolution of average speeds, 2009-2020

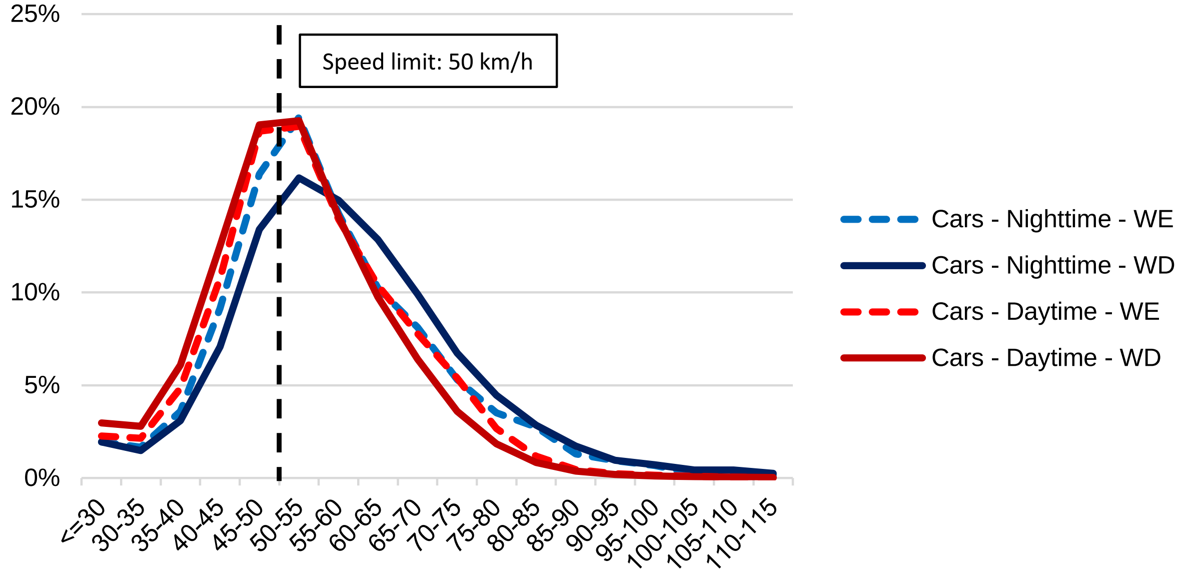


NB : No LGV speed measurements in 2020

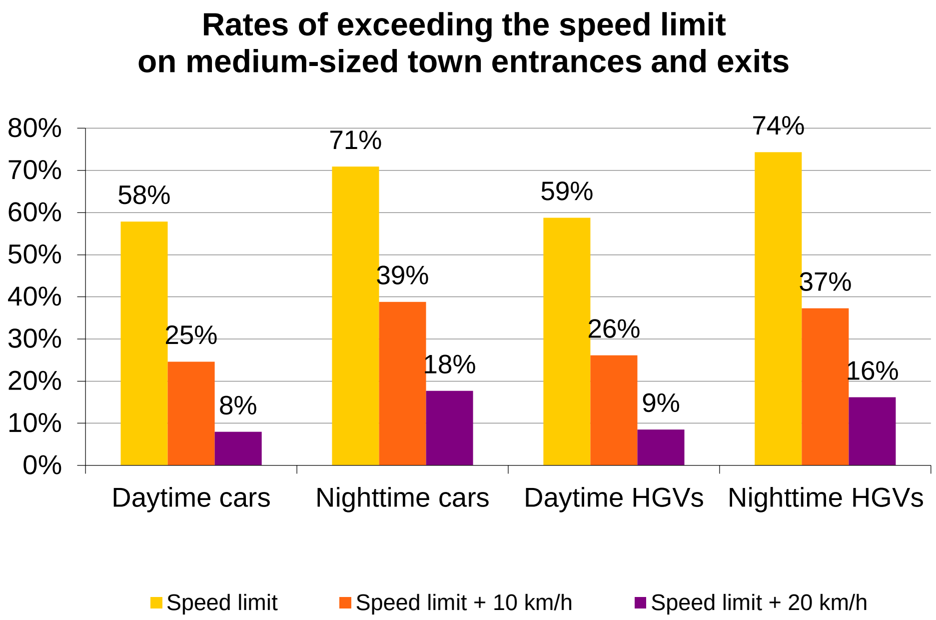
Distribution of passenger car and HGV speeds, 2020



Distribution passenger car speeds, 2020



Rate of exceeding the speed limit in 2020



8. Arterial roads in medium-sized urban centers (50 km/h speed limit)

Things to remember

- The **average speed** of passenger cars is between 10 and 13 km/h below that of other networks in urban areas.
- On average, passenger car speeds are **higher at weekends than during weekdays at daytime, but lower at night.**
- Passenger cars daytime speeds in excess of the speed limit are about three times lower for passenger cars than for other urban roads.
- The average speed of **HGVs** during the day is below 40 km/h.

Number of vehicles observed in 2020

Passenger cars		Heavy good vehicles	
Daytime	Nighttime	Daytime	Nuit
146 031	8 590	2 295	*72*

Observations

Unlike the other networks observed in urban areas, speeds on arterial roads in medium-sized urban areas have not been re-evaluated upwards following the change in methodology. On the contrary, the average speed of passenger cars during the day seems to continue its downward trend: 42.3 km/h in 2020, a decrease of 0.8 km/h compared to 2019 and of 4.4 km/h compared to 2012.

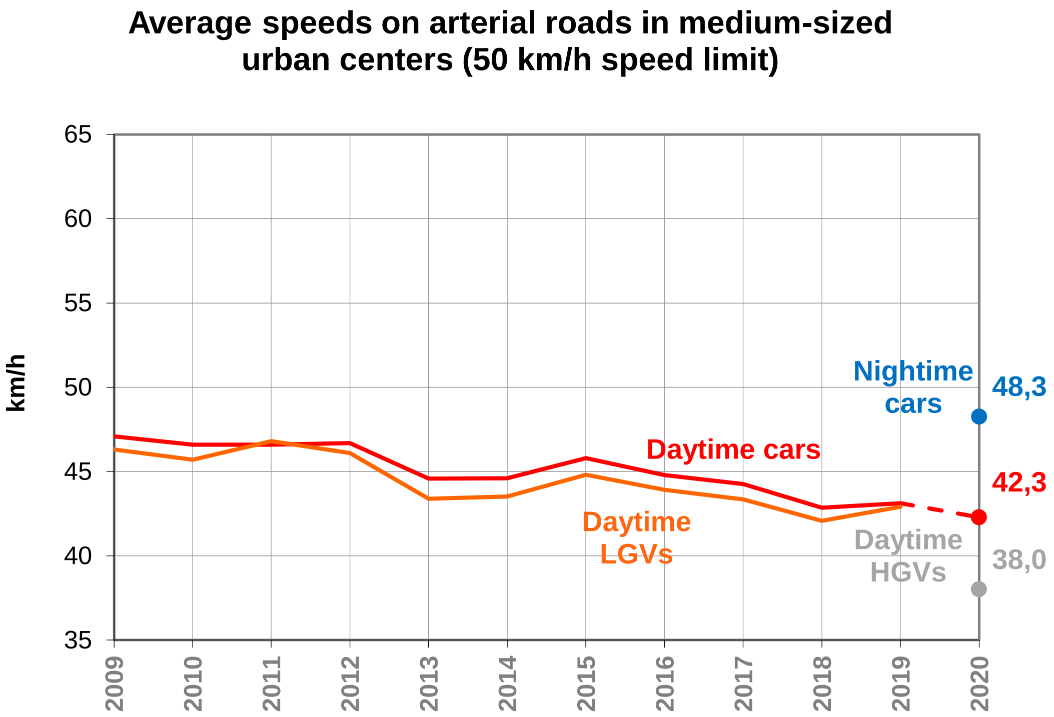
At night, the average speed of passenger cars is 6 km/h higher (48.3 km/h).

passenger car speeds are on average higher on weekends than during the day (43.6 km/h vs. 42.0 km/h), but lower on weekends than at night (47.7 km/h vs. 48.6 km/h).

As with average speeds, passing rates on this network are lower than on other 50 km/h networks: 19% of passenger cars exceed the speed limit during the day, about three times less than on other urban networks. At night, 40% of passenger cars exceed the speed limit.

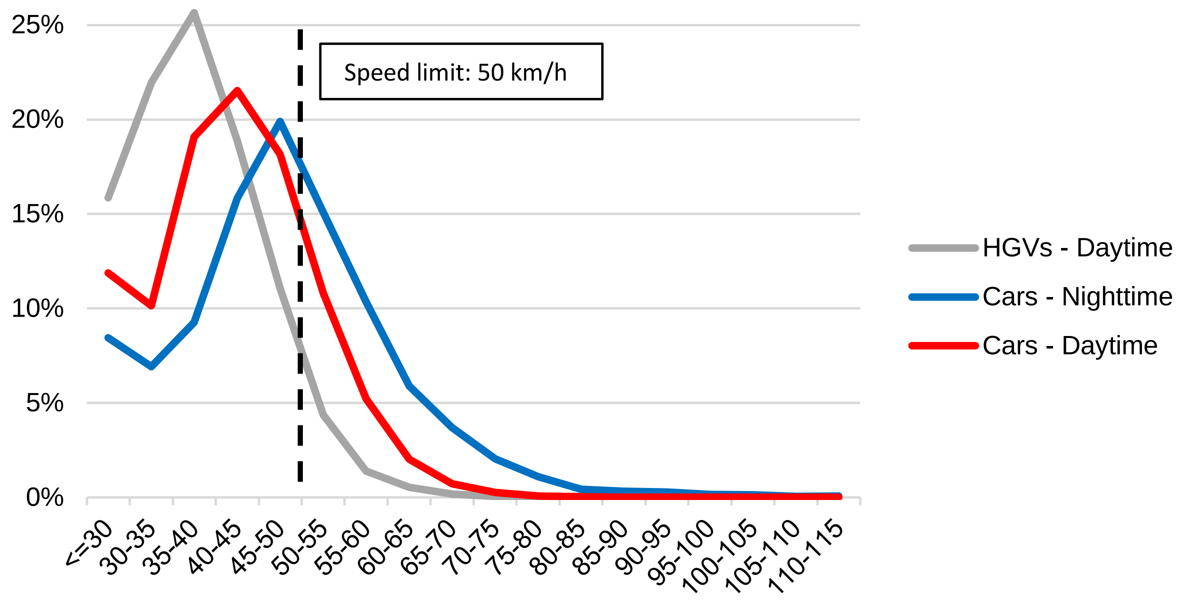
HGV speeds during the day are particularly low: 38.0 km/h on average and 7% exceeding the speed limit. At night, the numbers are too small to be statistically significant.

Evolution of average speeds, 2009-2020

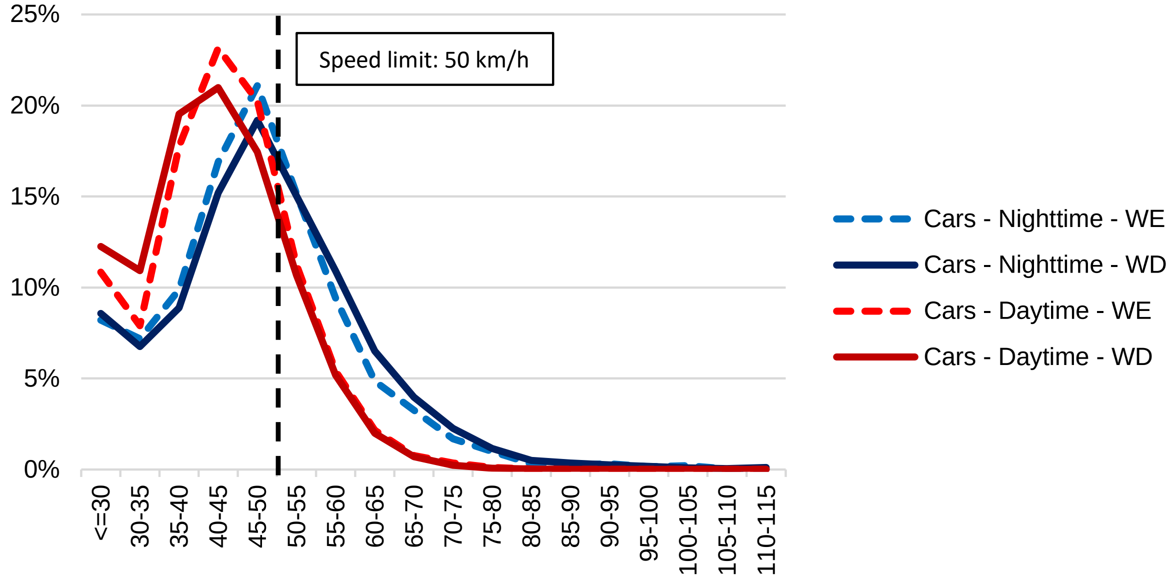


NB : No LGVs speed measurements in 2020

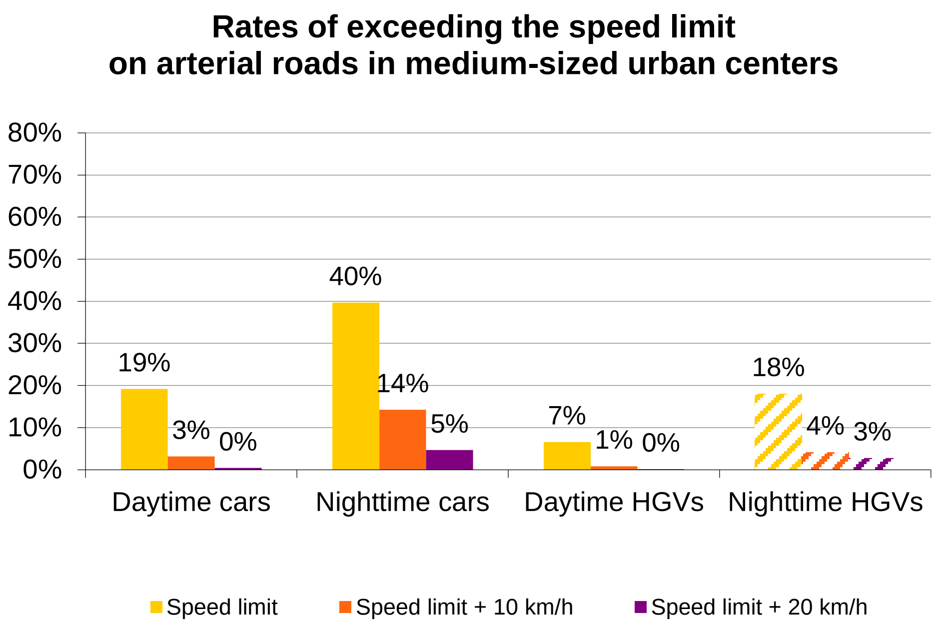
Distribution of passenger car and HGV speeds, 2020



Distribution passenger car speeds, 2020



Rate of exceeding the speed limit in 2020



*Hatched: too small a number to have significant results

Appendix 1: Number of vehicles observed

The following tables show the number of vehicles observed in 2020 by network type and vehicle category. For a given type of network, only the summary results for vehicle categories with a minimum of 200 vehicles are published. The shaded cells in the tables correspond to numbers below this threshold or to categories not observed for the year in question.

Daytime measurements

Types of networks	Passenger cars	HGVs	LGVs	M2Ws
Rural motorways	534 068	67 105	---	---
Urban motorways	284 926	40 638	---	---
Dual carriageways outside urban areas	568 904	76 761	---	---
2 or 3-lane roads outside built-up areas	882 915	66 309	---	---
Roads crossing small towns	249 662	12 724	---	---
Medium-sized town entrances and exits	173 789	6 576	---	---
Arterial roads in medium-sized urban centers	146 031	2 295	---	---

passenger cars : Passenger Cars
LGVs: Light good vehicles (less than 3.5 t)
HGVs : Heavy Good Vehicles
M2Ws : Motorized Two-Wheelers

Nighttime measurements

Types of networks	Passenger cars	HGVs	LGVs	M2Ws
Rural motorways	96 281	33 766	---	---
Urban motorways	106 093	23 803	---	---
Dual carriageways outside urban areas	100 147	24 164	---	---
2 or 3-lane roads outside built-up areas	57 216	9 083	---	---
Roads crossing small towns	15 622	1 658	---	---
Medium-sized town entrances and exits	10 483	526	---	---
Arterial roads in medium-sized urban centers	8 590	72	---	---

NB : No LGV or M2W speed measurements in 2020

Appendix 2: Methodology of the speed observatory

Since the 1980s, the ONISR has had a service provider carry out speed measurements and observations of road user behaviour at a number of observation points on the metropolitan road network.

For technical reasons, this system was interrupted between 2013 and 2015. During this period, speed measurements were carried out by Cerema (Center for studies and expertise on risks, environment, mobility and development) on a sample of points representative of the observatory panel. A new contract was signed in 2016 after a substantial change in the panel of observation points as well as more minor changes in the methodology. Since 2020 the methodology of the observatory has changed as well as the number of measurement points, going from 215 to 135 for a much larger number of people.

This appendix presents successively :

- the methodology currently used for speed measurements,

- the methodology in force between 2016 and 2019,

- the changes made up to 2012,

- the approach implemented over the period 2013-2015.

It then explains the principles used to reconstitute a history of results for the period 2009-2015, expressed according to principles that allow their comparison with the results for the years 2016 to 2019.

a) Current methodology (since 2020)

The panel of measurement points

The panel includes 135 points of automated measurements during the day and night (passenger car and HGV measurements) and 48 points of roadside measurements (P2W and LGV measurements) during the day and weekdays only. The following table details its composition by type of network.

Types of networks	Speed limit (km/h)	Number of points	
		Automated collection (cars, HGVs)	Roadside measurements (P2Ws, LGVs)
Rural motorways	130	24	16
Urban motorways	110	12	8
Dual carriageway outside built-up areas	110	18	4
2 or 3-lane roads outside built-up areas	80*	50	10
Roads crossing small towns	50	12	---
Medium-sized town entrances and exits	50	9	---
Arterial roads in medium-sized urban centers	50	10	10
TOTAL		**135**	**48**

* 90 km/h in departments that have chosen to raise the speed limit on certain roads. The number of vehicles concerned is displayed in part 5.

The measurement points are grouped in about thirty departments spread over the territory of Mainland France.

Requirements for measuring points

The speeds must be representative, i.e. not constrained by a singular element in terms of geometry or speed limit. Thus, the measurement points must be located on straight, flat roads, without traffic disturbance, and at a distance of more than one kilometer from any singular element such as crossroads, traffic lights, modification of the speed limit, etc. In built-up areas, this distance is reduced to a few hundred meters.

The points must also be at least five kilometers away from any automatic radar, outside built-up areas and 300 meters away in built-up areas.

Finally, the points must not be located in a dynamic speed control zone, where the speed limit is likely to vary permanently.

The service provider will check regularly (once or twice a year, depending on the case) that all the measurement points comply with these requirements. Points reported as non-compliant are replaced as soon as possible.

Measurement planning, duration, periodicity

Two measurement campaigns are conducted each year, each covering four months. The observations are spread out so as to be uniformly spread over the four months.

Two types of measurements are carried out according to the type of vehicle: automated collection for cars and HGVs, and measurements taken by investigators at the roadside for P2Ws and LGVs.

- Measurements in automated collection:

The provider deposits the automated collection equipment on a support present at the edge of the lane. The equipment remains at least 7 full days on site, day and night. The measurements taken between 9:30 am and 4:30 pm are retained for the "day" period, the "night" period is from 11 pm to 5 am.

- Roadside measurements:

Measurements are taken on working days, between 9:30 am and 4:30 pm, therefore outside the peak hours. The duration of the measurements is limited to 2 hours on site or 25 P2W and 50 LGVs measured.

Methods of measurement

- Measurements in automated collection:

The measurements are carried out by radar counters installed on supports present by the teams of the service provider in edge of way.

Are counted as passenger cars all the vehicles whose length is higher or equal to 2 meters and strictly lower than 6m. HGVs are vehicles whose length is strictly greater than 9 meters.

The specifications stipulate that the measurements must be carried out without constrained traffic: we are interested in the so-called free speed, i.e. the speed adopted by the driver under free-flowing traffic without interference or constraints. During the analysis and the filtering of the data, all the periods of 30 minutes whose average speeds are regarded as too low compared to the total sample are thus removed.

- Roadside measurements:

The measurements on motorways (rural or urban) are carried out in distance since a bridge overhanging the circulated lanes. Measurements on other roads (including 2x2 lanes) are made on approach by a kinemometer placed at the edge of the road.

Measurements must be postponed if traffic conditions appear modified or disrupted (construction site, congestion, extreme weather conditions, etc.). On the other hand, measurements can be taken during rainfall if it is not unusually intense.

Results, analysis, publication

The results are provided by the service provider separately for each type of network and for each of the following vehicle categories: passenger vehicles, heavy goods vehicles, others for automated data collection, and commercial vehicles and motorized two-wheelers for roadside data collection. In particular, the number of vehicles observed, their average speed and the distribution of speeds in 5 km/h increments are available point by point.

The rates of exceeding the speed limit or a higher speed threshold are calculated directly from the speed distribution and do not take into account a possible lowering of the speed limit in the presence of bad weather.

Results based on less than 200 vehicles are considered insignificant and are not published.

b) Methodology in effect between 2016 and 2019

The panel of measurement points

The panel is composed of 215 measurement points, 79 of which are also subject to night-time measurements. The following table details its composition by type of network.

Types of networks	Maximum authorized speed (km/h)	Number of points	
		Daytime measurements	Nighttime measurements
Rural motorways	130	42	14
Urban motorways	110	24	14
Dual carriageways outside urban areas	110	36	---
2 or 3-lane roads outside built-up areas	80*	50	20
Roads crossing small towns	50	25	12
Medium-sized town entrances and exits	50	15	9
Arterial roads in medium-sized urban centers	50	23	10
TOTAL		**215**	**79**

* 80 km/h as of July 1, 2018, except for passing lanes on 3-lane sections.

The measurement points outside the motorways are grouped in about twenty departments spread over the mainland territory. The points on motorways can be located in about fifteen additional departments.

Requirements for measuring points

The speeds must be representative, i.e. not constrained by a singular element in terms of geometry or speed limit. Thus, the measurement points must be located on straight, flat roads, without traffic disturbance, and at a distance of more than one kilometer from any singular element such as crossroads, traffic lights, modification of the speed limit, etc. In built-up areas, this distance is reduced to a few hundred meters.

The points must also be at least five kilometers away from any automatic radar, outside built-up areas and 300 meters away in built-up areas.

Finally, the points must not be located in a dynamic speed control zone, where the speed limit is likely to vary permanently.

The service provider will check regularly (once or twice a year, depending on the case) that all the measurement points comply with these requirements. Points reported as non-compliant are replaced as soon as possible.

Measurement planning, duration, periodicity

Measurements are made on all types of days (working days and weekends), between 9:30 am and 4:30 pm for daytime measurements and between 10 pm and 3 am for nighttime measurements, thus outside peak hours.

The duration of the measurements is 20 minutes per lane on motorways (rural and urban) as well as dual carriageways outside urban areas, and 30 minutes (simultaneously on all lanes of the observed direction, whatever their number) on the other types of networks.

Two measurement campaigns are carried out each year, each covering four months. The sampling plan requires the investigators to return, according to the defined frequency, to the same measurement point on the same day of the week, and in the same time slot (according to a division into three time slots for the day and two time slots for the night). The observations are distributed in such a way as to spread evenly over the four months, to cover all days and all time slots. The total number of "speed" observations is thus about 95,000 per year.

Methods of measurement

Measurements on freeways (link or alternate) are carried out at a distance from a bridge overhanging the traffic lanes. Measurements on other roads (including dual carriageways) are performed in approach by a kinemometer placed on the edge of the road.

The specifications stipulate that the measurements must be carried out without constrained traffic: we are interested in the so-called free speed, i.e. the speed adopted by the driver under fluid traffic without interference or constraints of circumstances. The measurements must be postponed if the traffic conditions appear modified or disturbed (construction site, congestion, extreme weather conditions, etc.). On the other hand, measurements can be taken in rain if it is not unusually intense.

Results, analysis, publication

The results are provided by the provider separately by type of network and for each of the following vehicle categories: passenger vehicles, light commercial vehicles, heavy goods vehicles (2 axles, 3 axles, 4 axles and more), public transport (buses and coaches), motorized two-wheelers, others. In particular, the number of vehicles observed, their average speed and the distribution of speeds in 5 km/h increments are available point by point.

The rates of exceeding the speed limit or a higher speed limit are calculated directly from the speed distribution and do not take into account a possible lowering of the speed limit in the presence of bad weather.

Results based on less than 200 vehicles are considered insignificant and are not published. This is particularly the case for:

- P2W (for all types of networks),

- 2-axle HGVs on 2- or 3-lane roads and networks in built-up areas,

- 3-axle HGVs on non-motorway networks,

- as well as HGVs with 4 or more axles on networks in built-up areas.

For night speeds, the average speed observed per type of network is compared to the daytime average on the same panel of points, in order to avoid selection bias.

c) Changes made until 2012

The methodology applied until 2012 was very similar to the approach taken between 2016 and 2019. The main change was in the number of measurement points and their selection.

The panel in use until 2008 included 285 measurement points, 80 of which were also subject to night-time measurements. It has been slightly reduced during the 2009-2012 contract due to works on some sites. The following table details the composition of the panel at the end of 2012.

Types de réseaux	Maximum authorized speed (km/h)	Number of points	
		Daytime measurements	Nighttime measurements
Rural motorways	130	42	14
Urban motorways	110	24	10
Dual carriageways outside urban areas	110	25	---
2 or 3 lane national roads	90	49	19
Departmental roads with high traffic volume	90	49	---
National roads inside urban areas < 5000 inhab.	50	49	12
Medium-sized town entrances and exits	50	17	10
Arterial roads in medium-sized urban centers	50	23	10
TOTAL		**278**	**75**

The notions of "national road" and "departmental road" used for the typology of networks corresponded to the situation before the transfer of the road network to the departments in 2006. As this distinction is no longer relevant, the two types of networks "2 or 3 lane national roads " and " Departmental roads with high traffic volume " have been grouped into a single type comprising 50 measurement points. In addition, the number of measurement points has been reduced for roads crossing small towns and increased for dual carriageways outside urban areas.

The 2012 panel of speed measurement points has been completely reconsidered. 42 low traffic points (less than 30 passenger cars observed per shift in 2012) were eliminated. The other points were subjected to an exhaustive review in order to verify their compliance with the requirements aimed at ensuring the representativeness of the observations. 107 points of the 2012 panel were found to be non-compliant, mainly due to a change in the speed limit, the installation of an automatic radar in the vicinity, or a change in the geometry of the road. Replacement points were sought in order to obtain the required number. In the end, the panel of 215 points defined in early 2016 included 133 points in common with the 2012 panel (or 62%) and 82 new points (or 38%).
Other elements of the methodology had only minor changes:
- the requirements applicable to the measurement points have been completed by the absence of dynamic speed control zones, a device under development on motorways and urban expressways; this condition led to the elimination of several points from the previous panel;
- compliance with these requirements is now checked regularly;
- the number of measurement campaigns has been reduced from three to two per year;
- the observations no longer distinguish between registered and unregistered motorcycles, since registration is now compulsory for mopeds;
- the rate of overtaking the speed limit, calculated by the service provider, included the lowering of the speed limit in the presence of bad weather (110 km/h instead of 130, 100 km/h instead of 110, 80 km/h instead of 90); as this practice made it more difficult to interpret the evolution of the rate of overtaking over time, it was considered preferable to abandon it and to base the rate only on the speed limit applicable in bad weather.

-

d) Approach implemented over the period 2013-2015

The methodology followed by Cerema for the 2013-2015 measurements is very close to the previous and current modalities. Only the variations introduced in the approach are presented below.

The sample of measurement points

Un échantillon de 58 points représentatif du panel antérieur a été sélectionné. Il est décrit dans le tableau suivant.

Types de réseaux	Maximum authorized speed (km/h)	Number of points 2012 panel	Number of points Cerema sample	Coverage rate
Rural motorways	130	42	14	33 %
Urban motorways Dual carriageways outside urban areas	110	49	14	29 %
2 or 3 lane national roads Departmental roads with high traffic volume	90	98	14	14 %
National roads inside urban areas < 5000 inhab Medium-sized town entrances and exits Arterial roads in medium-sized urban centers	50	89	16	18 %
TOTAL		**278**	**58**	**21 %**

Measurement planning, duration, periodicity

The measurements took place only during the day, and only on working days. The time slot was identical (9:30-16:30), as well as the duration of the measurements (20 minutes per lane on motorways and 30 minutes per direction on the other types of networks).

Only one measurement campaign was carried out in 2013, in October-November. In 2014 and 2015 three measurement campaigns were carried out respectively in March-April, June and September-October. Measurements were also made in March-April and June 2016, to feed the historical reconstruction process (see below).

The total number of "speed" observations was about 16,600 in 2013, 45,000 in 2014, and 46,600 in 2015. Therefore, caution should be exercised regarding the interpretation of trends observed in 2013.

Methods of measurement

The procedure of the measurements is strictly identical to the current methodology. On the other hand, the measurements were preferably carried out in dry weather, whereas the general methodology only excludes extreme weather conditions. In practice:
- in 2014, out of the 163 measurement sessions performed, only 2 took place in rain and 2 others without rain but with wet pavement ;
- in 2015, out of 169 measurement sessions, none took place under rainy conditions and only one took place with wet pavement.

Results, analysis, publication

The observations were grouped according to less detailed vehicle categories than in the general methodology: light vehicles (including passenger vehicles and light commercial vehicles), heavy vehicles (without distinction of the number of axles) and P2W.

Because of the smaller number of measurement points, the results were published according to a network typology based solely on speed limit (130, 110, 90 and 50 km/h), instead of the 8 types of networks considered previously. Only the results based on a sufficient number of people were published.

e) Reconstruction of a 2009-2015 history

The speeds measured by the observatory **do not claim to be absolutely representative** of traffic on the entire French road network. On the other hand, it is considered that their evolution over time is representative of the general evolution of behaviors, in other words that these observations have a **relative representativeness**, under the condition of a panel of measurement points stable over time.

In fact, in order to meet the objective of absolute representativeness, it is necessary to identify all the characteristics likely to influence the value of each variable observed, and then to define the sample of points and collection periods in such a way that it is representative of the entire network with respect to each of these characteristics.

With respect to speed, there are countless characteristics that can be influenced. These include, but are not limited to
- vehicle category
- the type of network
- the speed limit;
- the possible proximity of an automatic radar;
- the geometry of the infrastructure: longitudinal profile (horizontal road, uphill, downhill, according to the longitudinal slope), plan (curves), cross-section (width of the lanes, existence of a paved shoulder, etc.);
- the nature and condition of the pavement;
- Vehicle flow, and the specific flow of heavy vehicles (which can slow down other vehicles on fast networks);
- weather conditions;
- geographic area (is there "cultural" variability between different regions of the country?)
- the type of day (working day or weekend, the reason for travel may be different);
- the nature of the trip (short or long distance, habitual or not, etc.).

For many of these factors, our knowledge of the road network is not sufficiently detailed: how the road network is divided up by lane width? And even if all of this were known throughout the country, aiming for a representative panel with respect to the variability of all these factors would require a number of collection points that would be out of proportion with the means available.

Thus, the general principle underlying the speed observatory is that its results are only representative of the panel of points and the conditions (days, time slots, etc.) under which the measurements were taken. On the other hand, the stability of the panel, its volume and the stability of the measurement conditions **make it possible to reasonably consider that the variation in speeds observed on the panel of points is representative of the general evolution of behaviors on the scale of the territory**, as long as the measurement points are distributed over the territory, that the observations are distributed between the different types of days and that the results are expressed by type of network and by category of vehicle.

A slight potential bias remains due to weather conditions. For obvious reasons of planning the surveyors' rounds, it is not possible to impose data collection under uniform weather conditions; only extreme conditions can lead to postponing the observations, in other cases the weather conditions are simply recorded for use in evaluating the results. Two options are then possible:
- to calculate the average speeds only on the points of the sample measured in the absence of bad weather; the sites constituting the basis of comparison would then be different from one campaign of measurements to another, which would call into question the stability of the panel; it would be moreover difficult to appreciate the share of this factor in the observed evolutions;
- to keep the calculation of the average speeds on the whole of the observed points, and to take into account the share of the observations under bad weather during the interpretation of the observed evolutions; it is this second option which was retained, considering that the high number of points of measurement and the holding of the surveys at the same periods of the year make it possible to mitigate this disadvantage.

In conclusion, the results of the speed observatory are intrinsically linked to the panel of measuring points that feed it. A substantial modification of the panel, such as that which occurred at the beginning of 2016, requires the previous results to be transcribed and expressed according to principles that allow them to be compared with the results of 2016 and later years. The general principles of this approach are presented below.

General considerations for historical reconstruction

How can we relate observations made on two different panels at different periods? We assume that the difference between these two observations is the sum of two independent differences: the difference linked to the change of panel and the difference linked to the change of period; in other words, we assume that a temporal evolution observed on a given panel would be observed identically on another panel as long as these panels are both considered to be generally representative. This is the hypothesis on which our speed observatory is based.

To reconstruct a history following a change of panel, it is then necessary to dissociate the difference linked to the change of panel from that linked to the change of period, in order to then apply the first as a correction to the temporal evolution of the results obtained from the old panel. Such a dissociation is possible if we have a set of observations where one of these two differences is neutralized:

1) either observations made simultaneously on the two panels: in this case, the difference linked to the change of panel is obtained directly by comparison;

2) or observations made at different periods on the same subset of points, included in both the first and the second panel considered: the difference linked to the change of period observed on this subset being considered independent of the composition of the subset, it also applies to the two panels considered, and the difference linked to the change of panel is obtained by subtraction.

The second approach assumes, however, that the subset is sufficiently large to be considered as generally representative (which is only an approximation, since otherwise it would be useless to use larger panels).

To date, only the average daytime speeds have been reconstructed. The reconstitution of speed distributions, which also allow to estimate the rates of exceeding the speed limit, is more delicate because it depends not only on the average of the observations but also on their dispersion. This question is still under study. As for the night measurements (carried out until 2012), their much smaller statistical base does not allow for a similar approach.

Reconstruction of a history of average speeds 2013-2015

As an extension of its previous measurement campaigns, Cerema conducted in 2016 two measurement campaigns on the same sample of 58 points. We therefore have for the year 2016 a set of simultaneous measurements on the Cerema sample and on the 2016 panel, which allows to apply the first of the two approaches mentioned above.

However, the results of the Cerema measurements, due to their smaller size, are used in a more aggregated way:

- the points are grouped by speed limit (4 groups) and not in 7 types of network,
- vehicles are grouped into three categories: light vehicles (including passenger vehicles and light commercial vehicles), heavy vehicles (including the three categories now in force) and motorized two-wheelers.

The difference between the average speeds observed on the two panels, in other words the effect of the change of panel, is therefore only available for these groupings. Applied to the values measured at the time, it allows us to reconstruct average speeds for each of the years 2013 to 2015 and for each of the groupings of network types and vehicle categories.

In order to reconstruct average speeds based on the more detailed decomposition of networks and vehicles now in use, we adopt an additional assumption about how the average speeds of the detailed categories (e.g., passenger cars and LGVs) distribute around the average speed of their grouping (in this example, LVs). We calculate on the results of the 2016 panel observations the difference between the average speeds of each detailed category and the grouping category, as well as the proportion of vehicles in each detailed category. The same calculation is performed on the 2012 results, giving generally close values, Finally we estimate the value of these deviations and proportions for the years 2013 to 2015 by assuming that these quantities evolve linearly between 2012 and 2016, which allows us to obtain an average speed for each type of network and category of vehicle according to the detailed classification.

For the year 2013, only passenger cars and LGV were reconstituted, because of the too small number of heavy vehicles measured during the single Cerema campaign.

Reconstruction of a history of average speeds 2009-2012

We do not have measurements simultaneously on the 2012 panel and on another panel; the first approach mentioned above is therefore not possible. On the other hand, the existence of 133 common measurement points between the two panels 2012 and 2016 allows to apply the second approach.

The approach adopted therefore consists of calculating the average speed by type of network and category of vehicle in 2016 on the subset of 133 common points, and then for each of the years to be reconstructed. The difference between the average speed of a given year and that of 2016 is considered as representative of the temporal evolution of the "type of network, category of vehicles" segment considered. This evolution is then subtracted from the general 2016 result (obtained on the whole panel) to obtain a reconstituted value of the average speed of the year in question.

This approach requires the use of detailed results (by measurement point) of the observations, which are only available from the year 2009 onwards; this is why the reconstitution has only covered the period 2009-2012. In any case, it is to be feared that the relevance of the hypotheses underlying the reconstruction approach will diminish as we go back in time.

Appendix 3: Speed limit for heavy good vehicles

Article R413-8 of the Highway Code:

The speed of vehicles with a total authorized weight in charge of more than 3.5 tons or sets of vehicles with a total authorized rolling weight of more than 3.5 tons, except for public transport vehicles, is limited to:

1° 90 km/h on motorways ;

2° 80 km/h on roads with priority status and marked as such. However, this maximum speed is raised to 90 km/h for vehicles whose total weight is less than or equal to 12 tons on dual carriageways separated by a central reservation;

3° 80 km/h on other roads. However, this maximum speed is lowered to 60 km/h for articulated vehicles or vehicles with trailers whose total weight is greater than 12 tons.

4° 50 km/h in built-up areas. However, this maximum speed is raised to 70 km/h on the Paris ring road.

NB: Article R413-9 sets lower maximum speeds for vehicles transporting hazardous materials.