



Review

A policy review of synergies and trade-offs in South African climate change mitigation and air pollution control strategies



Carmen Klausbruckner^{a,*}, Harold Annegarn^b, Lucas R.F. Henneman^c, Peter Rafaj^d

^a Johannes Kepler University, Linz, Austria

^b Energy Institute, Cape Peninsula University of Technology, Cape Town, South Africa

^c Georgia Institute of Technology, Atlanta, GA, USA

^d International Institute for Applied Systems Analysis, Laxenburg, Austria

ARTICLE INFO

Article history:

Received 23 July 2015

Received in revised form 12 November 2015

Accepted 1 December 2015

Keywords:

Climate change

Air pollution

Contradicting policies

Co-benefits

GAINS

South Africa

ABSTRACT

Climate change mitigation and air quality management are mostly addressed separately in South African legal acts and policies. This approach is not always coherent, especially in the context of other serious issues South Africa is facing, such as poverty alleviation. Policies implemented to mitigate climate change might increase negative health affects due to unanticipated outcomes (e.g. increased local air pollution), and these indirect consequences must therefore be taken into account when devising mitigation strategies. However, greenhouse gas mitigation policies can also have co-benefits and positive impacts on local air pollution. An evidence-based approach that takes into account greenhouse gas emissions, ambient air pollutants, economic factors (affordability, cost optimisation), social factors (poverty alleviations, public health benefits), and political acceptability is needed tackle these challenges. A proposal is made that use of an integrated climate/air pollution techno-economic optimising model, such as the Greenhouse Gas and Air Pollution Synergies (GAINS) model, may provide a rational decision support tool to guide policy makers into effective strategies for combined Climate Change and Air Quality mitigation measures.

© 2015 Elsevier Ltd. All rights reserved.

1. Introduction

South Africa is an emerging country and the second largest economy in Africa. In terms of energy, a key to South Africa's past economic success was low energy prices that attracted and supported energy intensive industries. In turn, this has led to high emissions per capita of greenhouse gases (GHG) from the predominantly coal-fired power industry. Over the past decade, however, the relative abundance of low-cost electricity has changed—in the past years there have been electricity generation shortfalls and forced blackouts, and electricity prices have risen at rates well above inflation.

The power sector in South Africa is dominated by the state owned company Eskom, which produces 95% of the country's electricity¹. The main resource used for power generation is coal². South Africa is the largest CO₂ emitter in Africa. In 2004,

South Africa emitted 440 Mt CO₂ eq., which was around 1% of the global emissions. The share increased to almost 1.4% in 2010³, giving South Africa the status of one of the world's most carbon intensive economies. At the UNFCCC Conference of the Parties in Copenhagen (COP 15) in 2009, the country made a political commitment to reduce significantly its GHG emission (UNFCCC, 2011).

Local air pollution is another pressing issue due to its negative health impacts (Norman et al., 2007; Matinga et al., 2014; Shirinde et al., 2014). Electricity generation, industrial processes, domestic energy use and vehicular exhaust emissions are the main contributors to air pollution in South Africa (Scorgie et al., 2004).

Environmental issues in South Africa are frequently connected with the question of environmental justice, since these issues are linked to the question of poverty. Local air pollution disproportionately affects poorer (historically disadvantaged black) communities that are located close to industries (Dugard and Alcaro, 2013). Use of inferior quality fuel burning appliances expose these communities to concentrations of smoke and carbon monoxide

* Corresponding author. Tel.: +43 69919135501.

E-mail address: c.klausbruckner@gmx.at (C. Klausbruckner).

¹ http://www.eskom.co.za/OurCompany/CompanyInformation/Pages/Company_Information.aspx (accessed 10.11.2015).

² For more information on the South African coal sector see (Eberhard, 2011).

³ See <http://data.worldbank.org/indicator/EN.ATM.CO2E.KT/countries> (accessed 10.11.2015).

that cause adverse health effects (Shirinde et al., 2014). Furthermore, poorer households are likely to be more vulnerable to adverse effects of climate change, a consideration that has been taken into account in South African climate change adaptation strategies (DEA, 2013).

The purpose of this paper is to conduct a policy and legal analysis of South African climate and air pollution control policy strategies. The second section gives a perspective on South Africa's overall policy orientation, and explores issues surrounding air pollution and climate change. The policy frameworks in the fields of air quality and climate change are outlined in the third section. The discussion includes an overview of the legal framework, with special attention paid to how the different policies articulate with each other. Additional details (especially on international commitments, constitutional rights, legislation, and regulations) can be found in the Supplementary Material. The fourth section explores inconsistencies and contradictions between air quality and climate change policies, and implementation strategies within the current legal and policy framework. In the final section, a resolution of these inherent contradictions is offered through the implementation of an evidence-based, integrated approach, together with criteria for employing this approach that is applicable also for other developing countries facing similar problems. This approach has been adopted successfully for integrated assessments in Europe and in numerous developing countries in Asia (Purohit et al., 2010, 2013; Chen et al., 2015).

2. South Africa's position on mitigating climate change and the problem of local air pollution

2.1. Climate change

Climate change is a global issue that also affects South Africa. In 2013 South Africa was ranked 27th in the Global Climate Risk Index (Kreft et al., 2014). South Africa has ratified the major treaties on climate change: the 1992 UN Convention on Climate Change in 1997, and the 1997 Kyoto Protocol in 2002. Obligations regarding these treaties are determined according to the principle of common but differentiated responsibility. South Africa is listed as a developing country in Annex I of the Kyoto Protocol, and therefore has no obligations to reduce GHG emissions. Nevertheless, at the UNFCCC Conference of the Parties in Copenhagen in 2009 (COP 15), South Africa committed itself to reduce its GHG emissions 34% by 2020 and 42% by 2025 in comparison with the "Business as Usual" trajectory⁴ (UNFCCC, 2011), subject to conditions of technical and financial support from the developed countries.

2.2. Air pollution

Ambient – especially indoor – air pollution, are major public health issues. Local air pollution increases the risk of acute respiratory tract infections and pneumonia, especially in children of low-income communities—in 2012 the pneumonia incidence rate for children under five years was 66.8 out of 1000⁵, and an increased risk of wheezing for children due to outdoor and indoor air pollution was found in the Child Highveld Priority Area Study (Shirinde et al., 2014).

Domestic fuel use (mainly of coal, wood and kerosene) is a source of indoor and local air pollution. The problem occurs in South Africa particularly in informal settlements near major cities, but also in rural areas. Especially in winter, ambient particulate

concentrations can reach dangerously high levels in places such as Soweto, South Africa's largest township (Scorgie et al., 2004).

The use of electricity for cooking is increasing from 58% in 2002 to 78% in 2013 (General Household Survey, 2014). However, in some provinces (Limpopo, KwaZulu-Natal, Mpumalanga, Eastern Cape) solid fuels remain an important source of energy for cooking. Even if households are electrified, other fuels are still used extensively for cooking, for economic reasons⁶ (Matinga et al., 2014). Apart from air pollution, the use of solid fuels increases the likelihood of burn injuries and fire accidents (Kimemia et al., 2014).

3. Existing policies

Climate change is a global concern with GHG reductions discussed on the international level, whereas air pollution is a national concern that is addressed primarily on national, provincial, and local levels. However, measures to reduce GHG emissions have to be taken on the national and local levels. To understand the dynamics between climate change and air pollution, it is necessary to examine the policy papers and legal measures across all these areas. Legal measures in South Africa include the National Environmental Management: Air Quality Act (NEM:AQA) and its instruments (Ambient Air Quality Standards (AAQS), Priority Areas, Minimum Emission Standards (MES), Pollution Prevention Plans, Emission Licences), and are outlined in the Supplementary Material.

Before analysing specific measures in certain policy areas, the overall direction of South African policy development has to be outlined to show the national priorities. As a starting point, an overview is given of the recently developed National Development Plan (NDP), which is intended as the overarching policy framework for all aspects of national development over the next decade and beyond (National Planning Commission, 2013).

The National Development Plan was prepared by the presidential appointed National Planning Commission. The aim of the NDP is to provide implementable steps towards the sustained development of South Africa. It comprises all sectors (inter alia employment, poverty reduction, growth, health, infrastructure, etc.), identifies challenges, and gives a comprehensive outlook of the future challenges of the country with the time horizon to 2030. In order to implement the National Development Plan, the Medium-Term Strategic Framework (MTSF) 2014–2019 was published (The Presidency, 2014). The NDP stresses that the highest priority should be given to increase employment and improve the quality of education. The document focuses on economic development and takes into consideration the need for electricity (sufficient supply) for economic growth. GHG mitigation and health protection are detailed as challenges in this context. A major emphasis of the NDP is the need for investment in infrastructure for public transport, exploitation of coal resources, distribution and use of natural gas, and installation of 20 000 MW renewable electricity by 2030 (compared to 1000 MW in 2009) (Edkins et al., 2010).

According to the National Development Plan, 95% of the South African population should have access to electricity by 2030. An additional 29 000 MW of electric capacity is needed by 2030, which means new installed capacity of about 40 000 MW (20 000 MW renewables) due to the decommissioning of some older coal-fired power stations. The National Development Plan also addresses the need for affordable electricity for the poor. However, the necessity to increase electricity prices to finance Eskom is mentioned. The plan acknowledges the problem of energy poverty and the need for safe domestic combustion. Concrete measures for achieving these goals are not specified in the plan.

⁴ <http://www.climateaction.org.za/cop17-cmp7/sa-government-position-on-climate-change> (6.7.2015).

⁵ <http://indicators.hst.org.za/healthstats/209/data> (accessed 10.11.2015).

⁶ See <http://soer.deat.gov.za/42.html> (accessed 10.11.2015).

Download English Version:

<https://daneshyari.com/en/article/7467042>

Download Persian Version:

<https://daneshyari.com/article/7467042>

[Daneshyari.com](https://daneshyari.com)