The importance of the GSR for the future of vehicle safety
Casualty impact and cost-effectiveness evaluation

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Casualty impact and cost-effectiveness evaluation for the Commission proposal on General Vehicle Safety

Objective:
To calculate concrete **cost-effectiveness indicators and numbers of road casualties that could be prevented at an EU-28 level** for sets of safety measures proposed by the European Commission and considered for **mandatory implementation in new vehicles**.
Study scope
The specific scope of the study was defined as

- **Geographic scope**: EU-28
- **Vehicle categories covered**: M1, M2&M3, N1, N2&N3
- **Evaluation period**: 2021–2037
- **Baseline scenario**: No further policy intervention in the transport sector, but voluntary improvements and effects of already implemented policies continue: Continued dispersion of mandatory vehicle safety measures into the legacy fleet and **continued voluntary uptake of the safety measures under consideration**.
- **Action scenario**: 17 safety technologies made mandatory according to Commission proposal.
# Assessed proposal on General Vehicle Safety

<table>
<thead>
<tr>
<th>Measure</th>
<th>Cars (M1)</th>
<th>Buses (M2&amp;M3)</th>
<th>Vans (N1)</th>
<th>Trucks (N2&amp;N3)</th>
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<td>VIS-DIV</td>
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**Introduction dates assumed for cost-effectiveness analysis (evaluation period: 2021–2037)**

- B = 01/09/2021 new approved types, 1/09/2023 new vehicles
- C = 01/09/2023 new approved types, 1/09/2025 new vehicles
- D = 01/09/2025 new approved types, no mandatory introduction for new vehicles

*Actual introduction dates might deviate (see Commission Proposal).*
Benefits considered: Monetary values of casualties prevented (fatal, serious, slight) by safety measures

Costs considered: Cost to vehicle manufacturers (OEMs) of fitment of safety measures to new vehicles

Treatment of uncertainty: Interval analysis and scenario analysis

Results: Benefit-to-cost ratios (BCRs) and numbers of casualties prevented. All results are in comparison to the baseline scenario.
Method
European fleet and new registrations:

Uptake of safety measures into the fleet:

Voluntary scenario:

Mandatory scenario:

Percentage of all cars within the vehicle fleet equipped with pedestrian-capable AEB in baseline (voluntary uptake) and mandatory implementation scenario modelled.
Benefits

**Benefit simulation**
- Accident analysis
  - Stats19 and CARE
- Target populations for safety measures
- Measure effectiveness
- Casualties prevented by measure
- Monetary casualty unit values
- Monetary benefit EU-28 per annum

**Vehicle fleet calculation**
- Fleet dispersion model of safety measures for baseline and action
- Proportion of new vehicles and fleet equipped
- Remove casualties prevented from other target populations

**European road casualty baseline:**

- Historic numbers
- Policy target
- Fatal casualty baseline
Avoidance of double-counting of casualties prevented

**Clustering Levels – Example for Cars**

- **Driver Assistance**
  - DDR, ISA, ALC, TPM, SBR
  - Remaining target population for active safety

- **Active Safety**
  - AEB, LKA, ESS, PCD
  - Proportion of casualties prevented by reducing speed, distraction, better tyre maintenance and increasing belt wearing

- **Passive Safety**
  - **Front**
    - FFW
  - **Side**
    - PSI
  - **Rear**
    - Proportion of casualties prevented in front-to-rear shunts, run-off-road, side swipe...
  - **VRU**
    - HED
    - Proportion of casualties prevented in front, side, rear and pedestrian/cyclist collisions

- **ESC**
  - Remaining target population for front collisions

- **Target populations X Measure effectiveness**

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Overall model

Vehicle fleet calculation
- Fleet dispersion model of safety measures for baseline and action
  - Proportion of new vehicles and fleet equipped

Cost calculation
- Cost estimates for safety measures per vehicle
  - Cost of fitment EU-28 per annum

Economic calculation
- Inflation and discounting
  - Net present value of benefits and costs
    - Subtract baseline scenario benefits and costs
      - Calculate benefit-to-cost ratios compared to baseline
        - BCR

Benefit simulation
- Accident analysis
  - Stats19 and CARE
    - Target populations for safety measures

Measure effectiveness
- Casualties prevented by measure
  - Monetary casualty unit values
    - Monetary benefit EU-28 per annum

Remove casualties prevented from target population for subsequent safety measures

Target populations for safety measures

Measure effectiveness

Casualties prevented by measure

Monetary casualty unit values

Monetary benefit EU-28 per annum
Monetisation of casualties prevented & safety measure costs

### Benefit valuation:

<table>
<thead>
<tr>
<th>Casualty severity</th>
<th>Social unit value</th>
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<tbody>
<tr>
<td>Fatality prevented</td>
<td>€1,870,000</td>
</tr>
<tr>
<td>Serious casualty prevented</td>
<td>€243,100</td>
</tr>
<tr>
<td>Slight casualty prevented</td>
<td>€18,700</td>
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</tbody>
</table>

### Cost valuation:

<table>
<thead>
<tr>
<th>Initial OEM cost per vehicle for full set of measures</th>
<th></th>
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<tbody>
<tr>
<td>Cars (M1)</td>
<td>€516</td>
</tr>
<tr>
<td>Buses (M2&amp;M3)</td>
<td>€970</td>
</tr>
<tr>
<td>Vans (N1)</td>
<td>€521</td>
</tr>
<tr>
<td>Trucks (N2&amp;N3)</td>
<td>€1,013</td>
</tr>
</tbody>
</table>
Simulation and Calculation Model

Note that the model takes into account:

- **The interactions of all measures when implemented together** (to avoid double-counting of casualties prevented by different measures)
- **The voluntary uptake of the proposed measures** expected to happen without policy intervention (baseline scenario)
- **The effects of already existing mandatory measures**, which are still dispersing into the fleet (AEBS and LDWS for trucks and buses, ESC for all categories)
Key results
Key Results

Cost-effectiveness
Benefit-to-cost ratios (BCR) of the Commission Proposal

Years: 2021–2037
EU-28
Compared to the baseline scenario

Values greater 1 indicate that the benefits are greater than the costs
# Key Results

**Number of casualties prevented** by safety measures split by vehicle categories over the evaluation period 2021–2037 across EU-28 compared to the baseline scenario

<table>
<thead>
<tr>
<th></th>
<th>Cars</th>
<th>Buses</th>
<th>Vans</th>
<th>Trucks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fatalities prevented</strong></td>
<td>21,337</td>
<td>227</td>
<td>1,283</td>
<td>1,947</td>
</tr>
<tr>
<td><strong>Serious casualties prevented</strong></td>
<td>126,390</td>
<td>2,410</td>
<td>6,917</td>
<td>5,023</td>
</tr>
<tr>
<td><strong>Slight casualties prevented</strong></td>
<td>470,747</td>
<td>8,174</td>
<td>23,486</td>
<td>13,274</td>
</tr>
</tbody>
</table>
Key Results

Casualties prevented
Total sum; years 2021–2037; EU-28; compared to the baseline scenario

<table>
<thead>
<tr>
<th>Category</th>
<th>All categories</th>
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<tbody>
<tr>
<td>Fatalities prevented</td>
<td>24,794</td>
</tr>
<tr>
<td>Serious casualties prevented</td>
<td>140,740</td>
</tr>
<tr>
<td>Slight casualties prevented</td>
<td>515,681</td>
</tr>
</tbody>
</table>

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Conclusions
Conclusions

- **The Commission proposal on General Vehicle Safety:**
  - An ambitious option to reduce the number of deaths and injuries on EU roads – Savings of almost 25,000 fatalities and 140,000 serious casualties over a 16-year period.
  - Cost-effective – Benefits to society exceed the costs with a BCR of 1.27.
  - Substantial increase in consumer vehicle prices *not* expected in the medium and long term.
  - Technologically advanced – helping the EU Industry to remain competitive with regard to the challenges of developing automated vehicles, because it includes measures such as **Advanced Driver Distraction Recognition, Intelligent Speed Assistance** and **Vulnerable Road User Detection**.
Thank you