The BASELINE project:
Harmonized measurement of road safety Key Perfomance Indicators

ETSC webinar "the role of speed in the safe system"

May 23th, 2023

Peter Silverans, Vias institute

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Introduction
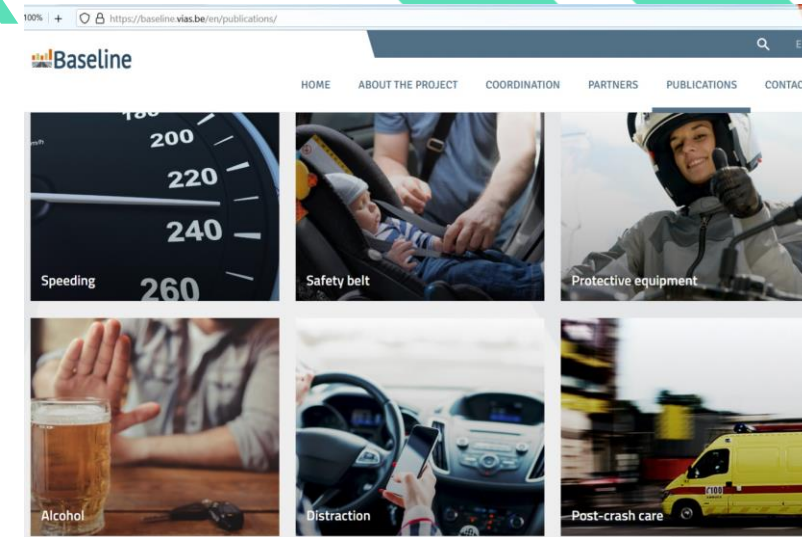
▶ **EU Road Safety Policy Framework 2021-2030 - Next steps towards "Vision Zero":** highlighs the need of measuring road safety KPIs at European level

▶ 8 KPIs directly related to the prevention of road accident fatalities and serious injuries

KPI area	KPI definition (European Commission 2019)
Speed	Percentage of vehicles travelling within the speed limit
Safety belt	Percentage of vehicle occupants using the safety belt or child restraint system correctly
Protective equipment	Percentage of riders of PTWs and bicycles wearing a protective helmet
Alcohol	Percentage of drivers driving within the legal limit for blood alcohol content (BAC)
Distraction	Percentage of drivers not using a handheld mobile device
Vehicle Safety	Percentage of passenger cars with a Euro NCAP safety rating equal or above a threshold
Infrastructure	Percentage of distance driven over roads with a rating above an agreed threshold
Post-crash care	Time elapsed between the emergency call following a collision resulting in personal injury and the arrival at the scene of the collision of the emergency services

European Commission

EU ROAD SAFETY POLICY FRAMEWORK 2021-2030
Next steps towards 'Vision Zero'

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# Common methodological framework

- Key definitions and operational specifications: SWD 283

- Differentiation between "behavioural KPI" and "technical" KPIs (vehicle, infrastructure, post-crash):
  - Behavioural => sampling, direction observation or measurement
  - Non-behavioural => complete databases, exploitation of existing databases

- Detailed methodological guidelines for each KPI:
  - Key concept: percentage respecting rules => refers to total of kilometers driven
  - Key aspects: sampling methods and size, measurement tools, definitions
  - Minimal vs recommended requirements
  - Balancing exercise: feasibility / reliability-exploitability

- Quality assurance procedures:
  - Considerations for sampling weights
  - Common database format (including confidence intervals and meta-data)
  - Quality control procedures

- Data collection: Jan 2020 -> Oct 2022

- Publication: March 2023

BASELINE - Speed

Minimum Level (required)

Time period	Road Type	Vehicle Type	Nr of Locations	N	Traffic Counts	Weight proportion	Average Speed	SE1	CI (95%) - lower bound1
weekday/daytime	motorways	passenger cars							
weekday/daytime	rural roads	passenger cars							
weekday/daytime	urban roads	passenger cars							
weekday/daytime	(All roads)	**passenger cars-Total**							

Minimum level (recommended options)

Time period	Road Type	Vehicle Type	Nr of Locations	N	Traffic Counts	Weight proportion	Average Speed	SE1	CI (95%) - lower bound1
weekday/daytime	motorways	passenger cars							
weekday/daytime	motorways	vans, small trucks							
weekday/daytime	motorways	trucks/ buses/ heavy goods vehicles							
weekday/daytime	motorways	motorcycles							
weekday/daytime	**motorways-Total**	(All vehicles)							
weekday/daytime	rural roads	passenger cars							
weekday/daytime	rural roads	vans, small trucks							
weekday/daytime	rural roads	trucks/ buses/ heavy goods vehicles							
weekday/daytime	rural roads	motorcycles							
weekday/daytime	**rural roads-Total**	(All vehicles)							
weekday/daytime	urban roads	passenger cars							
weekday/daytime	urban roads	vans, small trucks							

Reports and publications

▸ **https://baseline.vias.be/en/publications/kpi-reports/**
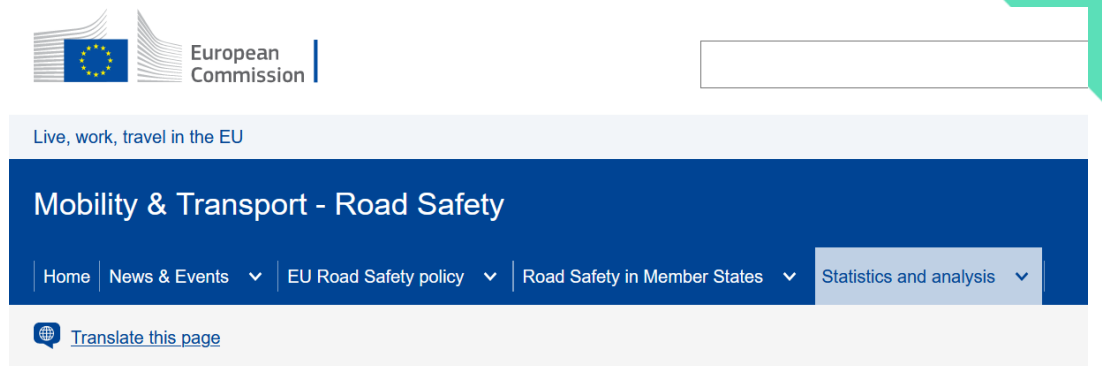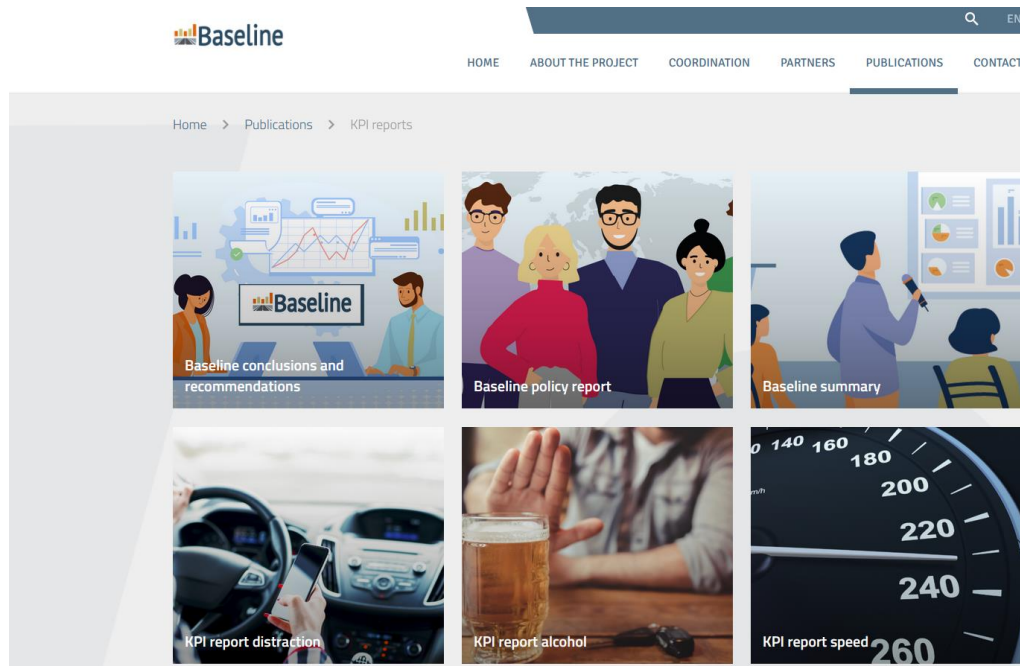
https://road-safety.transport.ec.europa.eu/statistics-and-analysis/data-and-analysis/key-performance-indicators-kpis_en

SWD 283 definitions for KPI speed
Free flow speed

Methodological aspects

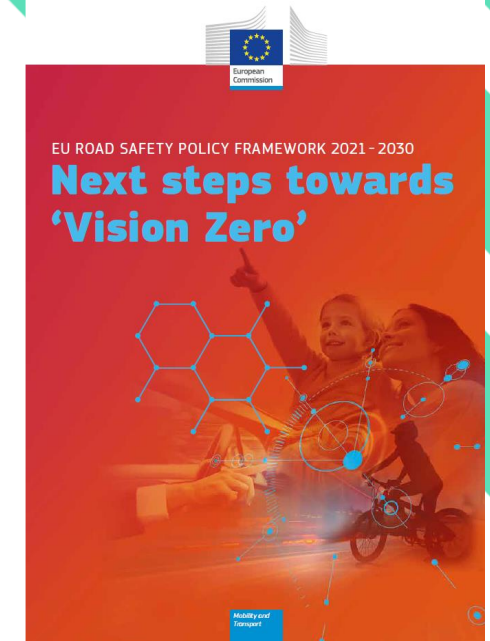| Aspect	Minimum methodological requirements
Road type coverage	The indicator should cover motorways, rural non-motorway roads and urban roads. The results should be presented separately for the three different road types.
Vehicle type	The indicator should include at least passenger vehicles (cars). Buses and goods vehicles (light [less than 3.5t] and heavy [more than 3.5t]) and powered two-wheelers are optional in a first phase (results should be presented separately for each vehicle type if possible).
Location	Member States to decide on the locations of the measurements, but measurements should not take place near safety cameras whether fixed or mobile. The choice of locations should be based on random sampling if this is possible, and in any case done with the objective of ensuring a representative sample.
Time of day	All Member States should elaborate the indicator for day hours in free flow traffic; the night indicator should be optional due to its higher cost. The results should be shown separately for day and night.
Day of the week	Measurements to be carried out on Tuesdays, Wednesdays or Thursdays. Weekend measurements also possible but optional, and again should be shown separately if carried out.
Month	Measurements to be carried out preferably in late spring and/or early autumn.
Weather	Measurements should not be taken in bad weather conditions (e.g. heavy rain, snow, ice, strong winds or fog). Member States will define the exclusion criteria and report them together with the data.
Tolerance	No tolerance (beyond the error margin of the measuring device), i.e. the values recorded should be those measured by the instrument.

EU ROAD SAFETY POLICY FRAMEWORK 2021-2030
Next steps towards 'Vision Zero'

Deliverable D3.6:

Road Safety Performance Indicators Theory

Please refer to this report as follows:

Hakkert, A.S, Gitelman, V. and Vis, M.A. (Eds.) (2007) *Road Safety Performance Indicators: Theory.* Deliverable D3.6 of the EU FP6 project SafetyNet.

Methodology – methodological guidelines

Table 2. Minimum requirements and optional additions for the KPI Speeding

	Minimum requirement	Optional additions
KPI definition	• Percentage of vehicles within speed limit	• Average speed (+ Standard Deviation and Standard Error/Confidence Interval) • V85
Method	• Should allow for the observation of momentaneous speed in free flowing traffic[4]	
Conditions	• Free-flow traffic • Good weather conditions • In spring or autumn	• Non free flow traffic • Bad weather conditions • In summer or winter
Sample size	• Min 2000 observations • Min 500 observations / road type • Min 10 locations / road type • The proportion of observations at each of the three road types should be at least 20%	*If optional vehicles are included, the minimum sample requirements are per vehicle type in order to be considered in the national KPI tables*
Locations	• Random selection • Representative of entire national road network • Measurements should not take place near speed cameras, either fixed or mobile • A minimum traffic flow of at least 10 vehicles passing per hour is required	• Stratification by Regions
Vehicle types	• Passenger cars	• Motorcycles • Vans and light trucks • Heavy trucks • Buses
Road types	• Motorways • Rural roads (defined as roads outside built-up areas, but no motorways) • Urban roads (defined as roads inside built-up areas)	• Differentiate between single and dual lane roads for rural and urban roads • Differentiate between speed limits within rural and urban roads
Time periods	• Weekdays • Daylight hours	• Weekend • Night-time hours

▶ Minor methodological differences (e.g. location selection):
all MS considered comparable

▶ Each MS observed passenger cars, 6 MS also other vehicles

▶ All indicators provided by most MS:
- percentage driving within speed limit (all MS)
- average speed (all MS)
- 85th percentile of speed (9 MS)

▶ Differences in speed limits between MS make comparing complex
   ▶ Same type of road with lower speed limit => lower compliance

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Key results

- *Van den Broek B., Aarts, L. & Silverans, P. (2023). Baseline report on the KPI Speeding.* Baseline project, Brussels: Vias institute

- **https://baseline.vias.be/storage/minisites/baseline-kpi-speeding.pdf**

- **https://road-safety.transport.ec.europa.eu/system/files/2023-03/Baseline_KPI_Speeding.pdf**

Baseline report on the KPI Speeding
January 2023

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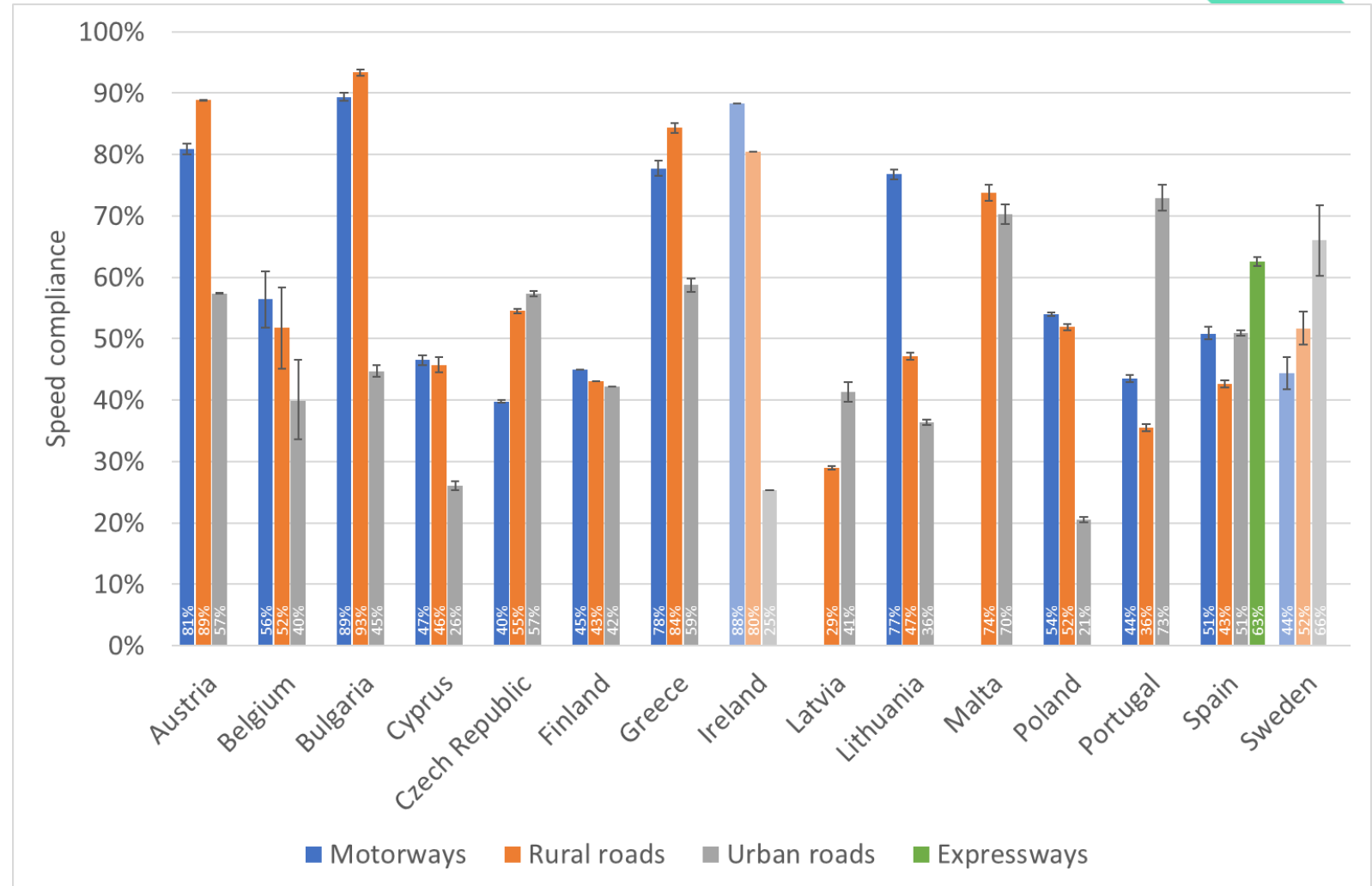Baseline.vias.be

# Free flow speed of passenger cars Percent compliance, measured

- ▶ **KPI: percentage of free flow traffic respecting speed limits**
  - ▶ Huge variability

- ▶ **Main points of attention:**
  - ▶ Impact of variance in speed setting
  - ▶ Very high percentage of non-compliance

- ▶ **ERSO:**
  - ▶ Direct cause of 30% of all fatalities
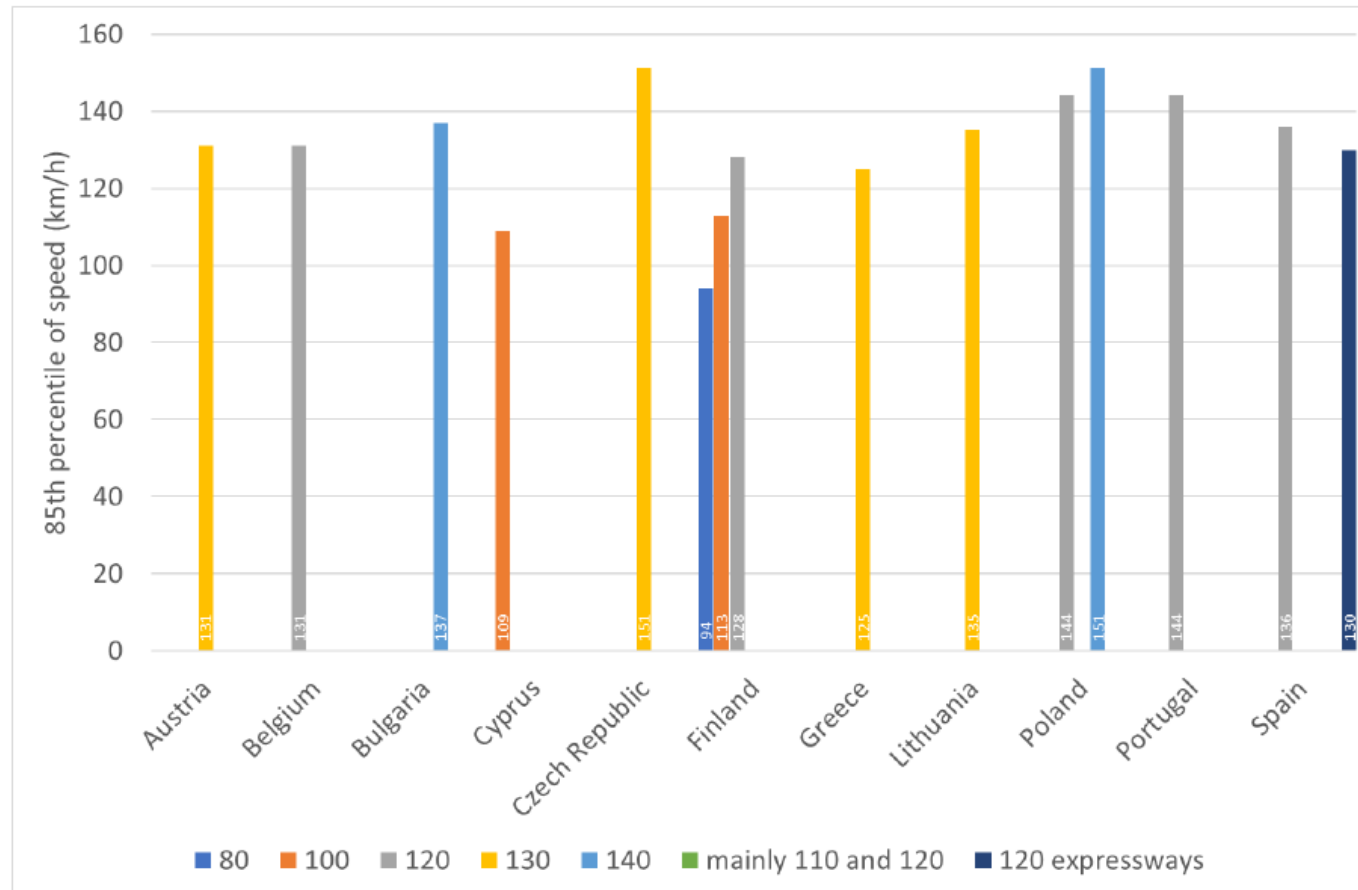 - ▶ => huge potential for accident reduction

Average speed per speed limit

Figure 7. Average speed for passenger cars on 80, 100, 120, 130, 140 and mainly 110 and 120 km/h motorways during weekday/daytime
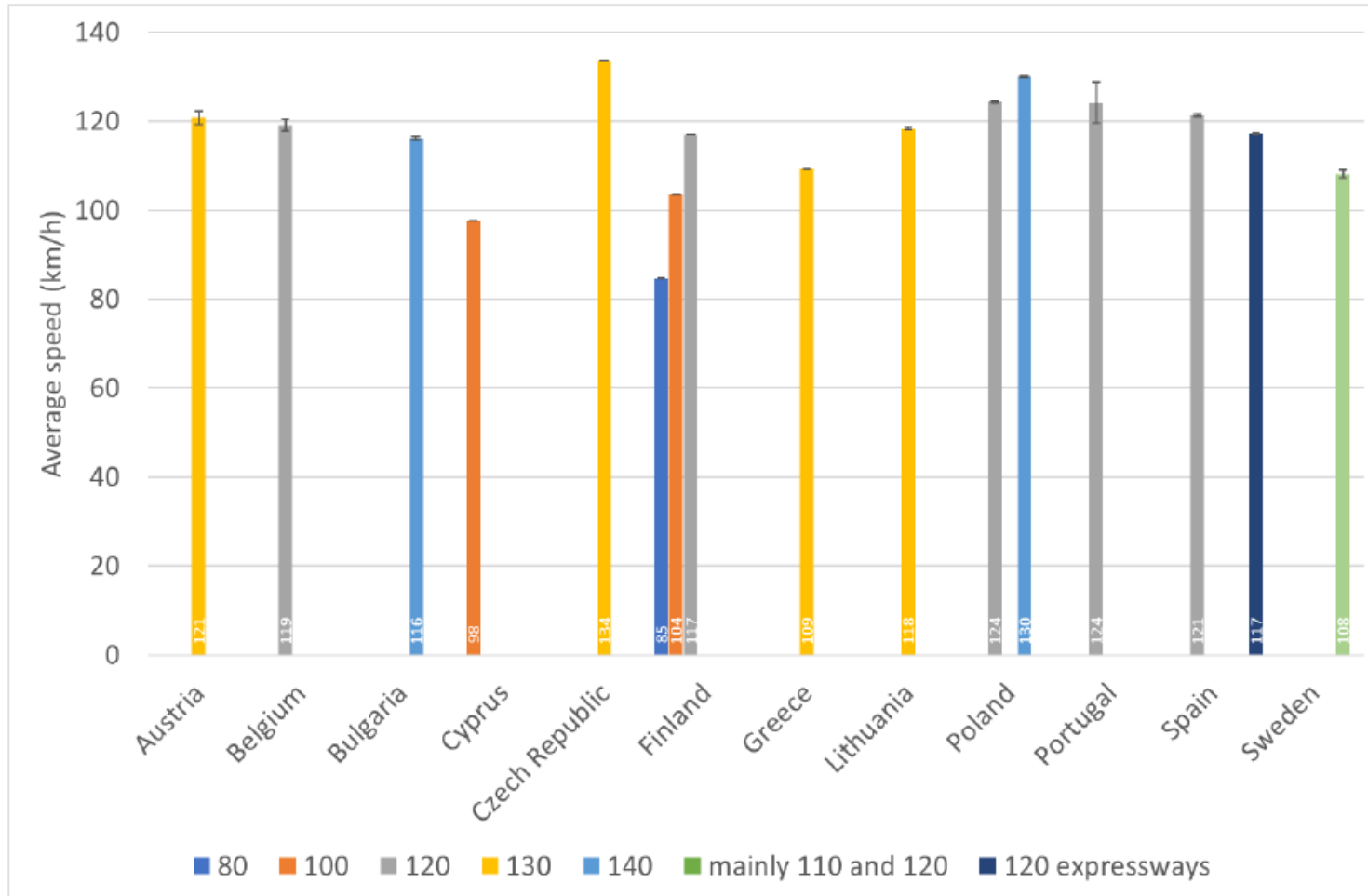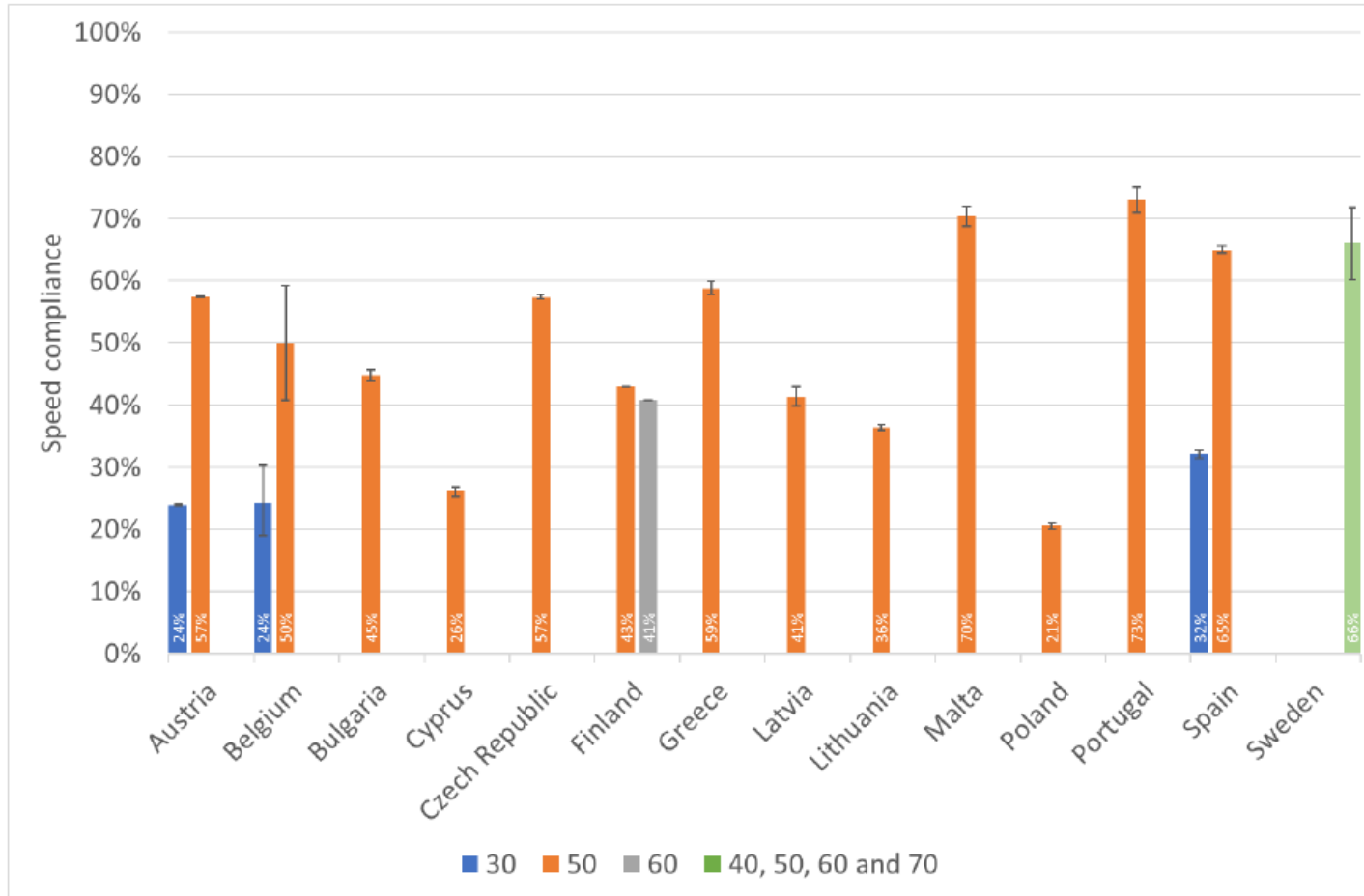
V85 per speed limit

Figure 8. 85th percentile of speed for passenger cars on 80, 100, 120, 130, 140 and mainly 110 and 120 km/h motorways during weekday/daytime

Compliance on low speed limit roads

Figure 18. Percentage driving within speed limit for passenger cars on 30, 50, 60 and 40, 50, 60 and 70 km/h urban roads during weekday/daytime

Detailed analyses reported also

▸ **Motorcycles (7 countries)**

▸ **Vans and small trucks (8 countries)**

▸ **Trucks, buses and heavy goods vehicles (9 countries)**

▸ **Breakdowns by night/day week/weekend (5 countries)**

▸ **...**

Conclusion and recommendations

- **Baseline KPI results:**
  - Benchmarking:
    - Strong international variations in KPI performance
    - Depending on KPI huge to very huge potential for improvement
    - Contextual explaining factors yet to take into account
  - Target setting:
    - Foundations laid for defining objectives
    - Targets yet to be set (take Km driven in infraction into account)
  - Monitoring:
    - Cf. national practices in several countries
    - At EU level: "Trendline" measurements planned for 2023-2024

- **Adaptation of methodological guidelines:**
  - KPI definitions and specifications to be developed more in detail
  - Severity of infractions (cf. degree of risk) to be integrated in all KPIs
  - Methodological improvements recommended: direct or indirect observations, sampling locations, sample size, minimum requirements for weighting and confidence interval calculation

- **Future perspectives:**
  - Baseline for monitoring future trends: Trendline
  - Cf. https://trendlineproject.eu/