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Reducing the environmental impacts of energy use by automobiles: Selected future options for South Africa

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INTRODUCTION

The transport sector is the major consumer of liquid petroleum fuels, and a major source of greenhouse gas emissions. It had been estimated to contribute 11% of total national greenhouse gas emissions. It is thus a significant contributor to climate change and air pollution with the attendant negative impacts on climate and human health. This is worsened by South Africa's relatively aged vehicle fleet, whose average age has been estimated at about 11 years (SAPIA, 2008). In view of this, the South African National Energy Research Institute (SANERI) supported a project, executed by the CSIR, to look at the impact of energy use in the transport sector on the environment, particularly air quality in Cape Town and Johannesburg. Two stakeholder workshops were held to discuss findings and formulate recommendations for policymakers. Key issues to emerge from the workshops include reducing the number of old vehicles from the national fleet, and this forms the basis of this paper.

KEY ISSUES FROM STAKEHOLDER WORKSHOPS

- Stakeholders viewed the disposal of old vehicles as a complex issue requiring a 'toolkit' of diverse options to deal with it
- The vehicle emission standards associated with the upcoming controlled emitter status of vehicles will apply only to newly manufactured vehicles, leaving older vehicles outside this regulation.
- Replacement of catalytic converters is relatively expensive, and because of weak enforcement or inability to afford, old catalytic converters are sometimes replaced with ordinary pipes. New cars will likely end up in this situation.

SELECTED INTERNATIONAL LESSONS IN SCRAPPAGE OF OLD VEHICLES

Internationally, no vehicle scrappage programmes have aimed only at greenhouse gas reduction. Different countries have different goals for their scrappage schemes; and some have been running for over a decade (e.g. Sweden, Vancouver in Canada). The goals include reduction of criteria emissions, stimulating the automotive industry, and to reduce vehicle abandonment. There are often multiple goals.

The resuscitation of the auto industry in this way (Engineering News, 2009) has been criticised as selective government support for certain industries and drivers, using tax revenue paid by all taxpayers (Miron, 2009). The sales spikes experienced at the time of scrappage rebates could be just short term, followed by depressed sales in the aftermath of these programmes. This was experienced in Germany in 1994-96, and in the US in 1997-98 (Katz, 2009).

SOME FINDINGS FROM THE US AND EUROPE

There have been different approaches to influencing consumer behaviour (Bauer 1996). The US focussed on setting emission standards on manufacturers, and hybrid vehicles in the US reached just 3% penetration of the vehicle fleet. On the other hand, Europe has favoured taxing gasoline to keep prices high, and succeeded in promoting diesel-fuelled vehicles to reach 50% of the fleet (Miravette and Moral, 2009).

Scrappage schemes generally impose a minimum age for a vehicle to qualify for a scrappage rebate, yet high fuel consumption vehicles occur across all age and cost categories. The minimum age restrictions exclude newer '*gas guzzling*' vehicles that emit more per kilometre. Furthermore, there is evidence to suggest that newer cars may be driven for longer distances per annum than older cars, negating some of the efficiency gains obtained with the newer cars. This tendency may depend on the vehicle in question and the income of the driver.

The cost effectiveness of scrappage for any given criteria pollutant is inconclusive at this stage (Miron, 2009). The production of replacement vehicles in an accelerated scrappage scheme will increase the production-related emissions.

The timing of scrappage programmes relative to the diffusion path of new technologies that consumers are expected to adopt is more critical than the size of the programme. This may partly explain the different outcomes between Europe and the (Miravette and Moral, 2009).

The mid to upper income group are the most likely to have money to purchase new vehicles and thus participate in scrappage schemes. There is therefore need to know the income profiles of the owners of vehicles, particularly within the bracket qualifying for the scrappage rebates.

Destruction of old vehicles in large numbers can lead to a reduction in availability of second hand vehicles for sale, leading to higher prices. This would prevent lower income owners with the oldest, worst polluters from accessing better, used vehicles (Allen *et al*, 2009).

SELECTED RECOMMENDATIONS RELEVANT TO SOUTH AFRICA

- A fuel economy-based eligibility scrappage incentive system open to all ages of vehicle, provided the fuel economy improvement is large enough. In this case, there is need for a limit on mileage to ensure that there is still life left in the vehicles to be scrapped. This approach is expected to encourage manufacturers to produce more fuel-efficient vehicles in the long run.
- The imposition of higher toll fees during peak hours as a measure to reduce congestion is ill-advised in the absence of complementary measures as it requires that there are viable alternatives for drivers giving up driving during peak times. The public transport system in South Africa compares poorly to the integrated systems found in many European countries where most workers commute to work on the well developed public transport systems.
- Given South Africa's relatively older vehicle fleet and high income inequality, the proportion of car owners able to qualify for rebate schemes is likely to be relatively smaller. Two parallel but complimentary programmes could meet both the environmental and stimulus goals: a scrappage scheme without the requirement to surrender the old vehicles in parallel with a rebate scheme for recycling old cars. This has potentially broader participation and greater impact (Li *et al*, 2009; Huang, 2010). It could target both the high and lower income segments with options suited to each and could suit South Africa.
- Cash incentives could be provided for the repair of old vehicles to a specified standard at qualified facilities.
- Introducing blended fuels or ethanol requires investment in extensive national infrastructure. A smart way to achieve this could be through localised use of flex fuel vehicles in niche areas like sugar estates or specific municipal fleets.

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As a major source of greenhouse gas emissions, the South African transport sector needs to find innovative ways to accommodate both high- and low-income vehicle owners to reduce the negative environmental impact of the sector.