
RACQ EcoDrive Research Study 2012

Introduction

Cost-conscious motorists have long understood the benefit at the petrol bowser of taking it easy on the accelerator.

But ground-breaking research by RACQ has succeeded in identifying not only the extent of fuel savings that can be achieved from training Australian motorists in 'eco-driving' but also the most effective forms of training.

By demonstrating that private motorists can achieve average fuel and carbon dioxide (CO₂) emission reductions of 4.6 percent from their vehicles after eco-driving training, the RACQ research study shows how to most effectively help us all contain our car running costs.

It also provides valuable guidance to governments striving to reduce greenhouse gas emissions from road transport and to manage liquid fuel security.



For full report please go to racq.com/ecodrive

Background

In the past 15 years the concept of 'eco-driving' has been increasingly researched, promoted and practically applied internationally – as an instrument of climate change response by governments and as a way for commercial road fleet operators to reduce their operating costs.

Eco-driving encompasses driver behaviours, vehicle maintenance and trip planning actions to reduce fuel consumption. The direct relationship between the amount of fossil fuel burnt in a vehicle's internal combustion engine and the greenhouse gases emitted through the exhaust pipe means that personal and environmental benefits go hand-in-hand.

Eco-driving is well developed in Europe with programs comprising media campaigns, inclusion in basic driver licence training, short and long-term training modules, and inclusion in bus and truck fleet management.

While eco-driving programs in the heavy vehicle segment have been driven by the dual motivations of safety and economy, there is a lack of research on the benefits of eco-driving in Australia in the privately owned, passenger vehicle segment.

Eco-driving strategies

- Monitor your fuel
- Watch ahead and cruise smoothly
- Brake and accelerate gently
- Use the right gear for the conditions
- Shift through the gears as quickly as possible
- Don't park and idle
- Maintain a steady cruising speed on highways – use cruise control where appropriate
- Minimise air conditioner use
- Maintain tyre pressure – keep your tyres inflated to the maximum level
- Remove excess weight and reduce aerodynamic drag – take off the roofracks
- Service your car to the manufacturer's schedule
- Plan your trips – avoid congestion, combine trips and share rides, consider walking, cycling and public transport



The RACQ EcoDrive Research Study, conducted between July 2011 and July 2012, was jointly funded by the RACQ and the Queensland Government through the Department of Transport and Main Roads.

The Centre for Accident Research and Road Safety – Queensland at the Queensland University of Technology provided the method support and peer review of the research.

The RACQ study sought to address which, if any, education interventions helped private motor vehicle drivers to implement strategies that reduced fuel consumption.

Its objectives were:

- Test the effectiveness of long-term behaviour change strategies in relation to eco-driving;
- Test the efficacy of different behaviour change strategies, comparing the cost and benefits of varying levels of intensity; and
- Develop prototype tools for roll-out of a full eco-driving program.

More than 1300 Queensland drivers, recruited mainly from RACQ's membership in metropolitan Brisbane and regional centres and demographically matched to the Queensland licence-holding population, were recruited for the blind study, which was controlled for environmental factors and used a statistically robust analysis. Data on fuel use and vehicle distance travelled was collected before the recruited drivers became aware of the specific purpose of the study. Their vehicles were mainly passenger cars but also included some four-wheel-drives and light commercial vehicles.

A separate group of motorists, who paid for their vehicle ownership and running costs through salary sacrifice arrangements, were used as a 'control group' against which to benchmark any reductions in fuel use achieved by active participants in the study after eco-driving training. Members of the control group were not aware that they were in the study.

Training

Having been initially surveyed on 'Driving Costs, Attitudes and Behaviours', the non-control group participants undertook one of five eco-driving training programs:

Intervention 1:

An on-line training module of up to an hour's duration.

Intervention 2:

On-line module plus a two-hour classroom session.

Intervention 3:

On-line module plus a 50-minute driving lesson in eco-driving with an accredited and specially trained instructor.

Intervention 4:

On-line module plus the classroom session and driving lesson.

Intervention 5:

On-line module plus a half-day workshop, including an in-car drive using advanced telemetry, before and after a classroom training session, to provide evidence of the fuel reduction benefits and improved comfort from eco-driving.

Key findings

By quantifying fuel use and emission reductions, the RACQ EcoDrive Research Study confirmed that changing driver behaviour can lead to lower-cost motoring and better results for the environment, and showed how best to achieve those outcomes.

It showed the intensive half-day workshop combined with the on-line learning module delivered the best results overall among study participants, while the on-line learning module alone provided the most cost-effective method of helping motorists reduce their vehicles' fuel consumption.

The average effect of all the training was a statistically significant 4.6 percent or 0.51 litres per 100 kilometres (l/100km) reduction in fuel use among participants.

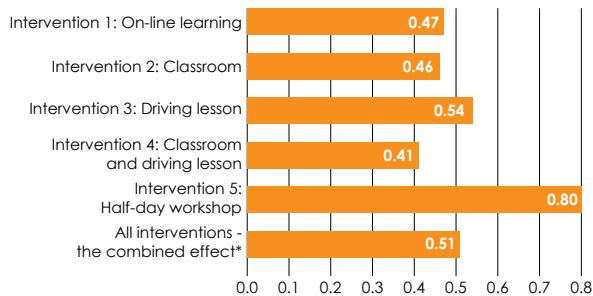
The figures below provide the mean absolute and percentage reduction in fuel use achieved by participants in five different interventions, along with extrapolated annual average financial savings and reduction in CO₂ emissions on a per vehicle basis.

The 4.6 percent reduction can be extrapolated to the entire licence-holding population. The average benefit for those who seek out eco-driving training could be much higher.

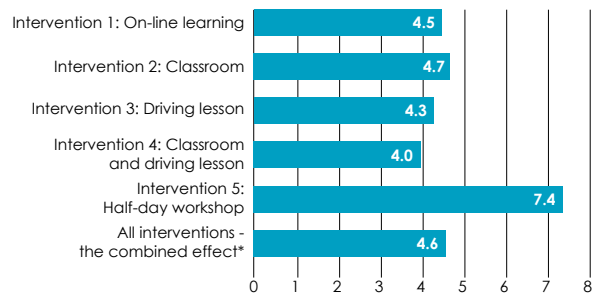
Participants in the top 15.9 percent (the mean fuel use decrease plus one standard deviation) achieved a reduction of at least 15.1 percent or 1.7l/100km.

Average absolute and percentage reduction in fuel use resulting from the eco-driving training

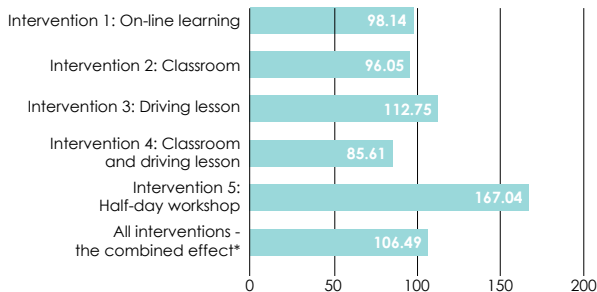
Average absolute change in fuel use (l/100km)



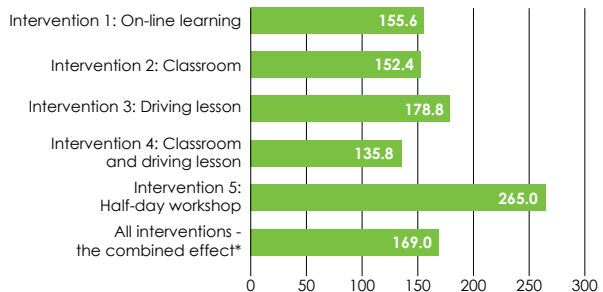
Average percentage change in fuel use (%)



Annual average savings (\$) ^



Annual average reduction in CO₂ (Kg) ^



* Note: the combined effect is the average change of all the participants who completed training, not the average of the five interventions.

^ Annual savings are based on an assumed average travel distance of 14,400km per year and an average price of unleaded petrol of \$1.45 per litre (Brisbane average price in 2011/12).

Key findings (continued)

While there appear to be some differences between the outcomes of the interventions, particularly intervention 5, these are not statistically significant. It is possible that the sample size of the group who completed the half-day workshop was too small to ascertain whether the difference in fuel use was significant.

The lowest intensity training (the on-line module) resulted in a 4.5 percent reduction in fuel use, which equated to a reduction of 0.47l/100km. The most intensive training (half-day workshop) resulted in a 7.4 percent reduction in fuel use, which equated to a reduction of 0.80l/100km.

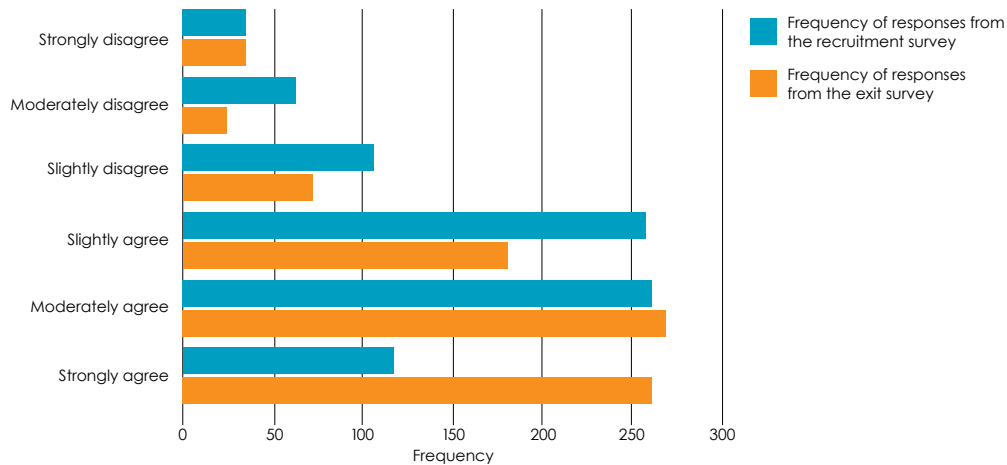
In the short term, intervention 1 (the on-line module) was the most cost-effective, returning a benefit-cost ratio of 3.4 for one year of benefits. If the benefits continue for several years,

the higher cost interventions 2 (classroom), 3 (driving lesson) and 5 (half-day workshop) become increasingly attractive.

In addition, entry and exit surveys indicated a positive shift in participants' views of their ability to reduce their vehicles' emissions through changing their driving style.

Participants were asked about the extent they agreed with the statement "I can reduce my vehicle's emissions if I change my driving style." In the recruitment survey 13.9 percent of participants strongly agreed with this statement while this extreme response increased to 31.0 percent in the exit survey. There was also a statistically significant decrease in the number of participants disagreeing with the statement.

Distribution of responses from the recruitment and exit surveys



I can reduce my vehicle's emissions if I change my driving style.



Policy implications

The RACQ research demonstrated that individual motorists will change their behaviour when provided with eco-driving training. The study showed a 4.6 percent reduction in fuel use and emissions is achievable across the whole passenger vehicle fleet. Savings would be even higher in households where there are a number of vehicles and trained drivers, or where distances travelled are higher than average.

The reduction in fuel use is a conservative estimate. The study was a blind experiment and hence the participating cohort included people who were interested in fuel efficiency and those who were not. Potential for greater savings exists among drivers who self-select for eco-driving training because they want to experience the benefits. It is notable that the participants in the top 15.9 percent (those achieving the mean fuel use plus one standard deviation) achieved a reduction of at least 15.1 percent or 1.7l/100km.

A 4.5 percent or 0.47l/100km fuel consumption reduction was achieved by using the on-line learning tool. This would account for an average yearly fuel saving of \$98 (using the average fuel cost of \$1.45 per litre in Brisbane in 2011/2012 and an assumed annual average distance travelled of 14,400km per year) for each individual, with greater savings achievable for drivers of larger vehicles and those travelling longer distances. In CO₂ reduction terms, this is a saving of 156kg per vehicle per year. Based on the results for the best performing participants in the study, it is possible for savings to improve to \$355 and a CO₂ reduction of 523kg per year.

The on-line tool is the cheapest and easiest option to implement on a mass scale. This training has the highest benefit-cost ratio. It could also be incorporated into learner driver training.

Similar savings can be achieved by attending the classroom and driving lessons. While this delivery mode is more expensive, it would be useful for those motorists who are unable or unwilling to access the on-line learning.

A 7.4 percent or 0.8 l/100km fuel use reduction can be achieved through completion of the half-day workshop. This would provide average yearly savings of \$167 in fuel costs and 265kg in CO₂ per driver per year. This option is most appropriate for high-mileage drivers, as the benefits outweigh the training cost, and fleet drivers, as the business costs can be reduced through taxation accounting.

In turn, eco-driving training could result in substantial cost savings to commercial and government fleets, as well as contributing to national liquid fuel security and efforts to reduce greenhouse gas emissions in the road transport sector.

The literature review, conducted as part of the RACQ study, identified limitations in the understanding of the relationship between eco-driving and safety. As safety is of interest to almost all drivers, it could be an additional motivator to drive efficiently. Further research is required to investigate possible relationships between eco-driving and safe driving.

Feedback from participants also suggests there may be benefits in research on driving stress and encouraging courteous behaviour. Stress reduction is a potential motivator to engage in eco-driving, although a lack of courtesy from other drivers (e.g., to someone slowing in advance of a red light ahead) is a potential barrier.

Overall, this research study points to opportunities for governments, motoring clubs and other interested organisations to further develop and implement eco-driving training in future.

For more detailed information on the RACQ EcoDrive Research Study visit racq.com/ecodrive or telephone 3872 8911 for the complete research report.

