NATIONAL ROAD SAFETY STRATEGY: RESEARCH AND MODELLING

Modelling the strategy's ambitions

Strategy initiatives and their likely benefits were estimated through data modelling carried out by the Monash University Accident Research Centre (MUARC). This work was informed by Australian and overseas research on the effectiveness of specific road safety interventions. The base crash data used in the model was provided by each state and territory road authority.

Modelling approach

The data modelling was undertaken using MUARC's Macro Estimates for Target Setting (METS) model, which has previously been used in the development of the Victorian and Western Australian road safety strategies.

METS is a macro model: only the most effective initiatives (expected to have a sizeable impact) addressing the high priority problems (in terms of serious casualty numbers) are modelled. There are a number of important initiatives, for example those relating to capacity building or implementation, which are not modelled.

The model is set up so that adjustments can be made to a number of key input parameters, including:

- Policy countermeasures: individual initiatives and cornerstones may be switched on and off
- Policy aggression: eg. investment level, timing of introduction
- Effectiveness of countermeasure
- Proportion of the serious casualty population to which the countermeasure is applied.

For the National Road Safety Strategy, the estimation process was carried out at a *national* level only – outcomes were not modelled for individual states, territories or regions.

The principal outputs of the model were:

- cumulative numbers of serious casualties saved over the 10-year life of the strategy
- percentage reduction in the number of serious casualties in 2020 compared with the average annual number of serious casualties during the baseline period.

The modelling process

The METS model was used to estimate the reductions in serious casualty numbers (people killed or seriously injured) that would result from a range of possible road safety interventions. The model focuses on those initiatives likely to have a significant effect on *national* serious casualty numbers, based on research evidence and/or expert opinion. The model involves two time periods called the ***reference period*** and the ***baseline period***.

The reference period is 2002–2007. This represents a pre-strategy timespan that can be used to extrapolate serious casualty trends into the future. During the reference period, serious casualty numbers per vehicle-kilometre travelled (VKT) declined by an average 2.45 per cent per year. This trend was combined with the projected growth in VKT out to 2020, to determine the future path of serious casualty numbers if there were no change in the conditions experienced during the reference period[1].

The model then estimated the impact on these projected numbers of a range of interventions in excess of those that operated during the reference period.

The baseline period is 2005–2007. This is the baseline for calculating projected percentage reductions in the annual number of serious casualties and for measuring progress towards the strategy targets. Using the latest available national data on serious casualty crashes, a baseline period of three years (2005–2007) was used to average out any short-term variations.

What the modelling shows

The main purpose of the modelling is to estimate what level of serious casualty reduction can be achieved during the life of this strategy and to indicate what kind of action would be required to bring this about.

The table on the next page describes two *possible* packages of key interventions that were estimated to achieve a ***30 per cent*** reduction in the annual number of serious casualties. The packages were based on some different assumptions about the mix of initiatives and policy settings implemented during the life of the strategy. They are not the *only* options for achieving the proposed reductions, but they are indicative of the type and level of intervention that would be required.

[1] For these conditions the model projects a ***9% reduction*** in the annual number of serious casualties by the year 2020. This estimate assumes a continuation of the underlying level of road safety activity and rate of improvement that occurred during the reference period; and it factors in a 2% per year growth in vehicle-kilometres travelled (based on mid-range projections produced by the BITRE).

Possible packages estimated to achieve a 30 per cent reduction in annual serious casualties by 2020

Roads	Speed limit reductions	Speed compliance	Vehicles	Road use	Cumulative serious casualties prevented[2]
PACKAGE A – target 30%:					
Investment in targeted safety programs: extra $845m per annum[3] [relative to investment levels during the reference period]	Targeted speed limit reductions on higher risk 50, 60 and 100 km/h roads[4] [5] [6]	1% speed reduction on urban roads (reach: 100% of casualties)[7] 1% speed reduction on regional/remote roads (reach: 20% of casualties)[8]	Full Electronic Stability Control (ESC) uptake in light passenger vehicles Intelligent Speed Adaptation (ISA) progressively introduced (from year 8) ESC and side impact protection in light commercials (from year 4)	Enhanced graduated licensing systems (from year 3) Reduced Blood Alcohol Concentration (BAC) limit for all drivers to age 25 years	**32,000** (if road initiatives introduced in year 3 and speed initiatives in year 4) **34,000** (if road initiatives introduced in year 3 and speed initiatives in year 2)
PACKAGE B – target 30%:					
Investment in targeted safety programs: extra $760m per annum[3] [relative to investment levels during the reference period]	Same as Package A plus: Targeted speed limit reductions on medium risk 60 km/h roads[9]	Same as Package A	Same as Package A	Same as Package A	**33,500** (if road initiatives introduced in year 3 and speed initiatives in year 4) **36,500** (if road initiatives introduced in year 3 and speed initiatives in year 2)

Note: In addition to the effects of the specific interventions listed in each package, the model assumes that there will be ongoing incremental gains from: continuing improvements in a range of behavioural programs; continuing improvements in the safety of the general vehicle fleet; and continuing investment in general infrastructure improvement (at current levels).

[2] Total number of serious casualties (fatalities and serious injuries) prevented during the life of the strategy from the specific interventions modelled.
[3] The model currently assumes that this level of sustained annual spending would be in place by 2013.
[4] Targeted speed limit reductions on higher risk 50 km/h roads. Model assumes that this will apply to 50% of serious casualties on 50 km/h roads.
[5] Targeted speed limit reductions on higher risk 60 km/h roads. Model assumes that this will apply to 25% of serious casualties on 60 km/h roads.
[6] Targeted speed limit reductions on higher risk 100km/h roads. Model assumes that this will apply to 20% of serious casualties on 100 km/h roads.
[7] Enhanced speed enforcement to reduce overall speeds by 1% on urban roads. Modelling assumes that this will apply to 100% of serious casualties on urban roads.
[8] Enhanced speed enforcement to reduce overall speeds by 1% on higher risk regional/remote roads. Modelling assumes that this will apply to 20% of serious casualties on regional/remote roads.
[9] Targeted speed limit reductions on medium risk 60 km/h roads. Modelling assumes this will apply to 50% of serious casualties on 60 km/h roads.

While the packages outlined above are not the only options for achieving these levels of reductions in annual serious casualty numbers, they serve to identify the areas of greatest potential gain during the life of the strategy. They also illustrate the degree of intervention (at a national level) that would be required in each area.

Estimated road safety benefits from this strategy

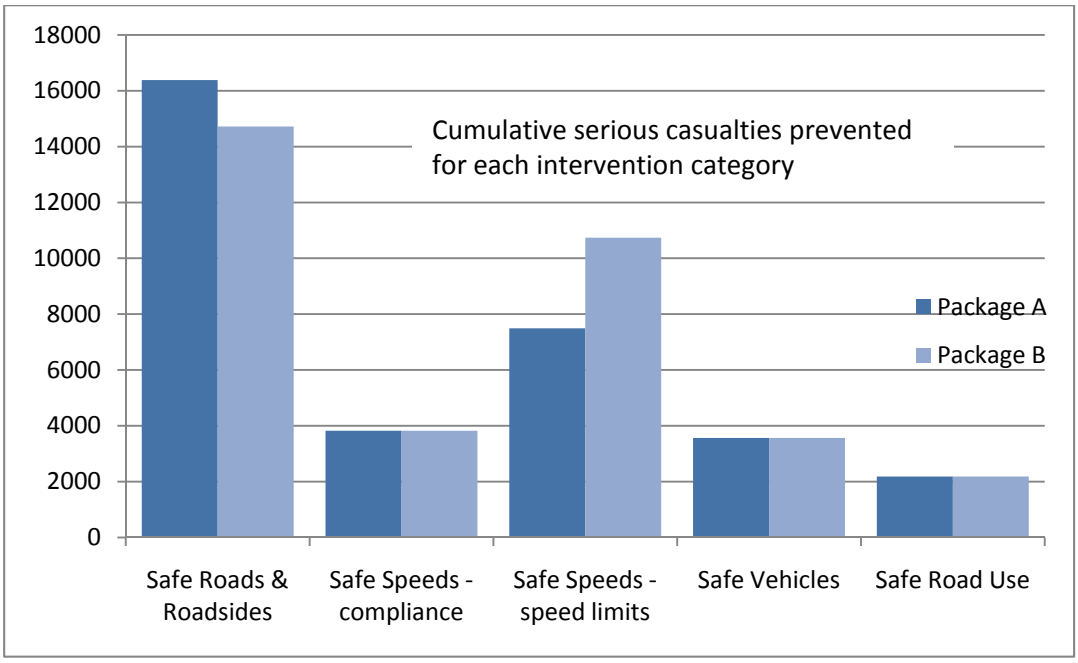
The policy scenarios outlined above show the potential to achieve larger reductions in annual serious casualties by increasing the level of intervention in one or more of the cornerstone areas. Once the detailed elements of this strategy have been finalised – after consulting with the community – further modelling may be undertaken to inform the adoption of specific targets for 2020[10].

To achieve these 2020 reduction targets, the relevant interventions would need to be in place *sometime* during the life of the strategy – that is, they could be introduced quickly or phased in gradually over the next 10 years.

However, the pace of implementation will have an important effect on the ***cumulative numbers of deaths and serious injuries*** prevented. Early implementation of major initiatives such as speed limit reductions, enhanced enforcement or increased road investment can significantly increase the total number of serious casualties prevented over the life of the strategy. This is illustrated in the last column of the table above.

The relative contributions of the different intervention areas are shown the following chart.

Cumulative serious casualties prevented for each intervention category*



* The chart shows the estimated number of serious casualties prevented for each intervention area *in isolation*. These cannot be added together to determine the aggregate benefit because of overlap effects between the areas.

[10] The 30 per cent reduction in serious casualties projected by the MUARC model is calculated from the baseline period 2005–2007 as described on page 2. The actual reduction target(s) adopted for the strategy may be referenced to a later period (such as 2009–2010).

For both packages presented here, most of the estimated serious casualty reductions come from interventions in the ***safe roads*** and ***safe speeds*** (both speed limit reductions and improved compliance) cornerstones. The MUARC research indicates that these areas have the greatest potential to significantly influence casualty reductions over the next 10 years.

This does not diminish in any way the importance of the other cornerstone areas:

- The benefits of vehicle safety improvements accrue over many years – effective action in this area will deliver some benefits in the short-term, and also will have a significant impact on safety gains beyond the life of the current strategy.

- New initiatives in the safe road user area form a very important component of the strategy by targeting specific groups and risk behaviours. It is difficult to quantify the benefits of many of these targeted interventions – such as training and education programs for novice drivers – which can play an indirect role in supporting change in other areas. (It should be noted that a lot of activity in this area was initiated under the previous strategy; the model assumes that continuing incremental gains will flow from these initiatives.)

All of the scenarios modelled for this strategy would result in significant reductions in road trauma and would deliver substantial benefits to Australia's health services, businesses, tax payers and the general community.

Additional notes on model assumptions and calculations

SAFE ROADS

Calculation method

- Based on level of investment, and estimated yield in serious casualties per annum per $100m invested.
- The model currently assumes that additional levels of sustained annual spending would be in place by 2013.
- It is assumed that no serious casualties are saved until the year after the increased investment starts (i.e. 2014), with 50% effectiveness in that year and 100% from the following year (i.e. 2015) onward.
- The benefits (reductions in serious casualties) accumulate over the life of the strategy (and beyond).

Programs

- 100 serious casualties saved per year for every $100m spent on black spots programs.
- 70 serious casualties saved per year for every $100m spent on safer roads programs.

SAFE SPEEDS AND SPEED LIMITS

Calculation method

- Based on Nilsson's curves applied to mean speed reduction targets; outcome-targeted rather than input-prescriptive.
- The model assumes that the speed initiatives would reach 50% of their total effectiveness in the year they start, and 100% the following year.

Programs

- Enhanced enforcement (from Year 1), sufficient to achieve:
  - 1% speed reduction in 100% of serious casualties in metro areas; and
  - 1% speed reduction in 20% of serious casualties in regional and remote areas.
- Targeted speed limit adjustments (in Year 4 or Year 8):
  - Reduction of 50 km/h zones to 40 km/h in metro and regional areas (mean speed from 35 km/h → 32 km/h). For packages A & B, modelling assumes this applies to 50% of serious casualties on 50 km/h roads.
  - Reduction of 60 km/h zones to 50 km/h in metro and regional areas (mean speed from 40 km/h → 37 km/h). For Package A, the modelling assumes this will apply to 25% of serious casualties on 60 km/h roads, and for Package B to 50%.
  - Reduction of 100 km/h zones to 90 km/h in regional areas (mean speed from 95 km/h → 90 km/h). For Packages A and B, the modelling assumes this will apply to 20% of serious casualties on 100 km/h roads.

SAFE VEHICLES

Calculation method

- Based on safety feature fitment to new vehicles:
  - Sales less scrappage (~4% fleet penetration of new vehicles per year).
- Assumes no additional effects relative to the 2002–2007 trend for side curtain airbag fitment in passenger cars and SUVs.

Programs

- New passenger cars and SUVS:
  - Intelligent Speed Adaptation (ISA) progressively introduced from Year 8 (2018): assumed to be in 2% of new vehicles in Year 8, 3% in Year 9, 6% in Year 10.
  - Existing and projected take-up of ESC since 2005 has been incorporated.
- New pickups, crew cabs and light vans:
  - ESC and side curtain airbags from Year 4 (2014).

SAFE ROAD USE

Calculation method

- Does not include speed compliance efforts (which are dealt with separately).

Programs

- Enhanced graduated licensing systems for younger drivers, assumed to take effect from Year 3 (2013).
- Legal BAC reduced to 0.02 for 21-25 year-olds.