

## South America Sub-Region

### Actions taken by governments to improve air quality

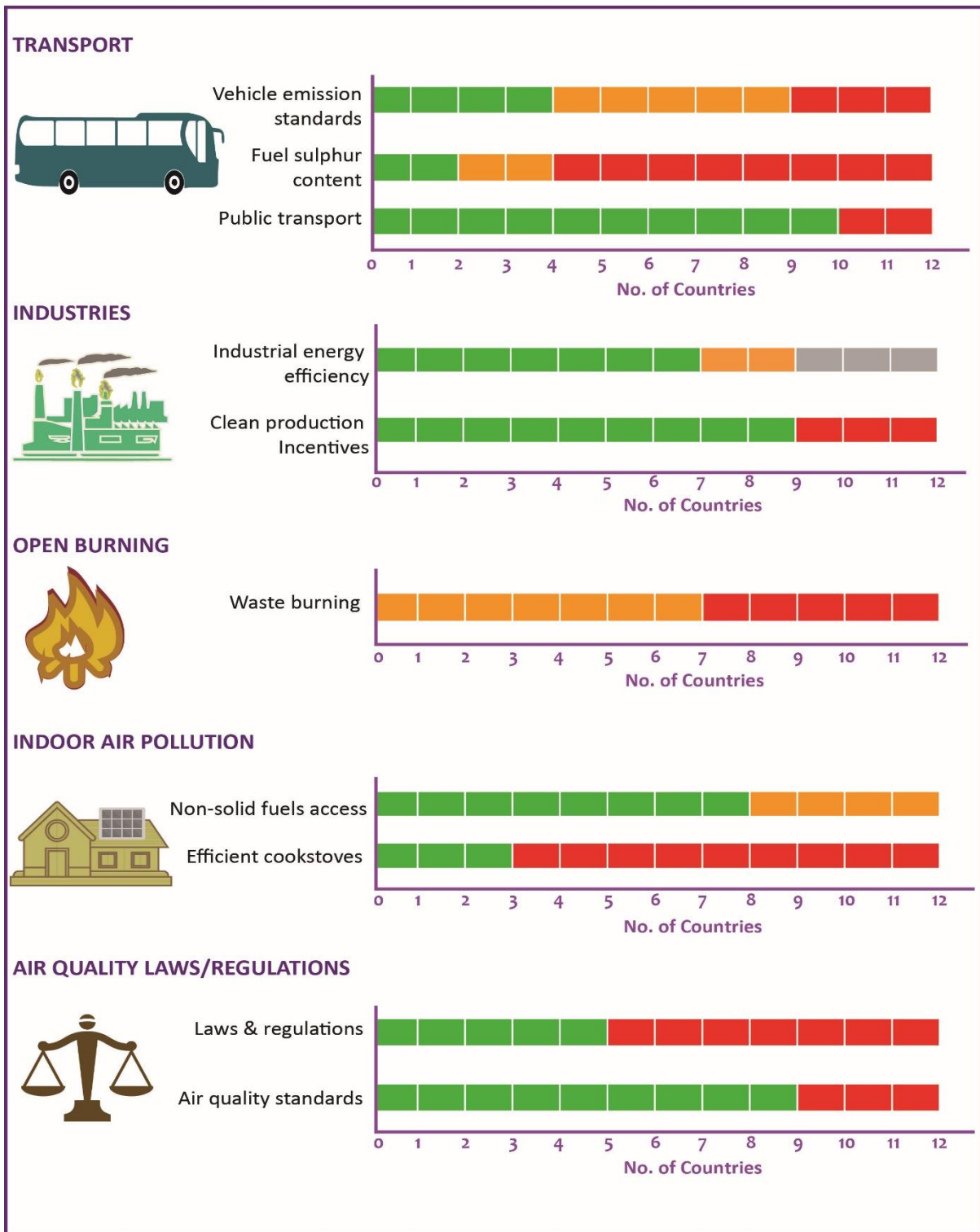
#### 1.0 Introduction

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 paragraphs 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 South America 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.

## SOUTH AMERICA 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

South America comprises of Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Guyana, Paraguay, Peru, Suriname, Uruguay and Venezuela. Air pollution is one of the leading environmental issues of concern in the sub-region, resulting in approximately 45,000 premature deaths annually. Governments in this sub-region have enacted laws and regulations on air pollution; however these laws and regulations are at different stages of implementation and enforcement. Nine out of the twelve countries in the sub-region have comprehensive ambient air quality standards and among these, five have accompanying national air quality policies, laws and regulations.

Indoor air pollution is a major cause of air quality related, premature deaths in South America. Estimates from the World Health Organization (WHO) indicate that approximately 40,000 people in South America die prematurely each year from air pollution. Indoor air pollution is primarily driven by the combustion of low quality fuels for domestic energy provision, mainly for cooking, heating and lighting. In an effort to reduce the overreliance on solid fuels, governments have put into place several policies, regulations and actions aimed at reducing the use of these fuels. Despite these actions and policies, the negative health effects associated with indoor air pollution still remain.

The transport sector is one of the two most dominant sources of ambient air pollution in urban centres. To curb these emissions, governments have established or tightened vehicle emission standards. To some extent, fuel quality has also been improved, although fuel with Sulphur content below 50ppm is only available in two out of twelve countries. In addition, there has been significant investment in public transport, with eight countries investing in Bus Rapid Transit (BRT) systems, and non-motorised transport.

Industrial emissions are the other dominant source of urban air pollution in the sub-region, and also impact some rural areas. Ten out of the twelve countries produce more than 30% of their electricity from renewable sources, and seven countries have an industrial energy efficiency above nine (measured as GDP per unit of energy use).

Open burning of waste also affects air quality. Open burning of agricultural and / or municipal wastes occurs in all twelve countries.

In recognition of the importance of air quality, a Regional Network on Atmospheric Pollution has been operating in Latin American and the Caribbean since 2008, and is formed by the Air Quality focal points of each and every Ministry of Environment. The Network is implementing a Regional Plan of Action for Intergovernmental Cooperation on Air Pollution in LAC, which provides a voluntary guide for the development of national action plans. To further assist in improving regional cooperation, a series of webinars have been held on different topics related to air quality management. While challenges still remain, the report from the “Intersessional Meeting of the Forum of Ministers of Environment of LAC” held in Mexico City in November 2015 highlights examples of the progress that has been made.<sup>1</sup>

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.

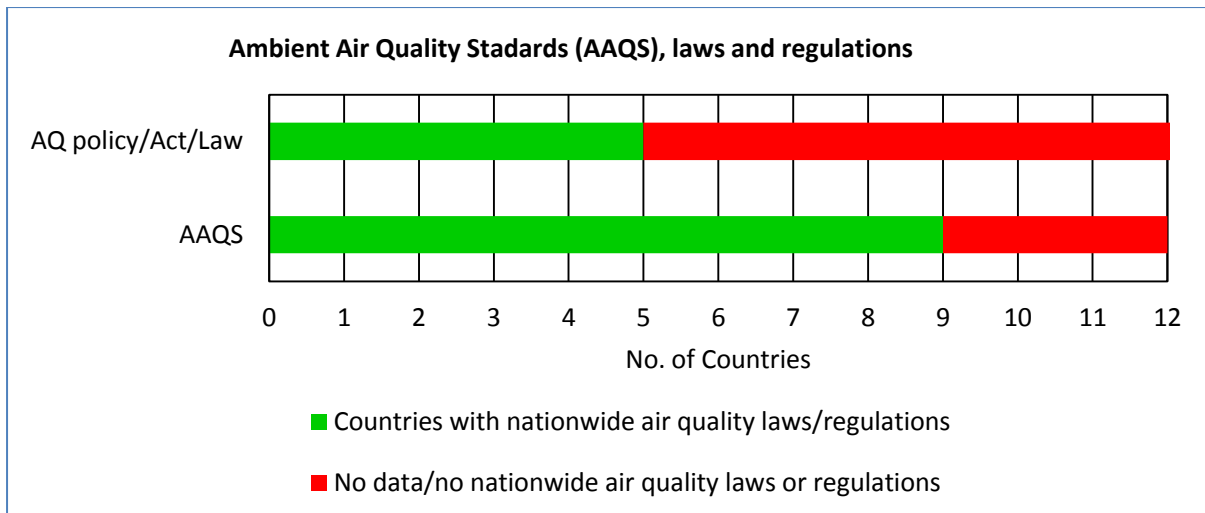
### **3.0 Actions Taken to Improve Air Quality**

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

Based on the UNEP Air Quality Policy Catalogue, nine out of twelve countries have some level of ambient air quality standards (Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Paraguay, Peru and Venezuela). Nonetheless not all meet WHO guidelines or have a standard for PM<sub>2.5</sub>. Four countries – Argentina, Brazil, Colombia and Paraguay – have national policies and laws that are specifically meant to improve air quality. However, their implementations and enforcement needs to be strengthened. Figure 2 below shows the number of countries in South America that have enacted and promulgated nationwide laws, regulations and/or standards to protect air quality.

---

<sup>1</sup> See [http://www.pnuma.org/forodeministros/20-reunion-intersesional/documentos/ENG\\_Avances\\_Foro\\_Min\\_Med\\_Amb\\_ALyC-14\\_OCT\\_2015\\_Rev2.pdf](http://www.pnuma.org/forodeministros/20-reunion-intersesional/documentos/ENG_Avances_Foro_Min_Med_Amb_ALyC-14_OCT_2015_Rev2.pdf)



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

In some of the countries in the sub-region, several major cities have established their own Ambient Air Quality Standard (AAQS) that are more stringent than national standards. For example the city of Buenos Aires in Argentina has established an AAQS that not only is stricter than the national standards, but also includes specific pollutants that are not captured by the national standards, such as PM<sub>2.5</sub>. La Paz, Bolivia also has much stricter AAQS compared to Bolivia's national standards: PM<sub>2.5</sub>, PM<sub>10</sub> (annual), SO<sub>2</sub> and NO<sub>2</sub> (1-hour) requirements meet WHO guidelines. The Santiago Metropolitan Region in Chile established AAQS earlier than the rest of the country.

Other countries are still working on establishing a legal and / or institutional framework. Colombia has been working on institutional strengthening of its environmental authorities and territorial entities, with a view to implementing the Policy for the Prevention and Control of Air Pollution. Costa Rica has been working on updating its emissions and air quality regulations to meet the limits recommended by WHO.

Within South America, there are some countries that are still in the initial stages of developing and implementing air quality standards and regulations, such as Ecuador which employed a participatory process in developing its National Air Quality Plan. Paraguay also approved the new organizational structure of the General Directorate on Air Quality, strengthening its institutional capacity in mid-2015. Additionally its regulatory framework

was updated through the publication of new air quality standards within the same timeframe. In Uruguay, a working group has been formed in the framework of the Metropolitan Agenda; this working group is also working on the implementation of an Air Quality Management Plan covering metropolitan Montevideo. In 2014 the Venezuelan government began a series of consultations with the public about water and air quality in preparation for new legislation on air quality that is expected to strengthen the legal framework, and provide for administrative sanctions for violations.

### **3.2 Transport**

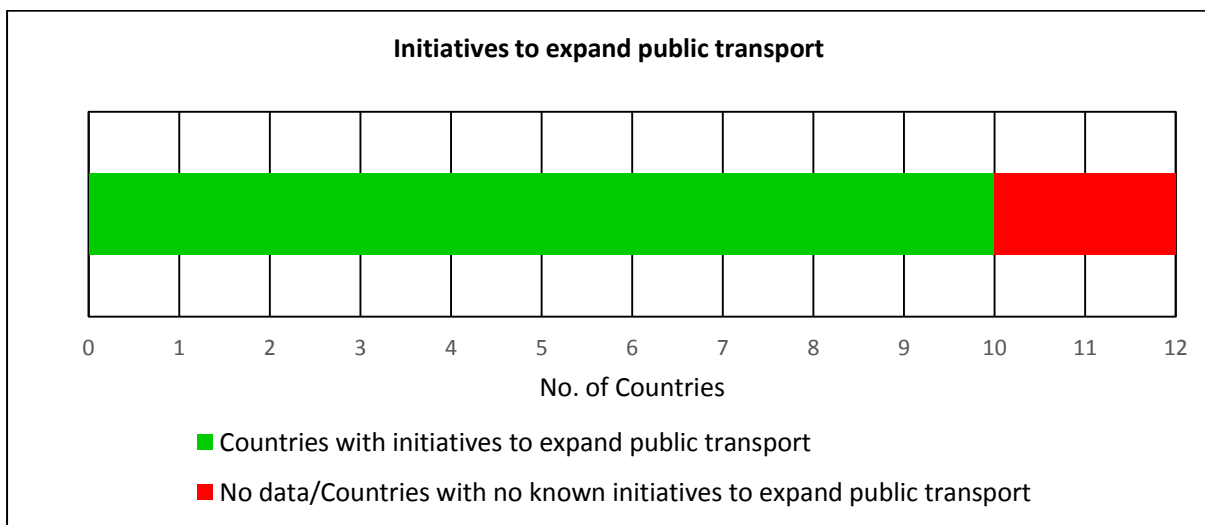
Given the increased congestion experienced in many urban areas, maintaining and increasing the modal share of public transport is essential for increasing mobility while decreasing transport emissions. Significantly expanding public transport and non-motorised transport infrastructure is a key action that can greatly limit emissions from the transport sector (Figure 3).

Buenos Aires in Argentina has increased the number of bus-only lanes for its Bus Rapid Transit (BRT) system, and transformed dozens of blocks in the city centre into an environment that encourages and prioritizes walking and cycling over driving.

In Bolivia, a recently built cable car system connects La Paz and El Alto, and has three lines, with five more being planned. A new municipal bus system in La Paz serves remote hillside neighbourhoods with three routes, with another four to follow. To further reduce emission from the sector, the government of Bolivia is offering loans to taxi and mini-van unions to purchase modern buses that run on natural gas, while diesel-powered buses are being converted to Compressed Natural Gas (CNG) as part of a national project.

Chile has committed to invest \$4.2 billion in 14 projects to upgrade public transport in Santiago, Antofagasta, Valparaiso and Concepcion, including the expansion of the Santiago Metro and the use of integrated public transport corridors to prioritise pedestrians, bicyclists and bus users. Bikesantiago is the first interdistrict public system to facilitate bicycle rentals in the capital.

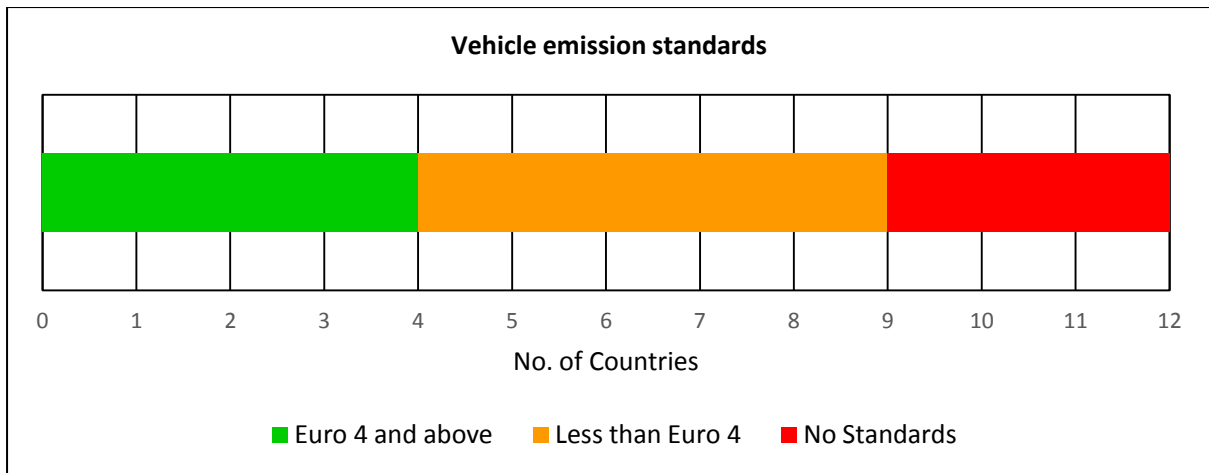
Curitiba, Brazil provides an excellent case study in urban transport and zoning. Over the years, the city has integrated its zoning laws and transportation planning to promote high-density development adjacent to high-capacity transportation systems, particularly its BRT corridors. As a result, Curitiba has one of the most heavily used yet low-cost transit systems in the world.<sup>2</sup> Around 80% of Curitiba’s commuters use the BRT to travel to work. The introduction of the BRT has saved the city about 27 million litres of fuel annually. Compared to eight other Brazilian cities of its size, Curitiba uses about 30% less fuel per capita, and has one of the lowest rates of ambient air pollution in the country.



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

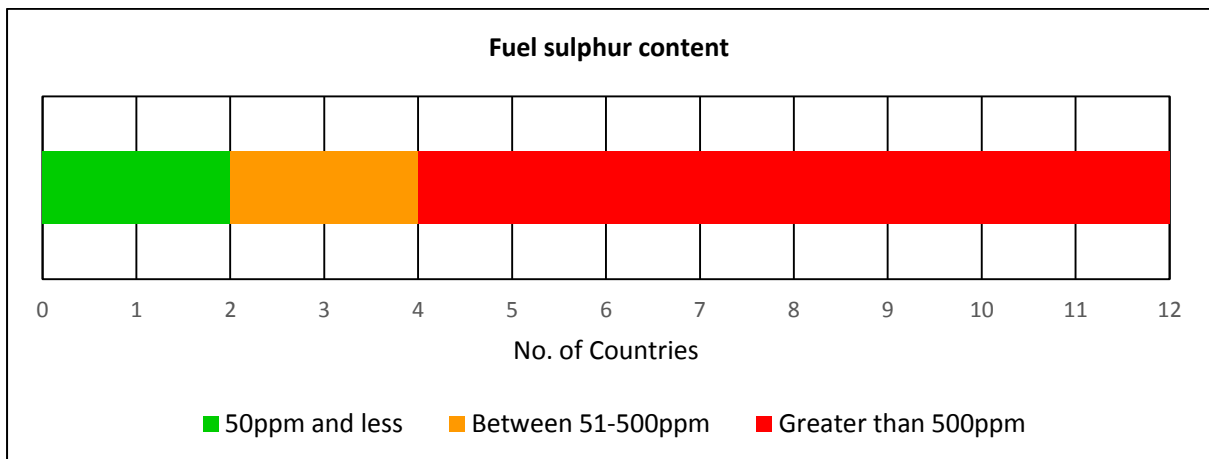
Improved fuel quality and implementation of vehicle emission standards are also required to minimise emissions created from transport. Four countries in the sub-region - Argentina, Brazil, Chile and Colombia - have adopted vehicle emission standards equivalent to Euro 4 and above (Figure 4).

<sup>2</sup> <http://reimaginerpe.org/node/344>



**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. Only Chile and Uruguay have adopted fuel quality standards that limit sulphur content to below 50ppm. Figure 5 shows the quality of fuel used by different countries within the sub-region; fuel sulphur content is used as an indicator of fuel quality.



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

Some countries in the sub-region implement stricter fuel and emission standards first in major cities, and later enforce these standards nationwide. This approach allows for the immediate benefits of cleaner fuels and vehicles in highly populated centres while allowing the country time to upgrade its national standards.

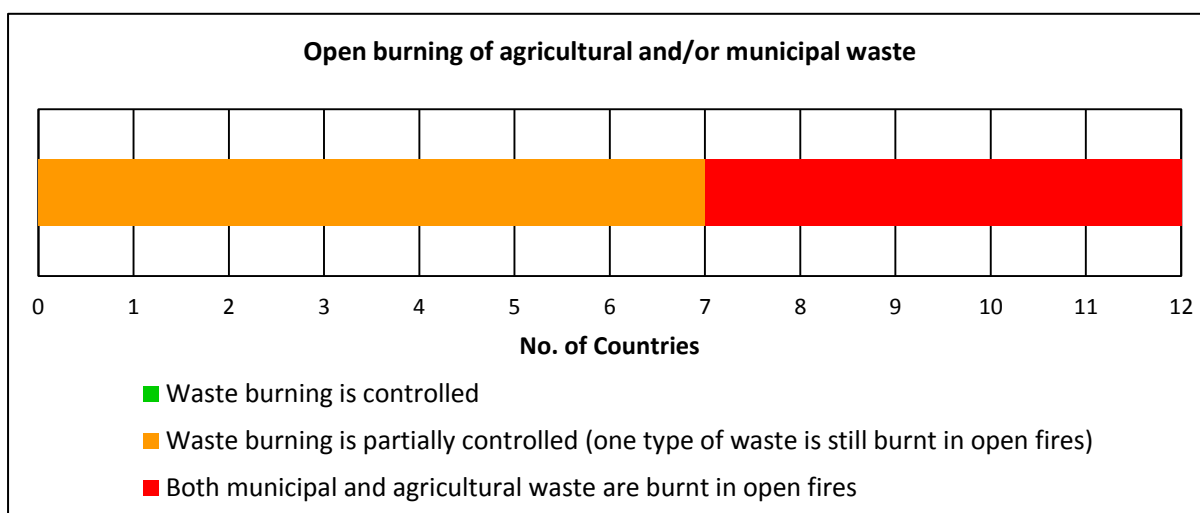


In Peru, for example, vehicle emission standards are regulated at Euro 3 equivalent for both light and heavy duty; however new buses in Lima are required to meet Euro 4 standard. In addition, the national standard for sulphur levels in fuel is 5,000 ppm, however, low sulphur fuel is available in Lima and Callao, with a national 50ppm target by 2017. Uruguay meanwhile plans to gradually replace fossil-based fuels with electric energy in its public transport system, and is currently assessing the cost and benefit of the transition.

### **3.3 Open burning of waste**

Open burning of municipal and agricultural waste, which occurs in all the countries in the sub-region, is another significant source of pollution in both urban and rural settings. In urban areas, open burning of waste can be a major driver of air pollution and its associated health impacts. This is particularly important as most emissions from municipal waste burning are known to be toxic to human health. This can be reduced or eliminated by ensuring waste collection in the city is adequate and that waste is disposed of by designated authorities.

In rural areas, agricultural waste burning is one of the major emitters of air pollutants and can have considerable impact on the local and regional air quality. For example, while air quality in Bolivia is generally good much of the year, the 4-month dry season experiences higher levels of pollution due to the many agriculture-related fires. Figure 6 below shows the number of countries in the sub-region that regulate waste burning for both agricultural and municipal waste.

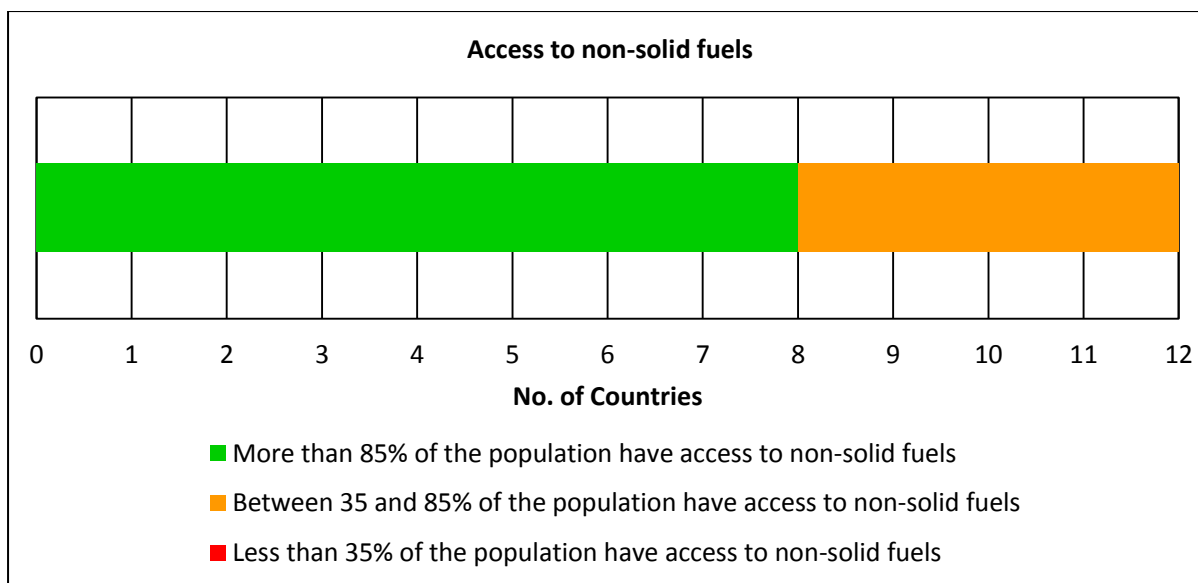


*Figure 6: Number of countries where laws, regulations and actions to ban and regulate open waste burning have been implemented.*

### 3.4 Indoor air pollution

Although most nations in this sub-region have implemented several actions and programmes aimed at providing clean burning fuels for their populace, the problem of indoor air pollution still persists. This is largely as a result of biomass burning 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.

In Chile, Guyana, Venezuela, Brazil, Ecuador and Argentina, more than 90% of households have access to non-solid fuels. Figure 7 indicates the number of countries in South America that have various rates of access to non-solid fuel.



**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.

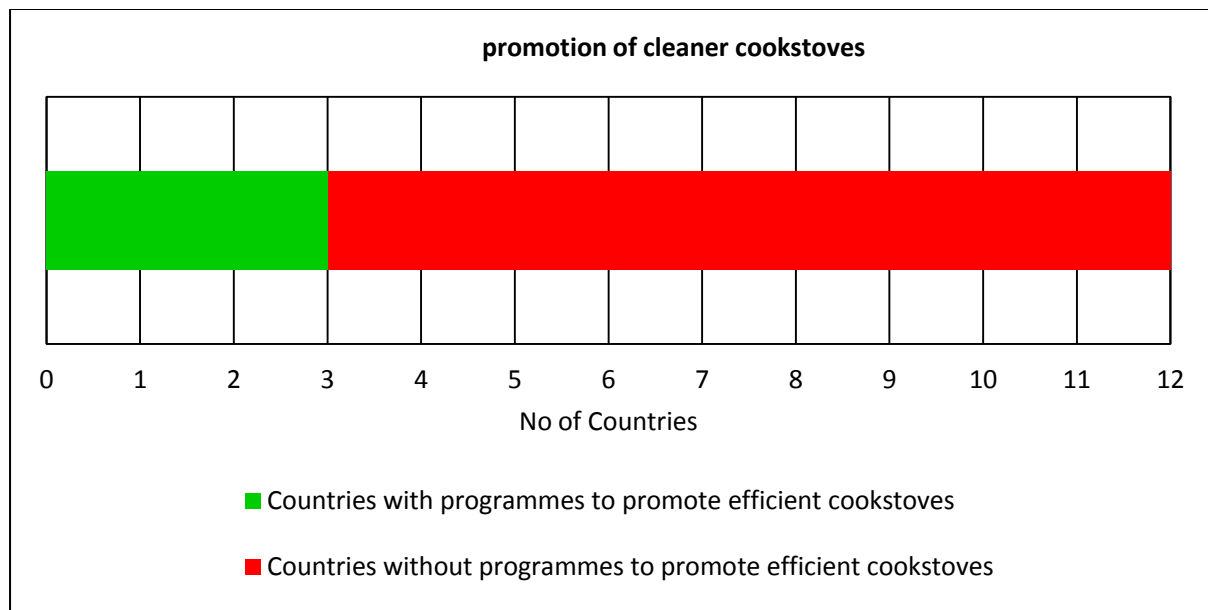
Cleaner cookstoves are more efficient compared to traditional open fires; this translates to less biomass use and less emissions. Due to the numerous varieties of cookstoves available in the market, analysis of all the programmes at a national level would be resource and time consuming. Therefore, an analysis of countries promoting one type of cookstove<sup>3</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.

Three out of the twelve countries in South America have initiated programmes that promote clean cookstoves that also qualify for carbon trading schemes.

One of the countries that is promoting efficient heating stoves is Chile: the Ministry of Environment has the Sustainable Heating Programme which exchanges old wood stoves with new heating systems like wood pellet stoves, gas stoves and certified wood stoves. This

<sup>3</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.

programme is mostly focused on polluted cities where one of the principal causes of air pollution is residential wood burning.



**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.

Another means to reduce indoor air pollution is by increasing access to electricity. Nine out of twelve countries have at least 95% of their population connected to electricity, while three have more than a 70% connection rate. Despite high rates of access to electricity, there is continued use of solid fuels, especially in rural areas, indicating that other factors apart from electrification (such as cost and reliability) determine the choice of cooking and heating fuels.

In Guyana, the Low Carbon Development Strategy seeks to expand hinterland electrification of rural communities using solar-PV systems and to provide increased access to clean stoves; it offers exemptions from VAT and duty for renewable energy equipment to support this goal.

### 3.5 Industries

The use of incentives for promoting investment in energy efficiency, clean technology, renewable energy and / or pollution control is common in South America, with nine (Argentina, Brazil, Chile, Colombia, Ecuador, Guyana, Paraguay, Peru and Uruguay) out of twelve countries having some form of incentives.

A number of countries have legal and financial incentives to increase the share of renewable energy in the total energy mix. For instance, Argentina's renewable energy law promotes wind farms and solar power through exemptions from VAT, fuel tax, income tax and duty, and provides a feed-in tariff for power generated from renewable sources. In Brazil, renewable energy is promoted through exemptions in fuel tax and import duties. Additional policy options used by the Brazilian government to encourage investments in renewable energy include transmission discounts and renewable energy mandates for water heating and space heating in buildings.

Chile has a renewable energy target of 20% electricity generation (excluding hydro) by 2025; it has laws and programmes to promote solar heating, solar power, geothermal, biomass, and rural access to renewable energy. Incentives aimed at achieving this include fuel tax exemption and transmission discount. The Renewable Portfolio obliges electricity sellers to include into their source mix at least 5% (increasing to 10% by 2024) of non-conventional renewable energies, which includes everything apart from hydro larger than 20MW. Chile also has governmental programmes and financial initiatives that focus on introducing technologies or techniques for cleaner production by financing part of the cost, such as the Clean Production Agreement. The Centre for Innovation and Enhancement of Sustainable Energy develops and supports governmental measures to introduce sustainable energy technologies or practices into industrial process.

Several countries within the sub-region have established ambitious plans towards increasing their overall renewable energy share. Uruguay has a renewable energy target of 50% primary energy and 90% electricity by 2015, with VAT, fuel tax and income tax exemptions provided. Ecuador has set a target to increase its renewable energy share to 90% by 2017; to achieve this, it has established several incentives to stimulate investment in the renewable energy sectors.

In Venezuela, the programme “Plan for Economic and Social Development of the Nation 2007-2013 (PDESON)” aims to increase the renewable energy share through several incentives. However, none of these incentives is currently available.

Ten out of twelve countries now have at least 31% of their electricity coming from renewable sources, and seven have over 50% (Brazil, Colombia, Paraguay, Peru, Suriname, Uruguay and Venezuela). Figure 9 shows the number of countries in the sub-region that use incentives to reduce emissions from industrial installations.

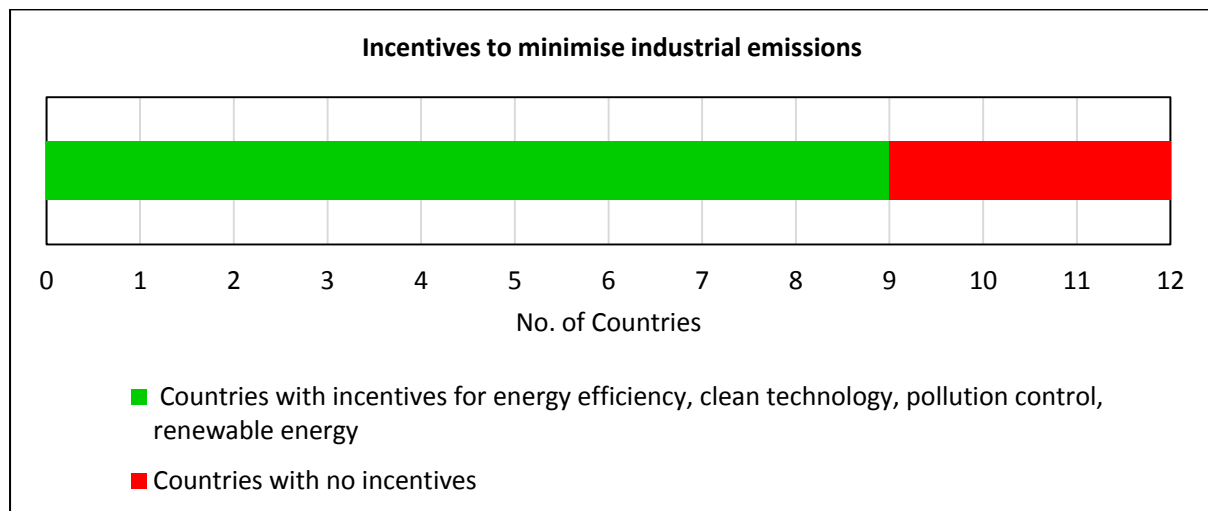


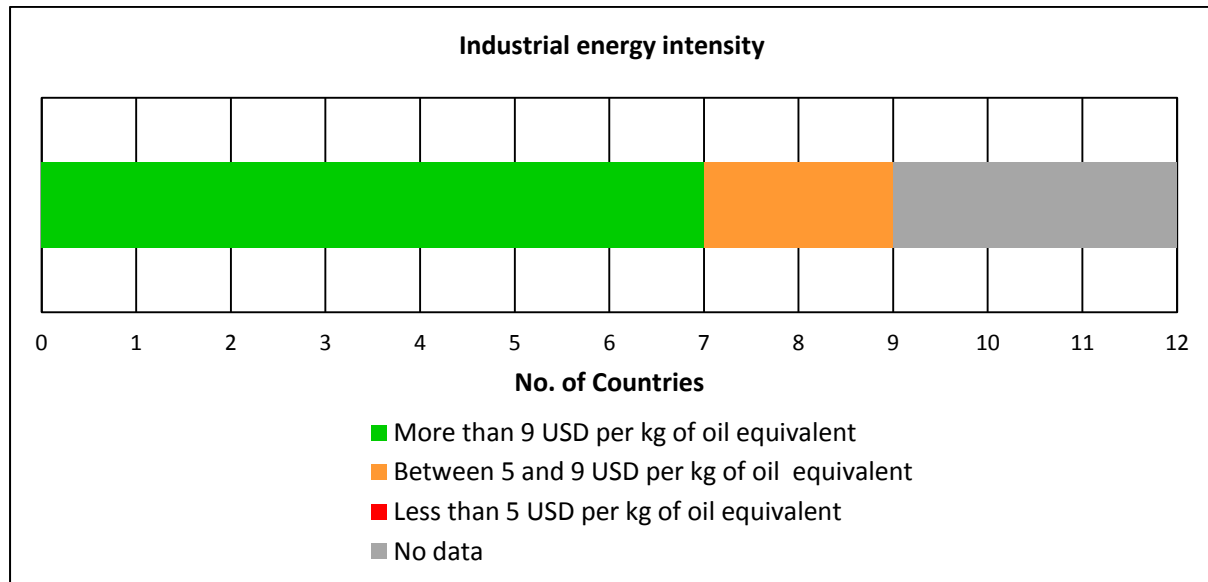
Figure 9: Number of countries in the sub-region that use economic incentives to stimulate cleaner production in the industrial sector.

Other South American nations have established programmes aimed at increasing energy efficiency. Suriname’s planned project “Development of Renewable Energy, Energy Efficiency and Electrification of Suriname” includes an energy efficiency component and proposals to update legal, institutional and regulatory frameworks for renewable energy and energy efficiency initiatives. The project also intends to use micro-hydro, hybrid and solar systems for off-grid and on-grid electrification of rural areas. Uruguay’s Energy Efficiency Law has led to the creation of the Uruguayan Saving and Energy Efficiency Trust to provide funding for technical assistance in energy efficiency.

In 2012, Brazil’s national emission standards were applied to older industrial facilities, including boilers, electrical turbines, oil refineries, steel mills, aluminium smelters, lead foundries, cement kilns and fertiliser factories. This is unusual, as standards are often only

applied to new facilities. Additionally, the Brazilian Energy Efficiency Program requires electricity providers to spend 0.5% of their net income in energy efficiency projects.

Figure 10 shows the number of countries in the sub-region that have implemented policies and programmes to increase industrial 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/pcfvl/>
- 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/>
- Forum of Ministers of Environment of Latin America and the Caribbean  
[http://www.pnuma.org/forodeministros/20-reunion-interseccional/documentos/ENG\\_Avances\\_Foro\\_Min\\_Med\\_Amb\\_ALyC-14\\_OCT\\_2015\\_Rev2.pdf](http://www.pnuma.org/forodeministros/20-reunion-interseccional/documentos/ENG_Avances_Foro_Min_Med_Amb_ALyC-14_OCT_2015_Rev2.pdf)