Report review
Air Quality: Missing the wood for the trees by Ivo Vegter published by the South African Institute of Race Relations, September 2016

Christiaan Pauw
Nova Institute, 13 Beuke Place, The Willows Ext 14, Tswhane, Gauteng, South Africa

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This report of just under 20 pages into South Africa's air quality situation comes out with its conclusion right on the front page as a subtitle: "Indoor pollution is SA's most serious air quality problem". The title, *Air Quality: Missing the wood for the trees*, itself is clearly polemic. Upon reading the title, one wonders exactly who it is that is missing the wood for the trees. The answer becomes apparent in the first line of the introduction section, namely that when examining air quality *media and activists* focus of industrial pollution but loose sight of what the author regards as the real problem, namely indoor air pollution.

Content of the report

The report is a synthesis of existing published material on air pollution in South Africa complemented with case studies derived from interviews with residents of Concordia, on the outskirts of Knysna, in the Western Cape.

After the introduction that contains the main argument in abbreviated form, the report is made up of four more sections.

Section two critically discusses what Vegter believes to be a sensationalist treatment of ambient air quality in South Africa. Vegter is convinced even though the body of evidence is sparse and fragmented, a look at the available facts *exposes the superficial, sensational and piecemeal treatment that environmental lobby groups and much of the media apply to air quality*. He is convinced the there is no national air quality problem but he does acknowledge that hot-spots exist where air quality standards are exceeded, noting that air quality exceedances are common in cities worldwide. The sensationalist coverage of the process where 37 industries applied for postponement of the deadlines for compliance to minimum emission standards is critically assessed. Vegter gives a brief overview of results of the 13 monitoring stations operated by DEA in the three priority areas that was taken up in the 2016 World Health Organization (WHO) Global Urban Ambient Air Pollution Database. In eight out of the 13, the annual standard for PM10 was exceeded (year not given). Vegter then contextualises this with reference to Brazil, China and India where the former two appear to have even higher average concentrations than those found in South Africa.

He develops the argument that indoor air pollution is a greater source of concern making use of a case study with households who use wood for cooking and heating. A key element of Vegter's argument is the notion that indoor exposure is more important than ambient exposure. He support this with a quote from Norman et al.: *Although attention to air pollutant emissions is dominated by outdoor sources, human exposure is a function of the level of pollution in places where people spend most of their time. Human exposure to air pollution is therefore dominated by the indoor environment.*

Section three deals with the effects and consequences of indoor air pollution in comparison to other types of pollution. The first subsection discusses the health effects of indoor air pollution with particular focus on acute lower respiratory infections. With reference to a 2009 article by Brendon Barnes, Vegter asserts than *Indoor air pollution accounts for the deaths of 1,400 South African children per year* although he later states that *…specific studies with large enough sample sizes that link changes ALRI* (in acute lower respiratory tract infections) *incidence with indoor air quality have not been made*.

The second subsection in this section makes use of research by the Medical Research Council's (MRC) Burden of Disease Research Unit to show that, for the year 2000, indoor air pollution was responsible for fewer deaths but more disability-adjusted life years (DALYs) than ambient air pollution. The fact that, according to the MRC's calculation, indoor and outdoor air pollution, even when combined, account for less than 1% of all healthy life-years lost in South Africa is used to argue that a single-minded focus by activist groups on pollution from mines and industry is misplaced since it risks dismissing solutions that have a higher benefit-to-cost ratio and may have significant health benefits. The last subsection deals with the economic consequences of indoor air pollution and emphasises the lack of good data on the subject, but speculates that benefits may be large.

Section four deals with solutions to indoor air quality problems. Vegter briefly discusses electrification, alternative top-down ignition of coal fires, low smoke fuels, improved cookstoves, thermal insulation of houses, LP gas and biogas. Vegter notes the advantages of electrification but also the barriers that limit complete adoption of electricity by all households for all utilities. He briefly describes some of the background relating

to the alternative top-down ignition method for coal fires noting the problems inherent in behaviour-change interventions. The macro-scale experiment conducted by the then Department of Minerals and Energy (DME) in Qalabotjha in 1997 is mentioned, noting that low-smoke fuels have potential to improve indoor air quality. Vegter briefly discusses 'improved' cookstoves based on a 1996 study comparing different cookstoves and an open fire. He also mentions the problem of approximately three million uninsulated RDP houses and the benefits that thermal insulation of such structures may have. Vegter notes the obvious benefits that replacing solid fuels with liquefied petroleum gas (LPG) may have. He questions the rationality of the Department of Environmental Affairs' (DEA) suggestion in the *Draft Strategy to Address Air Pollution in Dense Low-Income Settlements* that the uptake of LPG can be increased by regulation of the price of not only LPG but also of LPG cylinders. Vegter notes that although biogas has limited applicability because it requires a fairly large investment and a minimum amount of water and dung, there are some benefits that merit further research and support.

Vegter mentions a series of international examples of interventions to reduce indoor air pollution through improved ventilation, improved stoves, biogas stoves and behaviour change to show that success in reducing indoor air pollution can be achieved.

With reference to a 2006 article by Leiman et al., Vegter introduces the theme of cost-benefit analyses. He emphasizes the point made by Leiman and also by Yvonne Scorgie that interventions focused on household pollution sources result in positive cost-benefit ratios while additional industrial *controls are not yet justifiable in terms of health care benefits as weighed against costs*.

The section concludes with a subsection called *Private sector opportunities and solutions* where Vegter points to the *opportunity for the private sector to make a difference given the slow progress of government programmes and the lack of resources among non-governmental organisations*. Apart from the obvious corporate social responsibility opportunities, he seems to be positive about the business prospects in marketing cleaner energy products to households. He provides examples of such businesses from Kenya, Pakistan and Guatemala. Air quality offsets are discussed at some length (compared to other aspects). He makes reference to Eskom's air quality offset pilot project in Kwazamokuhle. He mentions the opposition to this by environmental groups but emphasizes that the law allows for offsets and that there are clear advantages to this approach.

The document closes with a *Conclusion* section where the main argument is summarized. The argument is this: Media and activists tend to focus on ambient air pollution resulting from industries as a source of concern. They are correct in the case of a few hot-spots but this should be viewed within the context that cities world wide are polluted. Pollution from household sources have a far greater impact than industrial air pollution. Even if indoor and outdoor air pollution are viewed together they contribute less than 1% to the national disease burden. Examples of solutions to pollution from domestic sources do exist but there are still barriers. *An economic analysis shows that cleaning household air is more economical and yields greater social and health benefits than attempts to reduce industrial pollution. Private sector incentives may improve the quality, reach and long-term success of projects to clean the air in people's homes. Offsets could balance the dividends from indoor air pollution improvement projects against the costs of legislated emissions obligations*.

Analysis

The report is a short and not overly nuanced treatment of a complex topic. Vegter does not seem to be very familiar with the field but he does manage to spot a structural problem in the discourse perpetuated by, as he calls it, *media and activists*, especially as far at the resistance to air quality offsets are concerned.

There is one conceptual ambiguity that permeates the whole document: Vegter seems to use the term *indoor air pollution* almost as equivalent to air pollution from domestic sources as if domestic sources do not also lead to ambient air quality problems or pollution from large point sources do not ingress into houses. For example, with reference to the DEA's Environmental Offsets Discussion Document he notes that *…legal provisions that would permit companies to reduce their cost of regulatory compliance by funding innovative indoor air quality programmes could work, but only if these offset programmes are transparent and subject to independent oversight to limit corruption*. This ambiguity is present throughout. It seems as if the distinction between the place where an activity is located, the place where an emission occurs and the place where a person is exposed passes him by. The distinction is important however. The operation of a cast iron coal stove, of which there are still some hundreds of thousands in use in the townships on the highveld, can serve as an example: the activity of using the stove takes place indoors, a small part of the emission is also emitted into the indoor environment during the ignition process and through cracks in the stove or chimney. The larger proportion of the pollutants are, however, emitted into the ambient environment through the chimney. The people who are exposed to the indoor emissions are the household who performs the activity themselves. This exposure also takes place indoors. The people exposed to the emissions into the ambient environment may be the same household, the neighbours and the people in the same town. This exposure may occur outdoors when people are outside but also indoors as ingress of pollutants into houses (and possibly also accumulation) takes place. Following the principle of charity I read "indoor air pollution" in the text to mean all air pollution resulting from domestic activities.

The part of the argument that builds up to the assertion that there is no national air quality problem is somewhat contradictory. It starts with the acknowledgement that *Reliable and comprehensive statistics about air pollution, whether indoor or outdoor, are hard to find. Surveys and estimates are often incomplete, outdated, based on sparse information and*

sometimes inconsistent with each other but then insists that a comprehensive look at the information yields exposes the *superficial, sensational and piecemeal* treatment of air quality by environmental lobby groups and much of the media. The irony is that a comprehensive overview of incomplete data is still incomplete.

This subsection dealing with the question of whether there is a national air quality problem is basically an *argumentum ad auctoritatem*. Vegter follows the 2005 Country report to the United Nations Conference on Sustainable Development (UNCSD) by the DEA where it is claimed that there is no national air quality problem but air quality is poor in certain hot-spots without any critical reflection. He appears to find comfort in the fact that the 2010 report to the UNCSD does not mention air quality at all. He chastises the media and environmental groups for neglecting to mention that almost all cities in low- or medium- income countries have air quality problems. The definition of what constitutes an air quality problem appears to differ between Vegter and his ideological opponents. Vegter seems to think that as long as we don't have more problems than anyone else, we are fine. The environmental groups compared air quality in Johannesburg to the WHO guidelines. There is a clear difference in outlook.

I think Vegter is correct to find it disappointing that Earthlife Africa and groundWorks did not contextualise the air quality findings within the international context, but I find his low levels of ambition disappointing. It is fully possible to aspire to high standards and have a realistic understanding of how difficult it will be to reach those standards. There are many fields of research and practice that are difficult and acknowledged as such, such as alleviating mass poverty, curing cancer or rehabilitating heroin addicts. Practitioners and researchers in these fields start by acknowledging that the field of practice is difficult and the research questions are complex. Air quality is one of these fields.

The most disappointing section of the report is the section on *Solutions to indoor air quality problems*. His treatment of electrification and biogas use are a bit of an exception. He shows how electrification does lead to a reduction in exposure to pollutants and shortly explains the barriers to full electrification. The conclusion is that full electrification would have worked but is unrealistic and that the recommendation in the DEA strategy document is of precious little help. The *DEA's recent draft strategy for addressing air pollution in poor communities says little about free basic electricity apart from stating that "government will explore new ways of providing electricity subsidies"*. In the case of biogas he at least acknowledges the small potential impact.

In the rest of the section it becomes apparent that Vegter has superficial knowledge of the subject matter. This is especially clear in the lack of reference to the context onto which each of the intervention candidates are orientated as well as his lack of vision as to the relationship between intervention candidates. He does little else than name and shortly describe a list of intervention candidates in differing phases of development, with different socio-economic and spatial areas of applicability and with markedly different expected impact as far as potential impact and likelihood of success is concerned. Nowhere does he even attempt to say anything about what it will take to implement any of the interventions and what imaginable effects it may have. After this section one may conclude that we do not have any workable solutions in hand. He may not necessarily be so wrong on this point (although he missed the results of two major initiatives involving thermal insulation(see Langerman et al. 2015 for the work by Eskom and https://tinyurl.com/y7zkgfg3 for that by Sasol), one of which he refers to in the future tense when it has in fact been implemented). The inevitable conclusion that air quality interventions are difficult undermines the confidence he expresses in the last section about the possibility of *developing business models that provide profitable opportunities for large companies and small entrepreneurs to sell solutions that work and are affordable to the urban and rural poor*.

After all, convincing people to buy such solutions is the challenge of all business, whether the target market is rich or poor.

He refers to the DEAs, *Draft Strategy to Address Air Pollution in Dense Low-Income Settlements* from 2016 although he misses the significance of subsection 2.7 where sources of air pollution in dense, low-income settlements other than domestic solid fuel use are listed.

Sources

The report makes use of a limited number of sources and misses some important ones. Vegter's argument hinges on a few key assertions. In the paragraphs that follow I will look into the sources of these assertions and make a few critical remarks.

The assertion that the burden of disease from indoor air pollution is larger than that from ambient air pollution plays an important part in Vegter's argument. The source of the assertions on the burden of disease of ambient and indoor air pollution are two articles that resulted from the MRC's *Comparative Risk Assessment* (Norman, Cairncross, et al. 2007; Norman, Barnes, et al. 2007) as well as the summary report of that project. In these articles the burden of disease of both urban and indoor air pollution is estimated for the year 2000.

Two sources are used for assertion that cost-benefit ratios for interventions aimed at household pollution sources are higher than that for industrial emission controls namely an article by Leiman et al. (2007) and Yvonne Scorgie's doctoral dissertation. These two sources are in remarkable agreement. Vegter refers to these as if they are two sources: "*Ms Scorgie's thesis also concludes that …*" but in fact they both derive from the same source, namely the FRIDGE report from 2004 (Bentley West Management Consultants and Airshed Planning Professionals 2004b, 2004a). Interestingly enough, the FRIDGE report was also the source of the exposure estimate used for Randburg, Rustenburg, the Vaal Triangle and Kempton Park in the MRC study on urban air pollution referred to earlier.

Vegter missed a few important sources in the literature. He seems oblivious of the existence of the Clean Air Journal and would undoubtedly have benefitted from its online archive going back to 1971. He could have benefitted from reading the report on *Air pollution in dense, low-income communities in South Africa* by Friedl et al. (2008), if only for the bibliography that is longer that Vegter's entire report.

Vegter also seemed to miss the significance of the project by Sasol in Kwadela (see Sasol Secunda's Offset Implementation Plan page 6 onwards at https://tinyurl.com/y7zkgfg3), Mpumalanga where about 500 RDP houses where retrofitted with thermal insulation. Vegter does refer to the work done by Eskom in Kwazamokuhle but does not seem to grasp its content.

In his treatment of the alternative top-down ignition technique for coal fires, Vegter only refers to the *Basa njengo Magogo* implementation by the (then) DME and not the initiatives by Sasol or by the Nova Institute that was more sophisticated in implementation and monitoring as well as larger in impact than that of the DME (see https://mer.markit.com/br-reg/public/index.jsp?name=Nova%20Institute&entity=project&entity_domain=Markit,GoldStandard).

Conclusion

When interpreted charitably, I think Vegter is correct: Generally speaking, pollution sources close to poor people, often from dirty fuels used by necessity and not by choice, have a greater impact than emissions from large industrial point sources and therefore should be the focus of interventions. Air quality offsets do indeed provide a mechanism where the regulation of industry can be used to re-focus environmental improvements where they are needed most. The in-principle opposition to air quality offsets is indeed irrational and certain sections of the media and environmental pressure groups needed to be berated.

To my mind there is a need in South Africa to build deeper understanding of air quality issues among all stakeholders, even if it is only to foster better quality disagreement. Vegter makes a contribution to this discussion. However, the chances that after reading his report, the likes of Earthlife Africa and groundWorks will repent and rejoice at the discreditation of their erstwhile selves (to quote John Milbank's review of a book by David Bentley Hart), is slim indeed. This is partly because we live in a day and age where, in public discourse, the semantic accent from talking about something to speaking about of who is allowed to say something, is the rule rather than the exception. It is a pity therefore, that these groups had to be chastised (justifiably so) by an elephant-culling enthusiast[1] with a propensity for climate change scepticism[2] and a blindness in the economic right eye.

The report once again emphasised how limited our understanding of the extent and impact of air pollution in South Africa is. Air quality monitoring stations are limited to a few areas but there are clear indications that the problem is larger than the monitored areas. The work by the MRC team on the burden of disease related to indoor and ambient air pollution refers to the year 2000.

How do we get there from here

Reading through Vegter's report I think of two things, the one is about knowledge and the other is about action. Vegter didn't do a particularly good job of collecting and synthesising authoritative sources. In fairness, that may not have been his purpose. He seems to want to make an argument against his ideological opponents as represented by certain environmental groups. However, as I read through this, I think that we need an update of the FRIDGE report, the DANIDA report[3] and the burden of disease studies, only this time more suited to the 21st century through incorporating emerging paradigms such as reproducible analysis and citizen science - maybe even for all of it to take shape on GitHub[4], complete with forks for alternative approaches.

I had an informal discussion about the idea of citizen science with Dr Gerrit Kornelius at the National Association for Clean Air (NACA) conference last year. His reaction to my enthusiasm for the application of the concept of citizen science to air pollution in South Africa was that such an undertaking is a waste of time because we already know enough about the problem, we now need to act upon what we know instead of getting bogged down in more research. I have great respect for Gerrit's opinion and have often thought about what he said during that conversation since then. He may have articulated himself provocatively, but he is correct. Our knowledge of the problem is far ahead of our implementation of solutions. Following this logic, should one just ignore the environmental naysayers and proceed with the implementation of air quality offsets? As the saying goes: *Those who say it cannot be done should get out of the way of those who are doing it.*

The choice between knowledge and action is not a binary one. One needs knowledge in order to do something. Those who are *doing it*, may not understand exactly *what* they are doing. It furthermore remains important to create a broad social consensus, not only to avoid wasting time and resources on mudslinging and senseless court battles but also to mobilise the energy of all stakeholders. The weakest part of Vegter's report, to my mind, is the portion on potential interventions for, as he calls it, indoor air pollution. This subsection is so weak because it lacks context and quantification. He uses the DEA's *Draft Strategy to Address Air Pollution in Dense Low-Income*

[1] See https://tinyurl.com/yd4egh6p and also https://tinyurl.com/ycnzyl2z

[2] See for example https://tinyurl.com/y7awajhw and also https://tinyurl.com/ycaldwsb

[3] Download at https://tinyurl.com/yaqxxru2

[4] https://github.com/about

Settlements as an important source, and the DEA strategy is very weak on nuanced implementation ideas. This is one area where knowledge is especially sparse, exactly because of too little action. After all, knowledge about implementing interventions is only gained by mindful implementation. The recent projects undertaken by Sasol and Eskom show how air quality offsets gave impetus to both research and action.

It was stricter regulation of industries that set the implementation of air quality offsets in motion. When compliance options are flexible because offsetting offers alternative ways to achieve the environmental impacts envisioned by the regulations, more ambitious environmental regulations can be introduced because there will be possible avenues for compliance. The irony is that, judging by his other writings, Vegter will not necessarily like the idea of stricter regulation of businesses and that the environmentalists totally missed this point.

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