

## Southern Africa

### Actions taken by governments to improve air quality

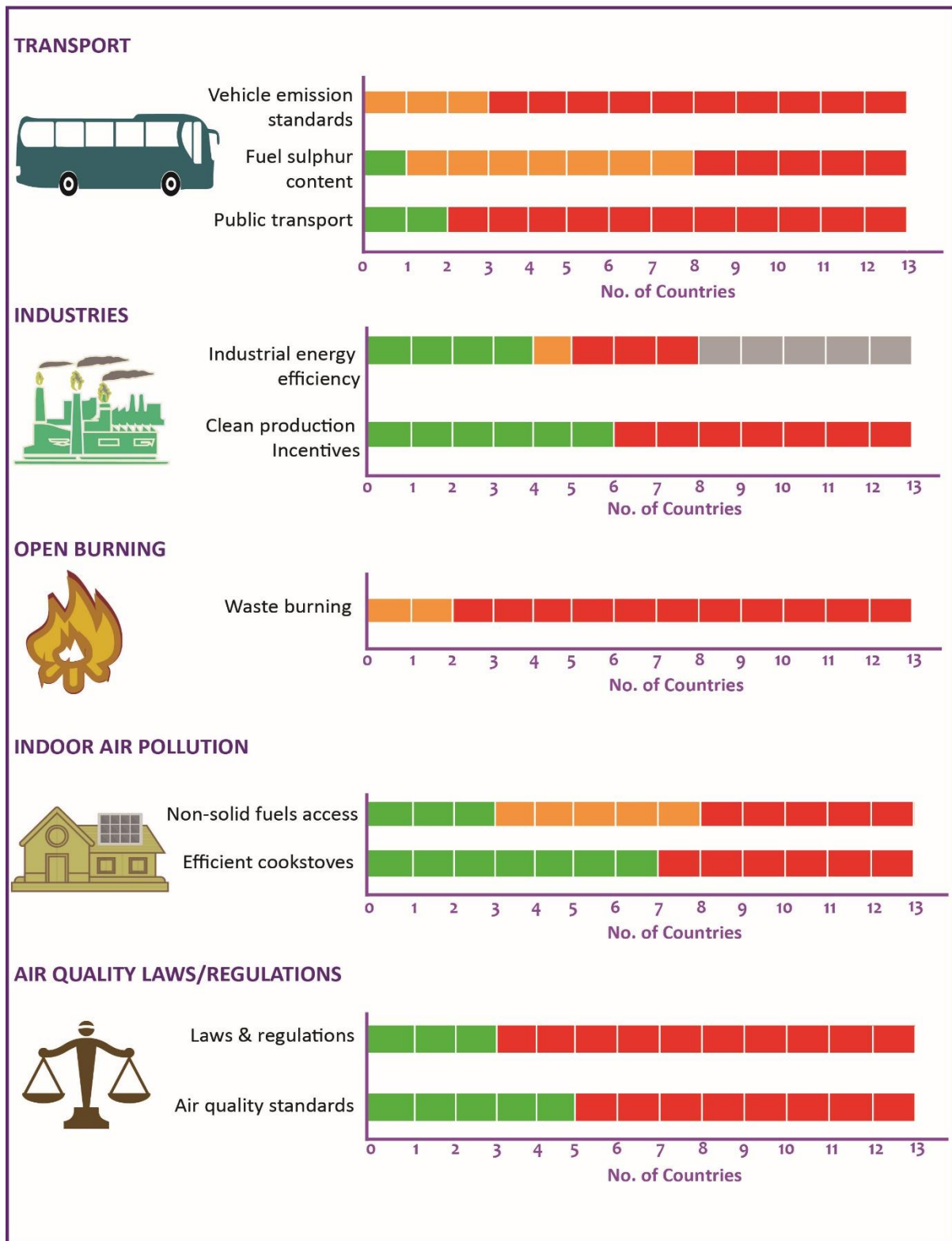
#### 1.0 Introduction

In June 2014 the United Nations Environment Assembly (UNEA) adopted resolution 1/7 *Strengthening the Role of the United Nations Environment Programme in Promoting Air Quality*. As requested in paragraph 4 and 7 of the resolution, which requested UNEP to develop a report detailing actions taken by governments to promote air quality, this report details some of the major actions being undertaken by governments in Southern Africa to improve air quality.

This report summarises ten actions being undertaken in the sub-region to improve air quality. In selecting these ten actions, consideration was given to their replicability, global appropriateness to address particular air pollution challenges and potential impact. For more details, please refer to the methodology document.

These actions are: *For Industrial activities*: 1) establishing incentives that promote investments in renewable energy, pollution control technologies, energy efficiency and clean production mechanism; and 2) increasing industrial energy efficiency. *For road transport*: 3) reducing sulphur content in diesel and petrol; 4) tightening vehicle emission standards to at least Euro 4/IV-equivalent; and 5) increasing investments in public and non-motorized transport infrastructure and systems. *For open waste burning*: 6) reducing open burning of both agricultural and municipal waste through provision of legislation, monitoring, enforcement and municipal waste management systems. *For Indoor air pollution*: 7) improving access to cleaner cooking and heating fuels; and 8) improving access to cleaner, more efficient cook/space heating stoves. *For general legislative efforts*: 9) establishing and continuously tightening ambient air quality standards to meet WHO recommendations; and 10) establishing laws and regulations to support efforts to meet ambient air quality standards, and strengthen monitoring and enforcement. Figure 1 provides a summary of these actions for the sub-region.

## SOUTHERN AFRICA POLICIES AND ACTIONS TO IMPROVE AIR QUALITY



**Figure 1:** A summary of actions, programmes, policies, laws and regulations undertaken by governments in the sub-region to improve air quality (green = progressing to best practice; red = action still required).

## **2.0 Regional Overview**

The Southern Africa sub-region includes Angola, Botswana, Lesotho, Madagascar, Mauritius, Malawi, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Zambia and Zimbabwe. Governments in the sub-region have enacted laws and regulations on air pollution which are at different stages of implementation. At least one out of the thirteen countries in the sub-region has a comprehensive ambient air quality standard with accompanying air quality laws and regulations. Although much has been done to improve air quality in this sub-region, it still remains an issue of concern: WHO estimates that it causes approximately 97,000 premature deaths annually, with most of those resulting from indoor air pollution exposure.

Use of poor quality fuels to meet household energy demand is the most important driver of deteriorating air quality, and it is responsible for around 95% of all premature deaths linked to air pollution in the sub-region. Even though poor quality cooking and heating fuels are responsible for indoor air pollution, they are also a considerable contributor to outdoor air pollution. Therefore to effectively manage air quality in the sub-region, governments and their partners have to enact policies and regulations that promote access to clean energy for both rural and urban households. In the past, governments in this sub-region have initiated programmes that were aimed at increasing access to clean burning fuels. However, only three countries in the sub-region have an electrification rate and non-solid fuels access rate greater than 75%.

Emissions from other sectors such as transport and industry are also significant especially in urban areas and major mining and mine processing zones. The current contribution of vehicular and industrial emissions to the overall air quality in countries within the sub-region is marginal compared to indoor air pollution. However, due to the projected rate of economic and population growth, transport will become more important in the foreseeable future, as more people will be able to afford vehicles. These countries therefore have an opportunity to minimise the impact on air quality from the projected growth in vehicle numbers. This can be achieved by increasing investment to expand public and non-motorised transport infrastructure and systems, and by enacting laws that will ensure vehicles (both new and second hand) being imported into the sub-region have at least Euro 4/IV emission standards and fuel is low sulphur.

Major industrial facilities that alter air quality in the sub-region are mining and energy production. Power production is particularly important as most of the power generated in the sub-region is derived from coal combustion. Although nine out of the thirteen countries produce more than 30% of their electricity from renewable sources, industrial energy efficiency<sup>1</sup> in the sub-region is low with four countries having a GDP per unit of energy use above nine. This indicates that older, less efficient technology is still in use in industrial production.

Open burning of waste is also a major source of air pollution. Open burning of both agricultural and municipal wastes occurs in eleven out of the thirteen countries, while in the other two countries at least one form of waste (agricultural or municipal) is burnt in open fires.

Progress has been made in different areas in different countries, and there are several positive case studies to be found across the sub-region. There are however specific areas in each country that can be improved, while standards need to be established and continuously tightened, public transport expanded, the use of best practice increased etc. In addition, for policies and legislation to lower air pollution, countries must also improve implementation and enforcement, without which actions to improve air quality will not achieve their potential impact.

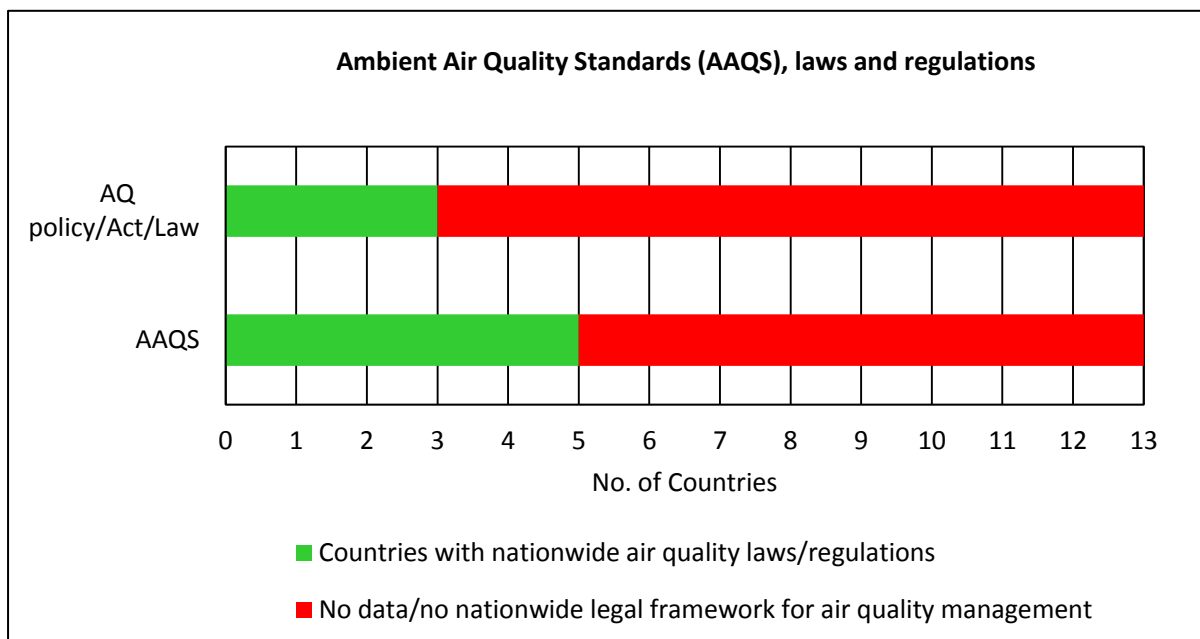
### **3.0 Actions Taken to Improve Air Quality**

#### **3.1 National air quality standards & regulations**

Five out of thirteen countries in Southern Africa have Ambient Air Quality Standards (AAQS): Mauritius, Malawi, Mozambique, South Africa and Swaziland. At least three countries – Botswana, South Africa and Zimbabwe – have a nationwide Law or Act specifically for air pollution control. Figure 2 below shows the number of countries in the sub-region that have established laws and regulations on air quality management. In most of the countries, air pollution is regulated under the larger framework of environmental protective laws.

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<sup>1</sup> Estimated as GDP per unit of energy use at constant 2011 purchase Power Parity (PPP) \$ per kg of oil equivalent



**Figure 2:** Number of countries in the sub-region that have enacted national air quality laws and regulations, and the number of countries that have enacted and promulgated Ambient Air Quality Standards (AAQS).

South Africa has a comprehensive system of air quality laws, regulations and standards. The Air Quality Act (Act 39 of 2004) includes: a national air quality framework; the establishment of national, provincial and local ambient air quality and emission standards; declaration and management of priority areas for areas where air quality is of particular concern; listed activities that require an atmospheric emissions license; listing of controlled emitters and controlled fuels; and a range of new criminal offences. A 2010 amendment to the Act established a list of emission sources to be regulated, and the minimum emission standards for each of these emission sources. However, air pollution, especially in the coal mining regions and urban centres, is still significant.

Although Botswana and Zimbabwe have specific air quality laws/regulations, these laws/regulations are not supported by a comprehensive ambient air quality standard. In Botswana for example air pollution is regulated under the Atmospheric Pollution Prevention Act. Under this Act, the contribution of individual emission sources to the overall air quality within its locality is not considered. However, individual operating permits may have provisions regarding air emissions or effluents, but not as part of a regional air quality management plan. The same case also applies in Zimbabwe, where air pollution is regulated

under the Environmental Management Act of 2002 and the Atmospheric Pollution Prevention Act of 1971, with no nationwide AAQS.

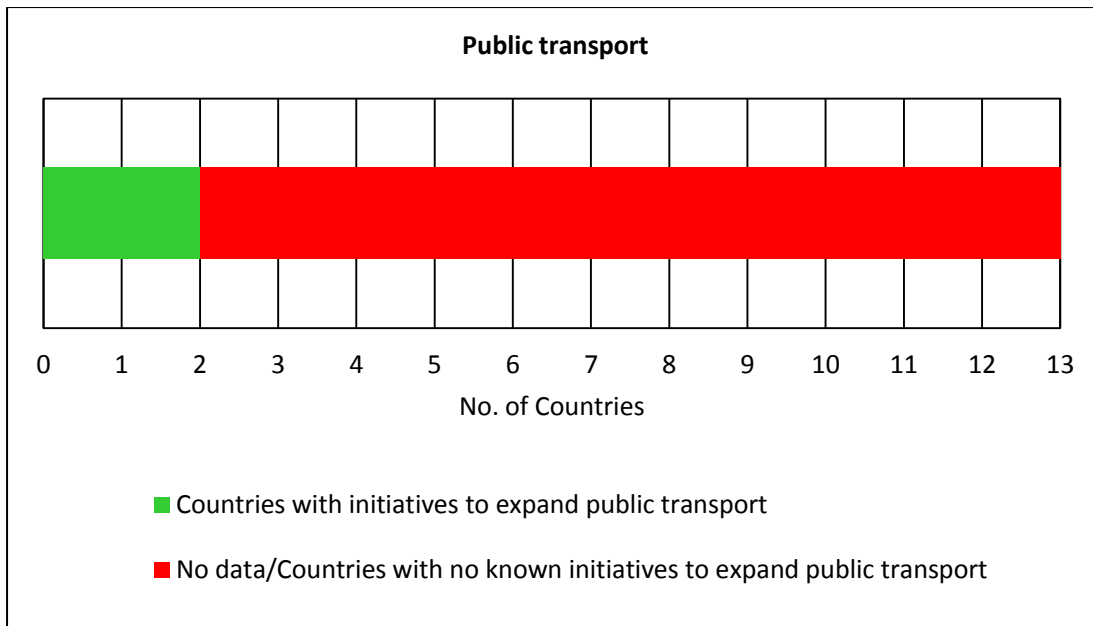
### **3.2 Transport**

Vehicle ownership for the sub-region is expected to increase considerably in the coming years. Given the increasing congestion experienced in many urban areas, maintaining and increasing the modal share of public transport is essential to increasing mobility while decreasing transport emissions. Actions and policies being implemented in the sub-region to reduce vehicular emission include the expansion of public and non-motorised transport infrastructure and systems.

Some of the initiatives being undertaken in the sub-region to improve public transport include investments in Bus Rapid Transit (BRT) system and light rail systems (Figure 3). Several urban areas in South Africa have or are in the process of developing bus rapid transit systems, and investments have been made in intercity train services.

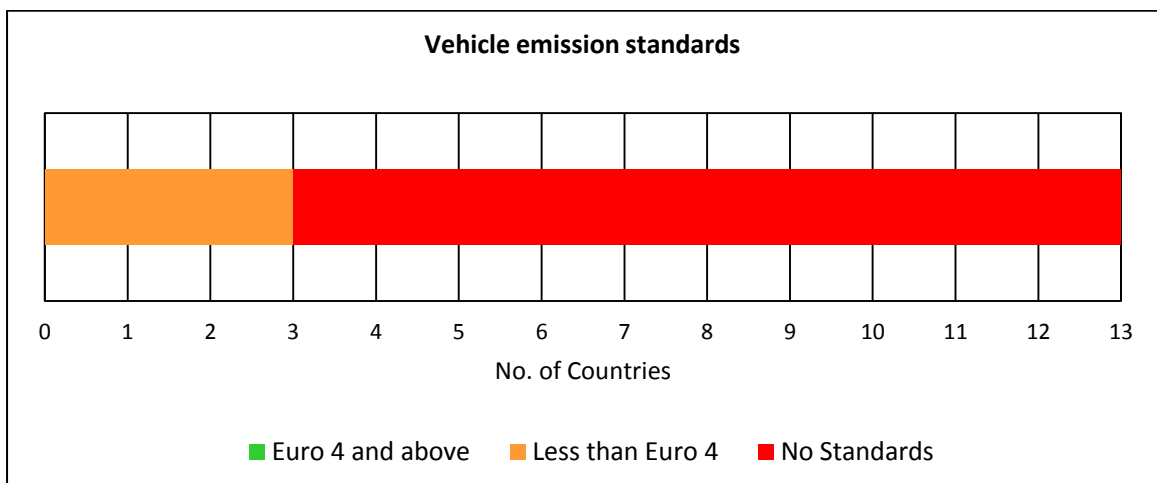
In addition, renewal of buses has been prioritised by Mauritius, where the regulatory body for vehicle registration and licensing (National Transport Authority) has a yearly bus replacement programme. Public transport buses will have their license revoked on reaching 16 years of age, and be replaced by a semi-low floor bus using Euro II emission standards. To further encourage the renewal of the bus fleet, the government provides grants and subsidies. Bus operators are also exempted from the Value Added Tax (VAT).

Expanding non-motorised transport infrastructure is also a key action that can greatly limit emissions from the transport sector. Several cities are making investments in non-motorised transport. The City of Johannesburg for instance is constructing two cycle lanes as a pilot in promoting walking and cycling.



**Figure 3:** Number of countries in the sub-region that have initiated programmes and initiatives to significantly expand public transport.

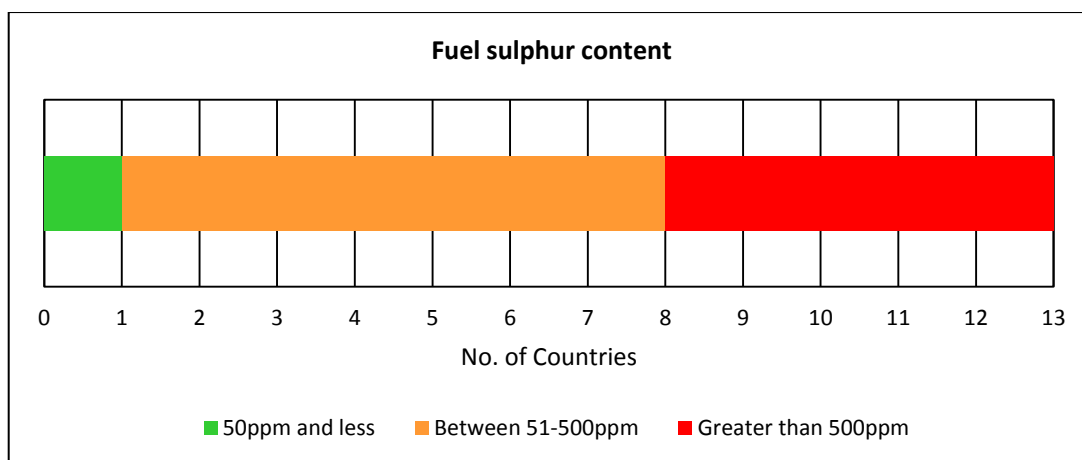
Other actions being implemented in the sub-region to mitigate against emissions from the transport sector include the establishment of vehicle emission standards (Figure 4). In the sub-region, none of the countries has a Euro 4 (or equivalent) vehicle emission standard, and only three out of thirteen countries - Mauritius, Seychelles and South Africa - have any vehicle emission standards. However, some of the countries are in the process of developing vehicle emission standards. For instance, Zimbabwe has a draft vehicle emission standard.



**Figure 4:** Number of countries in the sub-region that regulate vehicle emission at Euro 4 (or equivalent) standards.

Fuels and vehicles work as a system; in order to benefit from improved vehicle standards, low sulphur fuels are needed as these allow the advanced pollution control devices to work optimally. Another action necessary to minimize vehicular emissions is the establishment of low sulphur fuel standards. In the sub-region, only Mauritius has a national low sulphur fuel standard at 50ppm. Seven other countries in the sub-region have a sulphur standard set at a maximum of 500ppm (Figure 5).

Although Mauritius has the best fuel standard in the sub-region, its vehicle emission standard is at Euro 1, which means that it cannot fully reap the benefits of the available clean fuels with outdated vehicle emission control technology. The country is also implementing a national fuel economy project, which aims at improving the average vehicle fuel economy. As part of this initiative, the number of hybrid cars in the country doubled annually between 2010 and 2013. South Africa has also made some efforts towards limiting vehicle emissions under the Energy Efficient Motors Program, which issues direct subsidies to the purchase of new buses.



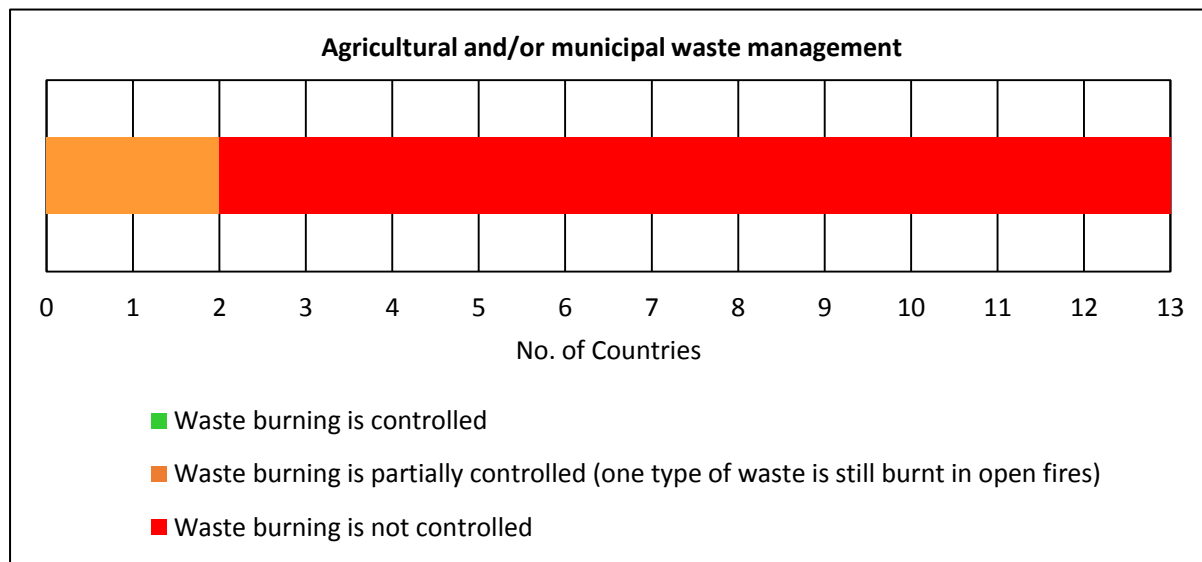
**Figure 5:** Number of countries in the sub-region that regulate fuel quality using Sulphur content as a proxy for fuel quality

### 3.3 Open burning of waste

Open burning of municipal and agricultural waste, which occurs in all the countries, is another significant source of air pollution in both urban and rural settings. Burning of agricultural waste is practiced mainly by smallholder farmers as a means of land clearing, and it is one of the dominant sources of transboundary air pollution in the sub-region.



Mauritius controls open air burning of municipal waste by offering at least weekly waste collection services to householders and regular services in all commercial areas. Figure 6 indicates the number of countries in the sub-region where open waste burning has been controlled.



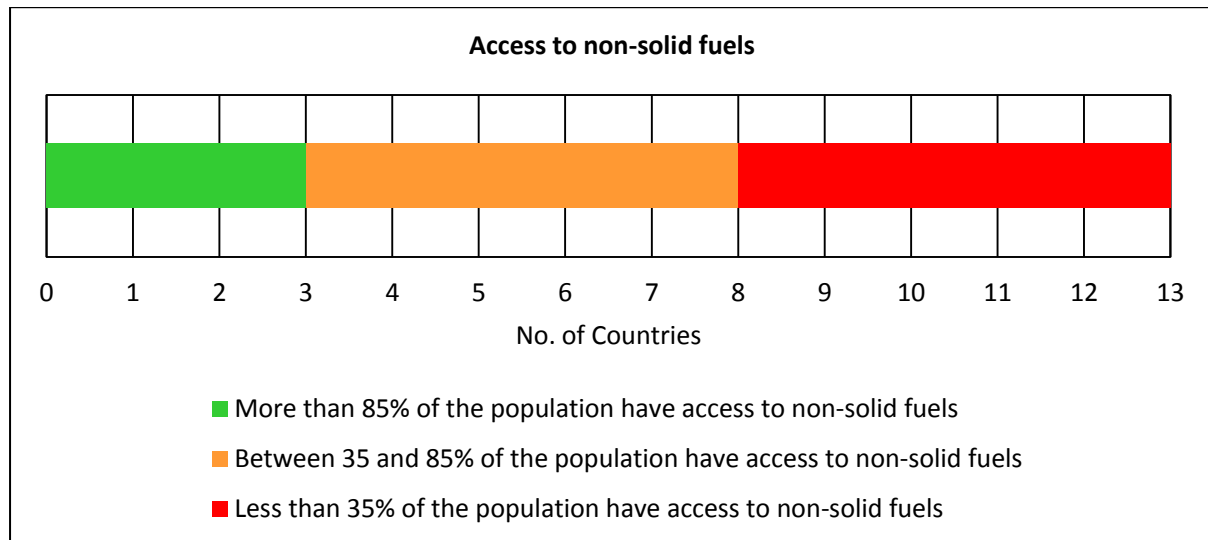
**Figure 6:** Number of countries where laws, regulations and actions to ban and regulate open waste burning have been implemented.

### 3.4 Indoor air pollution

Indoor air pollution is the main driver of premature mortality linked to air pollution in the sub-region, and it is directly linked to the predominant use of solid fuels (biomass and coal predominantly) for household energy provision. Cooking with solid fuels - wood and other biomass - over open fires is one of the major drivers of indoor air pollution and its associated health impacts. Access to non-solid fuels can reduce indoor air pollution, depending on the quality of the fuel and stove. For instance, the use of kerosene can increase indoor air pollution, especially if it is used with leaky and inefficient stoves. Therefore, in promoting the access to non-solid fuels, consideration should be given to the fuel quality and also availability of efficient stoves to be used with this fuel.

The use of solid fuels for cooking and heating is widespread in the sub-region with ten out of the thirteen countries depending heavily on biomass fuels for their domestic energy

demand. Five of these have more than 70% of their population depending directly on biomass energy for their household energy needs (see Figure 7). Only two countries – Mauritius and Seychelles – have more than 90% of their households using cleaner fuels for their domestic energy needs; they both also have an electrification rate greater than 95%.



**Figure 7:** Number of countries in the sub-region that have implemented programmes and policies to improve non-solid fuels access rate, as indicated by percentage of households with access to non-solid fuels.

Other countries in the sub-region have initiated several programmes to increase access to clean fuels for their citizenry. The Government of Botswana has initiated a non-grid rural electrification scheme using photovoltaic power: the National Energy Policy has a target of providing 80% access to electricity for the country as a whole and 60% access in rural areas by 2016. Malawi has also endeavoured to increase the electrification rate by launching the Malawi Rural Electrification Project (MAREP). Mozambique has established a plan to increase rural electrification through the Electricidade de Moçambique Master Plan which aims at the expansion of the country’s national power grid and distribution networks with the goal of reaching 15% of the rural population by the year 2020; this target was achieved in 2010.

In Namibia between 2007 and 2010, the Namibian Renewable Energy Program (NAMREP) was developed to remove financial, economic, political and public awareness barriers to solar energy. The Ministry of Mines and Energy has the Solar Revolving Fund that makes loans available to consumers to access renewable energy technologies (solar home systems

for lighting, powering home appliances and for water pumping for farmers); these loans attract an interest rate lower than what commercial banks offer. These renewable energy sources are for the most part used for off-grid electrification and domestic water heating.

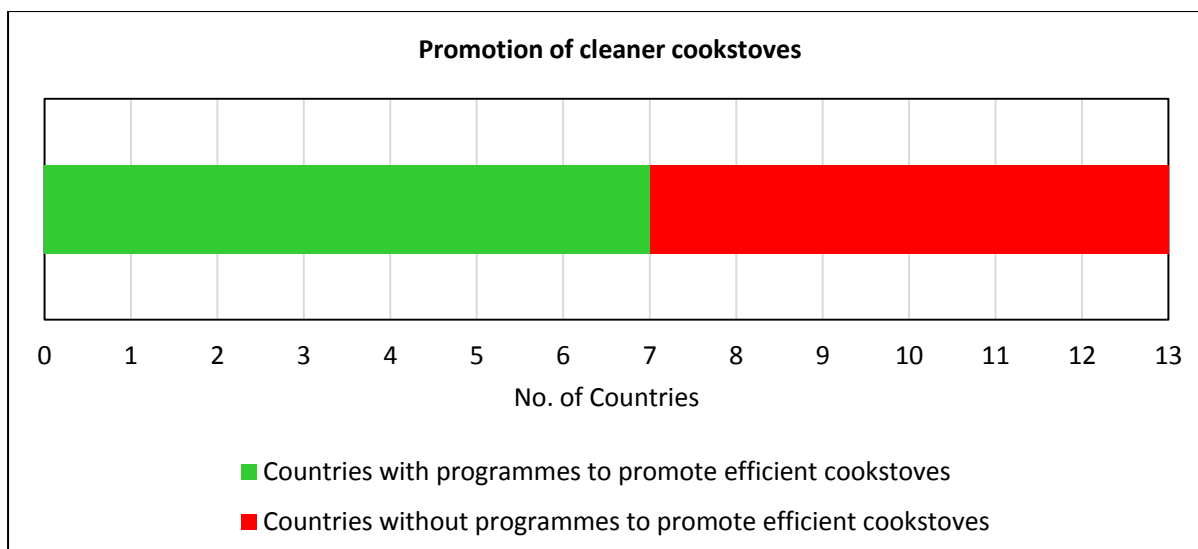
Cleaner cookstoves are more efficient compared to traditional open fires; this translates to less biomass use and less emissions. Due to the numerous varieties of cookstoves available in the market, analysis of all the programmes at a national level would be resource and time consuming. Therefore, an analysis of countries promoting one type of cookstove<sup>2</sup> is presented in Figure 8. Additionally, consideration was only given to biomass-based cookstoves as the Global Cookstove Alliance considers them the most appropriate transitional cookstove for the more than 3 billion people who cook and heat their homes using solid fuels and open fires.

The government of Malawi has undertaken a number of initiatives including the Program for Biomass Energy Conservation (ProBEC) which promotes the use of clay stoves to save fuel; the Promotion of Alternative Energy Sources Project (PAESP) which promotes non-traditional fuels for cooking and heating to reduce environmental degradation; and a National Sustainable and Renewable Energy Programme (NSREP) to support the use of renewable energy technologies in Malawi.

Figure 8 shows the number of countries in the sub-region that are promoting the use of efficient cookstoves.

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<sup>2</sup> Due to the different definitions of efficient cook stoves, Figure 8 only shows countries with programmes to promote efficient cook stoves that also qualify for carbon trading schemes. Cookstoves that qualify for Certified Emission Reductions (CERs) under the Clean Development Mechanism are considered efficient as they are estimated to reduce emissions by 1 to 3 tCO<sub>2</sub>e (carbon dioxide equivalent) per year, which also translates to reduced emissions of other air pollutants. Therefore, Figure 8 does not necessarily represent all countries that are implementing programmes aimed at promoting clean and efficient cookstoves. As such the number of countries promoting the use of clean and efficient cookstoves might be higher than indicated in the figure.



**Figure 8:** Number of countries in the sub-region that have programmes to promote use of efficient cook stoves. Due to lack of reliable data on clean cook stove, only programmes aimed at promoting cook stoves that also qualify for carbon trading schemes are represented here.

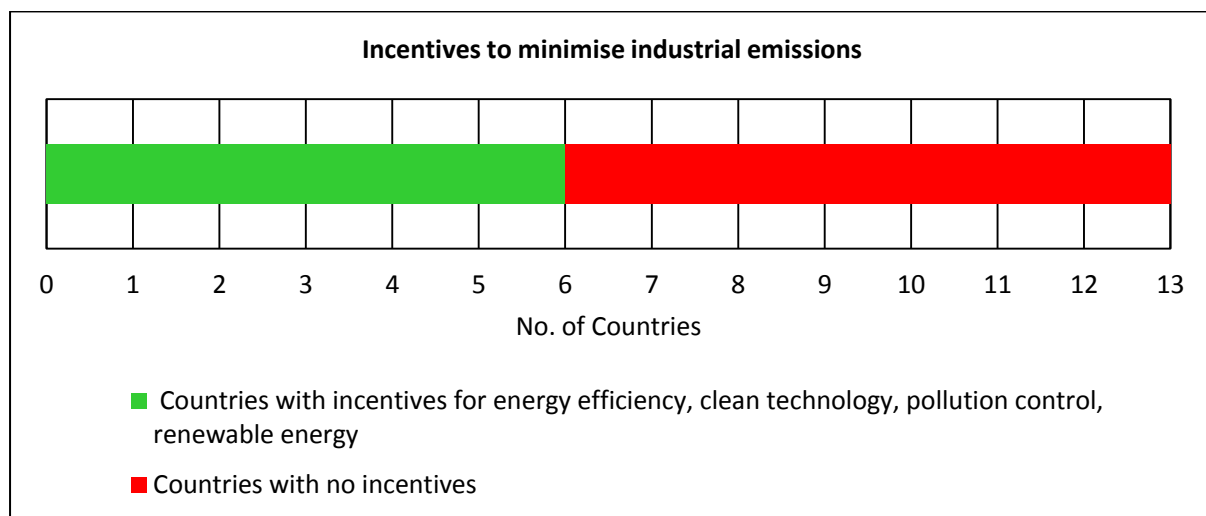
### 3.5 Industries

The use of incentives for promoting investment in energy efficiency, clean technology, renewable energy and / or pollution control can be found in six out of the thirteen countries: Angola, Mauritius, Seychelles, South Africa, Zambia and Zimbabwe. In Angola, feed-in tariffs are used to encourage energy generation from both renewable and non-renewable sources. Seychelles has removed the Value Added Tax on some energy efficient appliances and on equipment used in the production of renewable energy. Renewable energy production in South Africa is subsidized to encourage investment in the sector and there are several incentives and support schemes to encourage clean production, including various funds and tax allowances / deductions. Zimbabwe allows duty free importation of solar panels and other power saving devices.

In terms of electricity generation, there is a growing use of renewable energy in the sub-region. Nine out of the thirteen countries in the sub-region have 31-50% renewable energy in their overall energy mix; six of these – Lesotho, Malawi, Mozambique, Namibia, Swaziland and Zambia – have greater than 50%. Traditionally, hydro power has been the most dominant source of renewable energy in the sub-region, and most governments have made

considerable investments in it. For instance all of the electricity generated in Lesotho, and 99% in Malawi and Mozambique, is from hydropower generators.

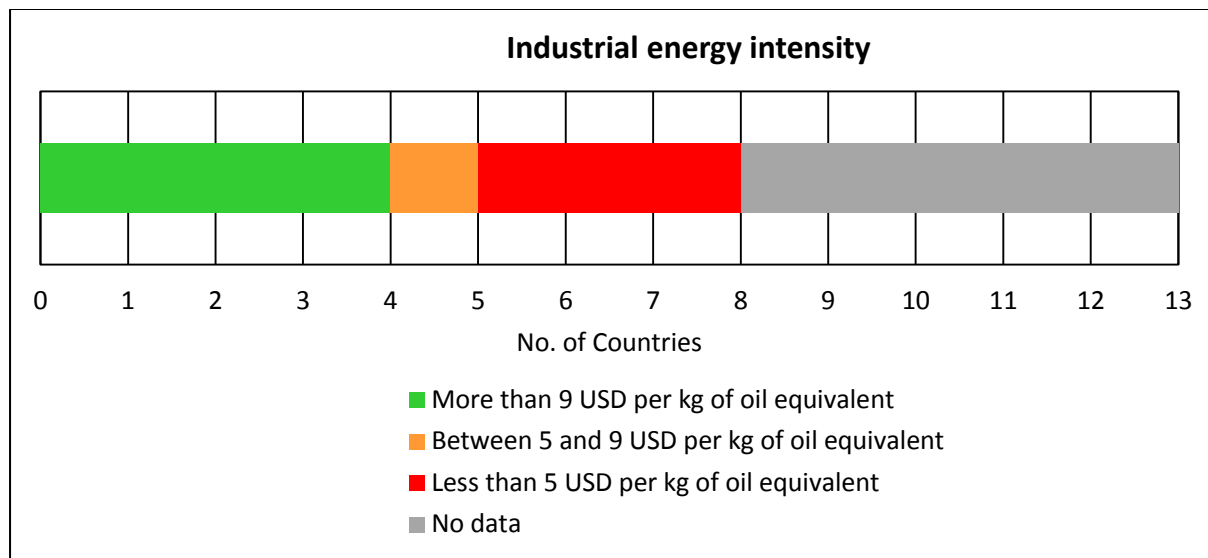
Zambia's National Energy Policy (2008) sets out a number of policy measures to stimulate investment in renewable energy, including the strengthening of the institutional framework for research and development, and the provision of financial and fiscal implements for the stimulation of renewable energy deployment, including feed-in tariffs to encourage power generation from renewable sources. In Mauritius the Long Term Energy Strategy 2009-2025, aims at increasing the renewable energy share from the current 20% to 35%; the Accelerated Income Tax Depreciation Provision for Green Investment has been reintroduced for energy efficient equipment, desalination plants, composting equipment, pollution control equipment, and water efficient plants. Figure 9 below shows the number of countries in the sub-region that use incentives to reduce emissions from industrial installations.



**Figure 9:** number of countries in the sub-region that use economic incentives to stimulate cleaner production in the industrial sector.

In the sub-region, industrial energy efficiency (measured as GDP generated per unit energy) is low. This suggests that industrial technology used in the sub-region is outdated, which translates to energy wastage and higher air pollution emissions from these facilities. Generally inefficient industries tend to emit more air pollutants directly and indirectly compared to equivalent efficient technologies. Figure 10 below shows a summary of

industrial energy efficiency in the sub-region. An industrial energy efficiency of USD 9 per unit of energy and above is used to indicate better energy efficiency.



**Figure 10:** Number of countries in the sub-region with their corresponding industrial energy efficiency. Energy efficiency is calculated as GDP per unit of energy use at constant 2011 PPP \$ per kg of oil equivalent

#### 4.0 Data sources

Data indicating progress or current status of each of the top ten actions was obtained from various sources.

- Airlex <http://airlex.web.ua.pt/>
- World Bank <http://data.worldbank.org>
- World Health Organisation  
[http://www.who.int/quantifying\\_ehimpacts/national/countryprofile/en/](http://www.who.int/quantifying_ehimpacts/national/countryprofile/en/)
- UNEP <http://www.unep.org/Transport/new/pcfiv/>
- Air Quality Catalogue <http://www.unep.org/transport/airquality/>
- Various government reports, websites
- Energypedia [https://energypedia.info/wiki/Main\\_Page](https://energypedia.info/wiki/Main_Page)
- Reegle <http://www.reegle.info/countries/>
- [www.BRTdata.org](http://www.BRTdata.org)
- Global Coalition for Clean Cookstoves <http://catalog.cleancookstoves.org/stoves>

- Global partnership on waste management  
<http://www.unep.org/gpwm/informationPlatform/WasteManagementDatabases/tabid/79590/Default.aspx>
- International energy agency  
<http://www.worldenergyoutlook.org/resources/energydevelopment/energyaccessdatabase/>
- South Africa industrial development corporation [http:// www.idc.co.za/home/idc-products.html](http://www.idc.co.za/home/idc-products.html)
- Department of trade and industry, republic of South Africa  
[http://www.thedti.gov.za/financial\\_assistance/financial\\_incentive.jsp?id=45&subthemid=26](http://www.thedti.gov.za/financial_assistance/financial_incentive.jsp?id=45&subthemid=26)
- South Africa government incentive schemes <http://www.investmentincentives.co.za/>