

CLEAN DIESEL FOR SOUTH AFRICA

Proceedings of the Clean Diesel Campaign Workshop

29 November 1995

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ABSTRACT

The control of diesel emissions in South Africa is a major challenge which requires not only resources and commitment from the authorities enforcing the Atmospheric Pollution Prevention Act (Act no. 45 of 1965), but also a team approach. To date, limitations of technical service centres and human resources have hampered the effective control of diesel emissions by local authorities. The most cost-effective way of decreasing and perhaps even eliminating the number of vehicles emitting black smoke is for the public, vehicle owners (individual and fleet), the motor industry and service industries, oil companies and authorities to team up and raise awareness of the detrimental effects of uncontrolled diesel emissions. Understanding the problem and its costs will generate commitment to address the issue. Only once we have learned how to successfully manage the problems will we be in a position to explore the real possibilities of increasing the South African diesel fleet. This paper summarises the proceedings of a workshop held on 29 November 1995 at the University of the Witwatersrand to invite comments and plan a Clean Diesel Project for South Africa.

1. INTRODUCTION

The workshop, organised by the National Association for Clean Air, the Environmental Law Association, and Nissan South Africa was attended by representatives of:

Automobile Association of SA
Atlantis Diesel
Automotive Refinisher
BP SA (Pty) Ltd
CSIR
Dept of Environment Affairs & Tourism
Dept of Transport
Dept of Mineral and Energy Affairs
Earthlife Africa
Environmental Health (Pollution Control) Cape Town City Council
Environmental Law Association
Europe Energy Environment Ltd
Fleetwatch
Gauteng Province Environmental Unit
Group Environmental Monitoring (GEM)

Keep SA Beautiful
Mercedes Benz SA
National Association of Automobile Manufacturers of SA
National Association for Clean Air
Nissan SA
S A Bus Operators
SA Transport
Sandton Town Council
South African Petroleum Industry Association
Sasol Oil
Sasol Chemical Industries
Toyota SA
Transnet
Transport Management consultant
Transport Management magazine

2. BACKGROUND: DIESEL FUEL AND THE ENVIRONMENT

Environmental impacts occur at all stages of the life-cycle of a diesel vehicle: during manufacture, service, and disposal or scrapping of the vehicle. Emissions represent merely one of the environmental impacts associated with our need for transport, and are produced at the "vehicle use" stage. Research has shown that emissions generated during the working life of a vehicle usually account for the most serious environmental impacts, and diesel vehicles are no exception. Much can be done to address this problem, and this section provides some background on the issue.

Emissions and the diesel vehicle

Diesel emissions include for the most part oxides of nitrogen (NO_x), unburnt hydrocarbons (HC), carbon monoxide (CO) and particulate matter (PM). These pollutants can lead to urban smog, are dangerous for our health, and contribute to the greenhouse effect. However, exhaust emissions are not uniform. Addressing one pollutant could lead to an increase in some other pollutant.

Furthermore, the relationship between emissions and fuel economy is non-linear. However, both fuel economy and a reduction in emissions could be achieved with careful maintenance practices.

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Fuel expenditure and consumption

Fuel costs can constitute between 5% and 15% of the annual costs depending on the vehicle and its operation. As operating costs, they could account for between 50% and 80%, again depending on operation and the vehicles used.

Diesel vehicles consume 15% to 40% less fuel than their petrol-driven counterparts. Reduction of the tare mass allows more payload and consequently higher productivity. (Productivity is measured in amount of fuel used to deliver a specific product as fast as possible.) Other vehicle specifications are also vital:

- ▶ The larger the front area of the vehicle, the higher the fuel consumption. Choice of the correct size for specific needs is therefore important.
- ▶ Radial ply tyres have an up to 30% lower rolling resistance and could improve fuel consumption by as much as 12%.
- ▶ Correct differential and gear ratio selections can affect fuel consumption by as much as 5%.
- ▶ Too powerful a vehicle could be as extravagant fuel-wise as an underpowered one. Engine size must be decided according to requirements.

A number of fuel-saving devices could be used, for which quantified savings are available. These include:

- ▶ Wind deflectors
- ▶ Under-bumper aprons
- ▶ Visco fans
- ▶ Vehicle speed governors

These devices may be supplemented with additional management controls, such as tachographs, on-board computers and vehicle tracking systems. Fuel-saving incentives should be developed to encourage their use and to increase personal responsibility.

Maintenance, emissions and fuel saving

Planned preventative programmes are foremost in ensuring that emissions are kept to a minimum and fuel economy is improved. Maintenance intervals should be specified for individual vehicles depending on their usage. The following could lead to excessive emissions and decreased fuel economy:

- ▶ Excessive air cleaner restriction
- ▶ Insufficient engine compression
- ▶ Faulty cooling system
- ▶ Under-inflated tyres
- ▶ Incorrect wheel alignment
- ▶ Binding brakes

These should be checked as part of routine services, and noted on a checklist. A schedule should be kept of each service and when the next one is due.

Responsible driving

While the manufacturer and dealers can do everything in their power to address environmental issues at each stage of the life-cycle of the vehicle, it is the responsibility of the public (drivers) to ensure that driving emissions are kept to a minimum.

Green-band driving and "reading" the route are the most important aspects of economical driving. How these are applied in stop-start traffic, open road, and uphill/downhill operations could affect emission levels and fuel economy more than is realised.

3. SUMMING UP OF WORKSHOP

In his keynote address Mr Martin Lloyd, South Africa's Chief Air Pollution Control Officer operating under the auspices of the Department of Environmental Affairs and Tourism, emphasised the importance of effective control of diesel emissions. He balanced the benefits of diesel as a transport fuel against the environmental and health costs when not used responsibly. The position of appropriate legislation and effective enforcement was put in perspective. He agreed that current legislation is not optimal, and concluded that sufficient information is available in South Africa to draft an appropriate strategy to address the current situation of ineffective control. Practical solutions are needed. It is time to act.

Nicola Robbins of Nissan South Africa, expressed the views of manufacturers. Her approach focused on the principle of life-cycle analysis. On behalf of the manufacturers, she asked what does it really mean to be a manufacturer of diesel vehicles? Today manufacturers must accept extended responsibility for their products and look at the raw materials and their origin (mining) in the process of manufacturing, eg emissions from paint shops, effluent and hazardous waste. However, 80% of the environmental impact of these vehicles occurs during their useful lifetime - in the hands of the consumer. Therefore, apart from the manufacturer's role in minimising the environmental impacts of the manufacturing process, there is a role to be played in educating the public. Stimulating awareness, which is the aim of this proposed Clean Diesel Campaign, is one way of addressing the impact of diesel vehicles throughout the life cycle of the product. An integrated approach involving a team of responsible people is called for.

Professor Dutkiewicz of the UCT Energy Research Unit provided perspective on the role of diesel as an energy source, balancing the advantages and disadvantages. He pointed out that there is no such thing as a clean fuel - only that some cause less damage than others. South Africa, in contrast with Europe, has an imbalance in the consumption of diesel relative to petrol. This is mainly due to the taxes which were placed on diesel vehicle imports during sanction years. Also, in South Africa there is little difference in the prices of diesel and petrol, while in European countries diesel generally costs less. According to Prof. Dutkiewicz poor maintenance of diesel vehicles is the key contributor to excess pollution from their engines. The emission of particulates which is the main

concern, is influenced chiefly by the sulphur content of the fuel, the fuel density and its poly-aromatic content.

Since diesel is preferable to petrol as a transport fuel from a number of perspectives (eg. more efficient, requires less crude oil imports, less frequent engine replacements, more economical), he proposed that the use of diesel be promoted in the Kombi Taxi industry. There is potential for increased use of diesel fuels in South Africa provided effective emission controls are introduced and enforced.

Viewpoints from metropolitan councils were given for Cape Town by Mr Hans Linde and for Johannesburg by Mr Gideon Slabbert, both of whom highlighted the problems of enforcement of current legislation. Current shortcomings in the legislation are:

- ▶ Administration is cumbersome
- ▶ Turbo-charged vehicles are exempted (50% of diesel vehicles)
- ▶ Penalties are low - the costs of testing and follow-up are higher than the fees
- ▶ Free acceleration testing is not representative
- ▶ Reactive

In Johannesburg about 1 500 vehicles are tested per year of which 30-40% exceed the HSU limits (Hartridge Smoke Unit limits are 60 for the coast, 65 for mid-level and 70 for the Reef). Both of these speakers called for improved legislation and team work to address the problem.

For the Department of Mineral and Energy Affairs (DMEA) Mr Theunis Burger pointed out that his Department recognised and made provision for the energy and environment interface. He noted that not only diesel but also petrol-powered vehicles are important from an environmental viewpoint. The Department acknowledged that diesel has a special role to play in South Africa's energy economy. In the context of fuel efficiency, diesel is preferred in the production sectors of the economy. Lower fuel taxes are being introduced especially in the agricultural sector. Only 13% of diesel is sold at retail level, the remainder is sold at the cheaper wholesale level.

It is the DMEA's opinion that good, enforceable legislation would be a fitting first step.

The Environmental Law Association represented by Robyn Stein, felt that many people consider South Africa to be environmentally lawless. This however, is not correct since good legislation exists but it is not well enforced. For example Section 36 of the Air Pollution Prevention Act deals with motor vehicle pollution. Currently only 40 local authorities nationwide have the power to enforce the Act. A general overview of the legislative control of vehicle emissions is given below.

Vehicle emissions are principally controlled in terms of Part V of the Atmospheric Pollution Prevention Act 45 of 1965 (APPA).

Application of Part V of the Atmospheric Pollution Prevention Act to local authorities

- ▶ In terms of Section 36 (1) of the APPA, Part V applies only in the area of jurisdiction of a local authority which has been designated by the Minister of Health by notice in the Government Gazette. Local authority must therefore be specifically designated by Ministerial notice to enforce air pollution control for vehicles. Not all local authorities in the Gauteng province, for example, have been empowered to exercise these control measures.
- ▶ Section 36 (4) of the APPA provides that if the Minister of Health is of the opinion that a local authority has not exercised its powers, the Minister may direct that the powers shall be exercised by the Chief Air Pollution Control Officer (appointed under the APPA) and may then recover from the local authority concerned the costs incurred by the Chief Officer in the exercise of those powers. The Minister of Health may furthermore after consultation with NAPAC, by notice in the Government Gazette, withdraw any notice which makes Part V of the APPA applicable to a local authority, by way of a further notice published in the Government Gazette.

Vehicle emission control procedures

- ▶ In terms of Section 37 (1) of the APPA a person who is authorised to do so by a designated local authority, may require the driver of any vehicle on a public road situated within the area of the jurisdiction of that local authority to stop such a vehicle and he/she may carry out a prescribed examination of the vehicle concerned. Furthermore, the person authorised by the local authority may serve upon a person who is registered as the owner of the vehicle concerned, a notice in writing calling upon the vehicle owner to make the vehicle available within a period and at a place specified in the notice for the prescribed examination.
- ▶ In terms of Section 37 (2) the APPA, if after the examination of a vehicle concerned, the person who carried out the examination is satisfied that noxious or offensive gases are being emitted from such vehicle he/she shall serve registered owner of that vehicle, a notice calling upon him/her to take the necessary steps for preventing the emission of noxious or offensive gases from that vehicle and to make the vehicle available within a period and at a place specified in the notice for examination. This notice is served on the owner of the vehicle by delivering it to him/her or by transmitting it to him/her by registered post at his/her last known address. Any person who fails to comply with the requirements is guilty of an offence.
- ▶ In terms of Section 39 (1) of the APPA the Minister of Health may, after considering a report by NAPAC, make regulations prohibiting the use on any public road

within the area of a local authority, the use of a vehicle from which noxious or offensive gases specified are emitted or prohibiting the emission of noxious or offensive gases which are of a darker colour or a greater density or content than is specified in the regulations. The Minister of Health may further prescribe the steps that shall be taken to prevent the emission from any vehicle of noxious or offensive gases contrary to any regulation (made under Section 39 of APPA) and may also prescribe the method that shall be applied in order to determine whether any vehicle emits noxious or offensive gases contrary to any regulation made under this section. Regulations have been promulgated to deal with prescribed examination procedures. The Minister has made the regulations on vehicle emissions applicable to certain local authorities only.

Appeal procedures

- ▶ In terms of Section 387 of the APPA any person who is aggrieved by any notice served upon him/her under Section 37 (2) may within 14 days of receipt of the notice referred to in that section, lodge an appeal to the Air Pollution Appeal Board. In terms of Section 38 (1) the Board may confirm, modify or set aside such notice and its decision is final.

Road Traffic Act 39 of 1989

- ▶ In terms of Section 101 (k) of the Road Traffic Act no person driving or having a vehicle on a public road may cause or allow the engine thereof to run in such a manner that it emits smoke or fumes which would not be emitted if the engine were in good condition or ran in an efficient manner.

The bottom line, therefore, is that legislation exists; we need to enforce it effectively, hence resource availability must be determined in advance. Furthermore, under the new Constitution, people have the right to live in an environment which is not harmful.

Mr George Bleimschein representing the South African Petroleum Industry Association (SAPIA) expressed the view of the oil industry. He gave the background to the environmental concerns related to diesel emissions focusing on the potential carcinogenic effects of diesel particulates; hence the control of particulate emissions is a key factor and can be done in various ways, eg. fuel composition, oil changes, engine technology, proper maintenance etc. He pointed out that lubricants add to the particulates and should be included in the control equation. He supported appropriate and enforceable legislation and warned that our own conditions must be taken into account instead of blindly following overseas trends.

For Fleetwatch, representing some end users, Mr Patrick O'Leary emphasised the importance of team work and getting commitment and buy-in from the users of diesel vehicles to control the emissions. Public education plays an important role. We need a strong campaign to promote the clean use of

diesel as time is running out. We need resources and support from all sectors. It is time to stop talking and take action.

The voice of the environmental movements came from Dawie Coetzee of Earthlife Africa, who challenged the audience towards a total paradigm shift. He pointed out that the principles of a total life cycle approach were important, and called for the replacement of fossil fuels with renewable energy sources as well as the elimination of the need for transport as we know it. He furthermore highlighted the fact that many environmental problems could be traced back to bad planning.

4. OUTCOME OF WORKSHOP

Delegates broke away in three technical groups which addressed the following specific questions:

Group I - Coordination and Finance

- Which body will be responsible for coordinating the campaign?
- When should the campaign start?
- How long should the duration be?
- Who to approach for funding?
- How much funding will we need?
- Other relevant issues.

Group II - Technical Aspects

- Who will be responsible for producing a framework document?
- What technical information is available?
- Is it sufficient for the needs of the campaign?
- What are the current international trends?
- Compilation of a public information flyer
- How to structure the campaign?
- Involvement of service stations
- How to provide motivation for emission reduction?

Group III - Communications and Public Involvement?

- What is the message?
- To whom are we speaking? Eg. target audience
- Why should they listen - why is our message relevant to them?
- Why do we want to tell them this?
- What action/response are we seeking?
- What is the tone of our voice?
- What is the budget? - this dictates the media we use
- What results do we want?
- By when do we want it?

Following the breakaway groups, a proposal was adopted to run a Clean Diesel Campaign.

Objective of Campaign

Clean up the dirty black smoke associated with diesel vehicles. Focus mainly on heavy trucks. Educational aspect crucial.

Key Focus Areas for the Campaign

Legislation

Some debate took place as to whether a campaign could be effective without adequate legislation in place but it was also felt that to wait for the passage of adequate legislation would slow down the pace of the campaign. The use of amendment of SABS standards (SABS 947: Testing of vehicles and SABS 0216: Equipment at testing stations) rather than waiting to change legislation, was suggested. Amendments to these codes are necessary and could be carried out quickly.

It was decided that legislation needed to be redrafted nonetheless, and could possibly be looked at by the Environmental Law Association.

Self-regulation was unlikely to work as responsible organisations such as the Road Freight Association represent only a small fraction of the operators. Small operators must be a key focus of the campaign. Success will require support of the courts.

Roadworthy

The suggestion was made that the roadworthy process be used to promote awareness, linked to annual licence provision, eg. provide information on smoke with issue of licence.

Diesel vehicles could be forced to undergo annual roadworthy tests which included emissions testing. There was some disagreement as to why diesel vehicles were being discriminated against. A suggestion was made that 10-year test for smoke would be adequate but it was pointed out that a one-off test is easy to pass, and the vehicle could continue to pollute the next day.

The capacity to cope with all this testing was questioned, and it was agreed that privatised testing stations would have the capacity to cope. This was also a political issue.

Roadside Testing

It was decided that road testing was a necessary part of ensuring compliance and ongoing maintenance. However, the practicality of such testing was questioned - there had been many failed attempts - there was a lack of resources, and technical difficulties existed. It was often difficult to pull vehicles off the road (eg. on freeways) and finding a suitable dust-free testing environment was crucial.

Hartridge is clearly inadequate, for example it excludes turbo vehicles. There is a need for something between Hartridge and "eyeball", eg. a simple hand-held opacity indicator. But it was unsure whether this would stand up in court. There are also difficulties in differentiating between different levels for different vehicles.

It was suggested that privatised policing be explored since it is clear that the old approach is not working. The Traffic Departments should take responsibility but they tend to push responsibility onto the Department of Health. In general, safety issues will always take higher priority, especially for the Traffic Department.

It was suggested further that enforcement officers should be able to issue tickets on the spot, instead of waiting for cases to go to court. Photographs could be taken and used as evidence, but the laws need to be revised in order for this to be carried out.

Other considerations

- ▶ Vehicles which do not emit smoke should provide visible evidence that they are serviced regularly - eg. certificate on the truck. Marketing for the responsible company.
- ▶ It is necessary to consider initiatives in other countries, eg. on-board opacity meters.
- ▶ Rewards could be considered for those that comply, eg. testing at fuel stations - and providing fuel at lower price if below a certain limit.
- ▶ Small business development groups need to be involved in order to reach the smaller operators.

RECOMMENDATIONS

The delegates concluded that a countrywide *Clean Diesel Campaign* would stimulate awareness from all parties involved, from manufacturers to end users. It was proposed that a steering committee be elected to follow up the issue. In view of current development in the legislation arena in South Africa, no action has been taken to date. However, the key players and organizers of the workshop are still committed to launch a campaign which will be effective and affordable. Suggestions/comments from the readers of *Clean Air Journal* will be welcome. To be addressed to Dr Petro Terblanche, President: National Association for Clean Air, CSIR, P O Box 395, Pretoria 0001.