Turn Your Key - Reducing Truck Idling

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Abstract As Australia enters the era of emissions trading schemes, strategies to further curb emissions will grow in importance. At the same time, a national emissions trading scheme is set to be introduced whilst the country is set to increase its dependency and volume of road transport in years to come. This raises a doubly important question for transport operators: what can they do to reduce emissions? Whilst advances in fuel technology and vehicle regulations will play their parts, changing driving behaviour is an area that remains relatively unexplored. This paper will highlight the design, implementation and evaluation of a behaviour change initiative that was trialled by the State of Western Australia Department of Environment and Conservation's CleanRun team in collaboration with fleet truck drivers in a large national transport company. It will also propose a model for broader implementation and compare this to other similar programs in other countries.

Introduction

By 2020, the total kilometres travelled by Australian vehicles is forecast to rise by 53 billion kilometres (BTRE, 2005), enough to drive to the moon and back 70,000 times. Australian policy makers must be innovative in order to combat the impact this increase will have on air quality and climate change. Countries including Canada and the United Kingdom are successfully reducing vehicle emissions through voluntary driver behaviour change programs: National Resources Canada "Idle-Free Zone" and Department for Transport's "Fleet Best Practice" in the UK. The potential to reduce emissions through driver behaviour change in Australia still remains relatively unexplored.

Community-based social marketing (CBSM) is a behaviour change methodology which underpins many programs across the world seeking to foster sustainable behaviour, from vehicle oil recycling to composting (see www.cbsm.com). According to McKenzie-Mohr (1999, p. 15), the success behind this approach lies in its pragmatism: "… (it) emphasises personal contact [and] involves identifying barriers and benefits to a sustainable behaviour, designing a strategy that utilises behaviour change tools, piloting the strategy with a small segment of a community, and finally, evaluating the impact of the program once it has been implemented across a community".

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This paper focuses on the CleanRun Behaviour Change Initiative (CR-BCI), a CBSM-based trial that sought to reduce diesel emissions by working with transport company drivers to adopt environmentally-friendly driving behaviours. The trial was developed by the Western Australian (WA) Department of Environment and Conservation's (DEC, 2007) CleanRun program and was one of a range of initiatives designed to improve the city of Perth's air quality by reducing diesel vehicle emissions.

The CR-BCI was conducted in two phases. The key lesson that emerged from Phase I is that a "pure" or traditional CBSM approach proved difficult to implement successfully in the complex environment of a large commercial business. Therefore, it was deemed necessary to modify traditional CBSM methodology in order to develop a behaviour change strategy that would work effectively for professional truck drivers. Following Phase I, CleanRun staff collaborated with drivers during a series of workshops to design a CBSM strategy that was "by drivers, for drivers". Based on the successful outcomes of Phase II, CleanRun developed a program and process that should prove replicable with other fleet-based companies.

The CleanRun model differs from traditional CBSM in a key way: instead of having personal interactions with each driver, the CleanRun approach works intensively with a percentage of volunteer drivers from each company to design a company-specific emissions reduction strategy. This process both engages and empowers volunteer drivers who participate in in-depth barrier/benefit analyses, as well as in the development of behaviour change tools which best suit those drivers' needs and conditions. Drivers who are not involved directly in this are nonetheless exposed to these tools and, more importantly, are influenced by the "modelling" of this new behaviour through the emergence of a new workplace norm and the effects of social diffusion (McKenzie-Mohr, 1999, p. 96). Norms - the perceived "right" behaviours - are particularly effective in this setting given strong company cultures and systems of peer pressure that exist in these workplaces and which result in a desire to conform. As such, it is very much a program that is "by drivers, for drivers" and, therefore, should prove to be practical for drivers across the industry to reduce engine idling.

This paper begins by providing an overview of CBSM methodology as defined by Doug McKenzie-Mohr, with an emphasis on the impact of social norms in changing behaviour. It will also outline his "Turn it Off" project that aimed to reduce engine idling amongst motorists in Toronto's "Kiss and Ride" parking lots. This example serves as an illustration of the implementation of a "typical" CSBM pilot. The paper then summarises the background, design and outcomes of the CR-BCI, including the process that resulted in the anti-idling program. The paper concludes by discussing the lessons learned in the CR-BCI.

Community-Based Social Marketing (CBSM) and the CR-BCI

The goal of the Behaviour Change Initiative (BCI) was to achieve permanent behaviour change that results in measurable reductions in diesel vehicle emissions. Following market research (DEC, 2006) into the in-service diesel vehicle (ISDV) sector, commercial courier companies were identified as a target audience where significant reductions in emissions within the metropolitan area could be gained.

Community-based social marketing (CBSM) is a social psychology strategy that seeks to bring about lasting behaviour change in individuals. As defined by Doug McKenzie-Mohr, it "draws heavily on research in social psychology which indicates that initiatives to promote behaviour change are often most effective when they are carried out at the *community level* and involve *direct contact* with people" (McKenzie-Mohr, 1999, x-xi).

CBSM approaches typically consist of four stages:

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1. Identification of the benefits of and barriers to the behaviour change.
2. Development of a strategy using effective "tools".
3. Implementation of a pilot.
4. Evaluation of the strategy.

These four stages are broken down into twelve specific steps for the design and implementation of a pilot program, as outlined in Table 1 below:

TABLE 1: The steps involved in the CBSM approach

1. Literature search	7. Pilot final design
2. Observation studies	8. Baseline data
3. Focus group	9. Pilot implementation
4. Phone survey (market research)	10. Pilot evaluation
5. Pilot - initial design	11. Analyse and refine
6. Focus group	12. Implement full program

CBSM was selected for a number of practical reasons, including the proven success of transport–focussed CBSM-based programs such as McKenzie-Mohr's own "Turn it Off" project; and that DEC's Community Education branch had previous experience applying CBSM for use in transport related programs, including in the design of the Green Stamp and TravelSmart programs.

CBSM was selected as the most promising strategy for use in the CR-BCI because the "pilot" stage allowed for "refining" of the program, and it focuses on reducing barriers and increasing the benefits to behaviour change. Given the limited experience in using CBSM with the commercial transport sector, it was important to be able to refine the strategy. Even if effective first time, the strategy would likely need refining based on lessons learned in the evaluation stage. Importantly, CBSM has more of a "pragmatic" approach to identifying what motivates people adopt sustainable behaviours in contrast to other common methods, such as information-based campaigns, attitude-behaviour approaches, and economic self-interest approaches.

"Turn it Off" – A Case Study in Reducing Vehicle Engine Idling

"Turn it Off" was a project initiated by Environment Canada in partnership with McKenzie-Mohr Associates and the Ministry of Environment that involved having motorists turn off their engines while parked and waiting in their vehicles. The project was carried out in Toronto's transit "Kiss and Ride" parking lots as well as at school drop-off/pick-up zones. It followed the first three steps that are typical to CBSM projects, as outlined below, and made recommendations for further implementation. Information provided in the summary below is taken from the "Turn it Off: Reducing Engine Idling" final report (McKenzie-Mohr, 2001) and from the "Tools of Change" website (www.toolsofchange.com).

Barrier Identification

Existing research on barriers to reducing idling revealed that an effective CBSM strategy would need to:

- remind drivers to turn off their engines;
- clarify the length of time engines should be idled before being turned off (10 seconds);

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- develop community norms supporting turning off an engine as the "right thing to do"; and
- be developed during warmer months, as comfort and safety are important reasons why idling occurs in colder months.

Strategy Design

Two CBSM techniques were considered: prompts (signs and vehicle stickers) and written commitments from drivers to reduce idling. Information cards were also used but are not considered a CBSM tool. Focus groups were conducted to seek feedback on these proposed strategies from drivers who used relevant school pick-up/drop-off areas and "Kiss and Ride" parking lots. Feedback from the groups helped develop communication materials including signs, stickers and info cards about not idling.

Implementation of a Pilot

Baseline data was collected at 12 locations over a 10-day period. Following this, CBSM tools were tested by random assignment to groups, including a control group with which no tools were used.

Results Summary

In total, 8,435 observations were made. Not surprisingly, participants that were exposed to the highest number of tools showed the most significant changes. Participants who received all tools were divided by school sites (Group 1) and Kiss and Ride sites (Group 2), as outlined in table 2 below.

TABLE 2: Results of "Turn if Off" project

Site Observations	**Reduction in Idling**	
	Frequency	**Duration**
Group 1 - School Sites	51%	72%
Group 2 - Kiss and Ride Sites	27%	78%
Average of Both	32%	73%

Recommendations

Baseline data revealed that 50% of drivers idled their vehicles, providing considerable scope for emissions to be reduced through implementation of this program. Recommendations were made to carry out the program using a combination of prompts and commitments with priority given to a strategy in Canadian schools. Further recommendations were as follows:

- a web-based anti-idling toolkit, including "how to" instructions and case studies, be developed to allow quick and widespread dissemination;
- further piloting be done with other motorists (bus drivers, trucker etc); and
- build on local CBSM approaches with a national anti-idling media campaign that would be strengthened by introducing anti-idling by-laws.

Canada now has an extensive national anti-idling program that combines these three approaches and draws on ten case studies conducted across Canada during 2003-04. The "Turn it Off" project provided a key case study which informed CR-BCI;

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however, the demands of the trucking business setting required that a more dynamic approach to changing behaviour be applied to address complex barriers that arise in this environment.

The CleanRun Behaviour Change Initiative (CR-BCI)

The CleanRun program aims to improve Perth's air quality by reducing vehicle emissions as part of the WA Government's implementation of the National Environment Protection Measure for diesel vehicle emissions (D-NEPM) and the Perth Air Quality Management Plan (AQMP). The two phases were conducted between January 2007 and March 2008 in partnership with Toll IPEC, a division of a national courier company. A replicable program was developed based on the outcomes of Phase II, a three-month trial that worked directly with metropolitan courier drivers to reduce unnecessary idling times.

CR-BCI – Phase I (January to April 2007)

Phase I concentrated on fuel consumption monitoring and followed the first ten of the prescribed twelve steps of the CBSM as outlined in Table 1 (section 1). It was designed using information gained from a literature review, market research, and barrier/benefit analyses. The preliminary research was completed with the assistance of a reference panel that included members of the transport industry. Driver behaviours that impact emissions, including harsh acceleration, speeding and excessive idling, were the secondary focus.

The primary objectives of Phase I were to gain practical experience with CBSM tools and techniques, plus obtain knowledge of the commercial transport sector. Secondary objectives included encouraging positive behaviour change and reducing fuel consumption. However, CleanRun encountered a number of difficulties:

- fuel consumption monitoring proved to be a complex behaviour because a range of staff at different levels were involved;
- leading hands (an intermediate point of contact between drivers and supervisors) were the focus because DEC staff were informed that they were the key "behavers"; and
- it proved difficult to achieve individual behaviour change because drivers did not have complete control to enable them to change.

As a result, DEC learned that drivers must be the target "behavers"; they need to be engaged from the outset; and they must be volunteers, if the CR-BCI was to be successful.

Workshops (August to October 2007)

CBSM theory suggests that behaviour change strategies "will be ineffectual if significant external barriers exist to the behaviour you wish to promote" (McKenzie-Mohr, 1999, 159). So, if drivers face company barriers that "reside outside the individual [then] changes have to be made in order for the behaviour to be more convenient" (McKenzie-Mohr, 1999, 150). As a result, CleanRun staff worked directly with drivers to identify behaviours that they viewed as completely within their control.

A series of workshops were conducted with drivers as the "experts" which involved barrier identification and strategy design. These were held in work hours from August to October 2007 with a total of 44 volunteers. The primary objectives of the workshops were to:

1. identify a specific driver behaviour to be the focus for Phase II;
2. investigate all barriers and benefits; and
3. engage drivers in the design of strategy tools.

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The aim was to empower drivers through decision-making, while increasing their awareness and knowledge about emissions. Drivers were asked to discuss a shortlist of behaviour changes (below) that could reduce emissions before selecting one as the focus for Phase II:

1. Keep idling to a minimum;
2. Keep tyres correctly inflated;
3. Drive smoothly;
4. Optimise gear changes;
5. Use air conditioner appropriately; and
6. Load vehicle correctly.

Seventy-two percent voted for "keeping idling to a minimum" as it was agreed to be completely within drivers' control, as well as a substantial contributor to vehicle emissions.

Objectives of Phase II (November 2007 to February 2008)

The objectives of Phase II were to:

1. Achieve measurable changes in idling behaviour;
2. Achieve measurable reductions in diesel emissions; and
3. Develop a model for broader implementation in the transport sector.

Design of Phase II – "Keeping Idling to a Minimum"

42 out of 70 drivers volunteered to participate and were divided randomly into four groups. The trial used and adapted established CBSM "tools" across the four groups in tiered layers, as outlined by the examples below.

TABLE 3: Behaviour change tools and driver groups

Group	**Standard Tools**	**Additional Tools**
A (Control)	Posters Noticeboard *"leakage"	None
B	Signs Stickers Posters Noticeboard "leakage"	Commitment
C	Signs Stickers Posters Noticeboard "leakage"	Commitment MDT Messaging
D	Signs Stickers Posters Noticeboard "leakage"	Commitment MDT Messages Periodic feedback meetings

* leakage, e.g., word of mouth, peer pressure, observation of other drivers' behaviour

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Signs, stickers and posters (myth-busters and behaviour norms) were important behaviour change tools used (see figures 1 and 2 below). Their design and content were largely developed in consultation with drivers in the workshops.

One group, Group D, attended regular feedback meetings with DEC staff to reinforce and encourage their progress in turning off, and to resolve any unforeseen barriers or problems.



FIGURE 1: Posters samples (A1-drivers' lunchroom, smoking area, radio room)

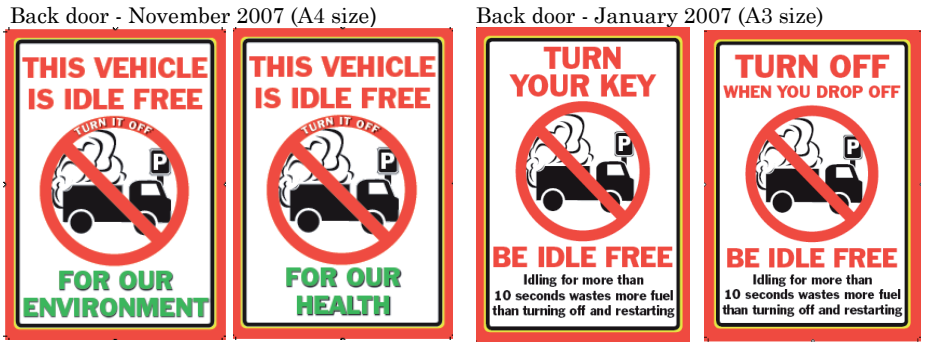


FIGURE 2: Sample of truck stickers

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Evaluation Methods and Results

Surveys were conducted before, during and at the end of the 3-month trial, with a fourth (maintenance) survey conducted 6 months after the trial. Information collected includes the impact of behaviour change tools, change in idling habits, and driver attitudes on related environmental and health issues. In summary, the results indicate that:

- drivers exposed to all behaviour change tools (Group D) reduced their unnecessary idling by 87 percent or three hours per week;
- average reduction across all drivers was 72 percent - approximately two hours per week;
- 79 percent said their behaviour outside work changed, e.g., not idling their own car and turning off domestic appliances; and
- group D rated feedback meetings and truck stickers as the most effective tools.

Twenty computers were fitted at random to trucks to record the duration and frequency of unnecessary idling. This data supported survey results:

- total reduction in unnecessary idling for the trial period was 11,704 minutes, which is the equivalent of 195 hours or 14 hours per driver; and
- idling reductions changed in proportion to the exposure to the CBSM tools.

Anecdotal evidence gained through feedback meetings and face-to-face contact was recorded throughout the trial, which was vital in the development of the model for broader implementation.

Outcomes From Applying CBSM in a Commercial Transport Fleet

Phase I highlighted that there are key differences in the design and implementation of a CBSM pilot for a commercial transport business compared with a pilot for a public community setting. Some of the reasons for this are:

- initial research methods (e.g., literature search) are unable to identify barriers and benefits specific to this company's drivers;
- in-depth observation studies of the company's specific operations and its drivers must be undertaken in order to design an effective pilot; and
- drivers need to be, and feel, involved in the design of the program and to participate on a voluntary basis.

The workshops resulted in a strategy that was essentially "by drivers, for drivers". It was this aspect of empowerment that proved critical to effecting change at Toll IPEC because it gave drivers a sense of ownership instead of appearing as another requirement by company management, as typified by the driver comment below:

> I turn off now because of the fact that you asked me to do it, not told me to - so I'm not being told to do something by the management. (Participant A, 16.1.08)

Anecdotal evidence gained during Phase II confirmed all drivers believed that participation in workshops (plus on-going feedback meetings) was an important step in the process of changing their behaviour:

> You can tell who's been to the course (workshop) here at the end of the day – those who have been switching off in the queue. (Participant B, 30.11.07)

> This is what convinces people – meetings. Other people slowly catch on after a few of the guys start turning off. (Participant C, 13.12.07)

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Some drivers claimed that raising their awareness and being consulted in workshops was sufficient for them to change their behaviour immediately - and permanently – but not in all cases. However, what drivers did repeatedly say was that changing their idling behaviour was relatively easy once they both knew and thought more about the environmental and health impacts of emissions:

> Before this I never turned off my truck. I turn off now because I have been to these meetings and found out about what happens with fuel emissions: I've got 2 young kids. (Participant A, 16.1.08)

> It's not like what you're asking us is hard, it's just turning off the engine when we're dropping off. It's not as if you're asking us to climb Mt Everest. (Participant D, 30.11.07)

Seventy-nine percent of drivers also commented that "switching off" became a habit that impacted on their behaviour outside of work:

> Well if you can win me over, you can win anyone over. I even turn off in my own car on the weekends. It's a force of habit. (Participant C, 16.1.08)

CleanRun has adapted the CBSM process to suit fleet-based companies based on the lessons from the trial with Toll IPEC (see figure 3). This adaptation engages drivers as 'experts' to act in place of focus groups or market research, as in prescribed CBSM design.

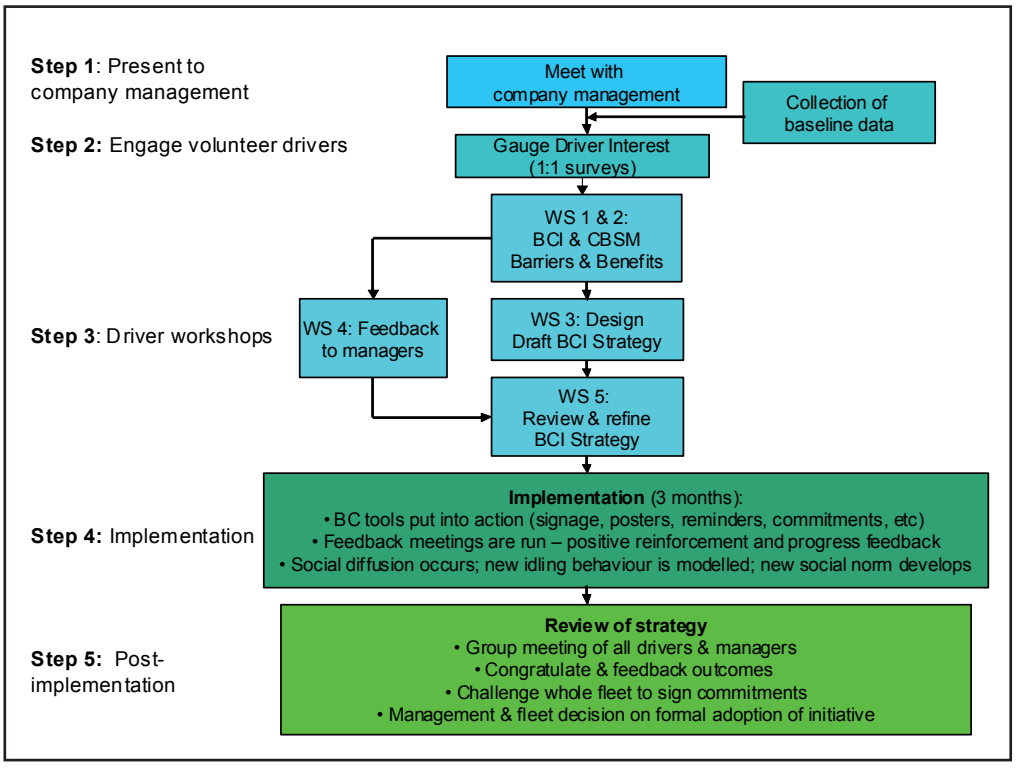


FIGURE 3: Adapted model of CBSM

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There are some important actions that occur at certain stages of this process:

- Step 2: To try to ensure high volunteer levels, drivers are approached 1-on-1 to gauge interest.
- Step 3: Drivers are consulted as the "experts" in identifying barriers and benefits, as well as identifying suitable behaviour change tools. Managers are also consulted at this stage.
- Step 4: A wide range of tools are put into action in order to have maximum effect.
- Step 5: Evaluation and feedback is given to all participants and stakeholders. If successful, fleet drivers are asked to voluntarily commit to the program.

Throughout this process, staff work intensively with a percentage of volunteer drivers and have direct personal contact with them, as recommended in traditional CBSM approaches (McKenzie-Mohr, 1999). By engaging drivers in the strategy design, complex workplace-specific barriers are addressed so that behaviour change is not impeded.

In his research into applying behaviour change approaches within business organisations, David DeJoy noted that although these approaches can be applied widely to varying workplaces, they are likely to need tailoring to each specific setting (DeJoy, 2005). In addition, results from successful behaviour change programs should have a type of "spill-over" effect in time which spreads through the organisation and can thereby lead to cultural changes across an entire organisation (DeJoy, 2005). This encapsulates the approach taken in the CleanRun example.

The potential for norms and social diffusion to enable the "spill over" to non-volunteers is particularly strong in a workplace such as this. Unlike norms (where drivers look to others for direction on how to behave), social diffusion affects behaviours through conversations or "introductions" to the "norm" behaviour. They are effective in this setting because:

- there is a high turn-over of staff, so new starters look to more experienced drivers for direction on how to behave (i.e., drive);
- experienced drivers are used to training new drivers; and
- there is pressure to "conform" to a correct way of doing things, to get tasks completed in the shortest amount of time.

These factors were evident at Toll IPEC. For example, when surveying a new starter driver, DEC staff recorded how an experienced Toll driver (who had not been a trial volunteer) had actually been mentoring this new employee. During this process the experienced driver trained the new starter not to idle his vehicle unnecessarily (i.e. when not in traffic). Previous to this, the mentor driver had been known to DEC staff as a "sceptic" about the idling initiative and had not co-operated.

Conclusions

CBSM is an effective and practical strategy that is widely utilised in efforts to foster sustainable behaviours. The "Turn it Off" case study proved it can be successful in reducing motorists' idling through clearly identifying barriers and applying established behaviour change tools. Phase I of the CR-BCI showed that, in the context of a commercial transport company, drivers must be involved in the process of identifying barriers and benefits to behaviours they are able to change if a CBSM strategy is to be successful. It also emphasised that CBSM can be effective in voluntary behaviour change so long as sufficient research and engagement is undertaken so the right "behavers" and behaviours are addressed.

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In the case of fuel consumption monitoring, drivers faced company barriers that resided outside their control, so changes would have had to be made in order for a behaviour change to be possible. The driver workshops undertaken as part of the CR-BCI focused instead on a behaviour that drivers could change – idling. Driver feedback indicated that the engagement and empowerment process was vital in creating lasting change in their behaviour. This tool thus forms a key component in the behaviour change model that CleanRun hope will be replicated across the transport industry in Australia.

Importantly, this is a program that has been designed to tackle truck drivers' unnecessary engine idling, however DEC's experience since the completion of Phase II at Toll IPEC has shown that the program can be dynamic and applied to any driving behaviour – provided it is identified first by drivers. It is now hoped that more lessons can be learned by applying this model and adapting it to other "communities" – schools, public transport authorities, local council fleets, public queuing and parking spaces (e.g. Park and Ride locations).

Keywords: Behaviour change; engine idling; diesel emissions; CBSM or community-based social marketing; transport.

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