Central America

Actions taken by governments to improve air quality

1.0 Introduction

In June 2014 the United Nations Environment Assembly (UNEA) adopted resolution 1/7 S*trengthening 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 Central 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.

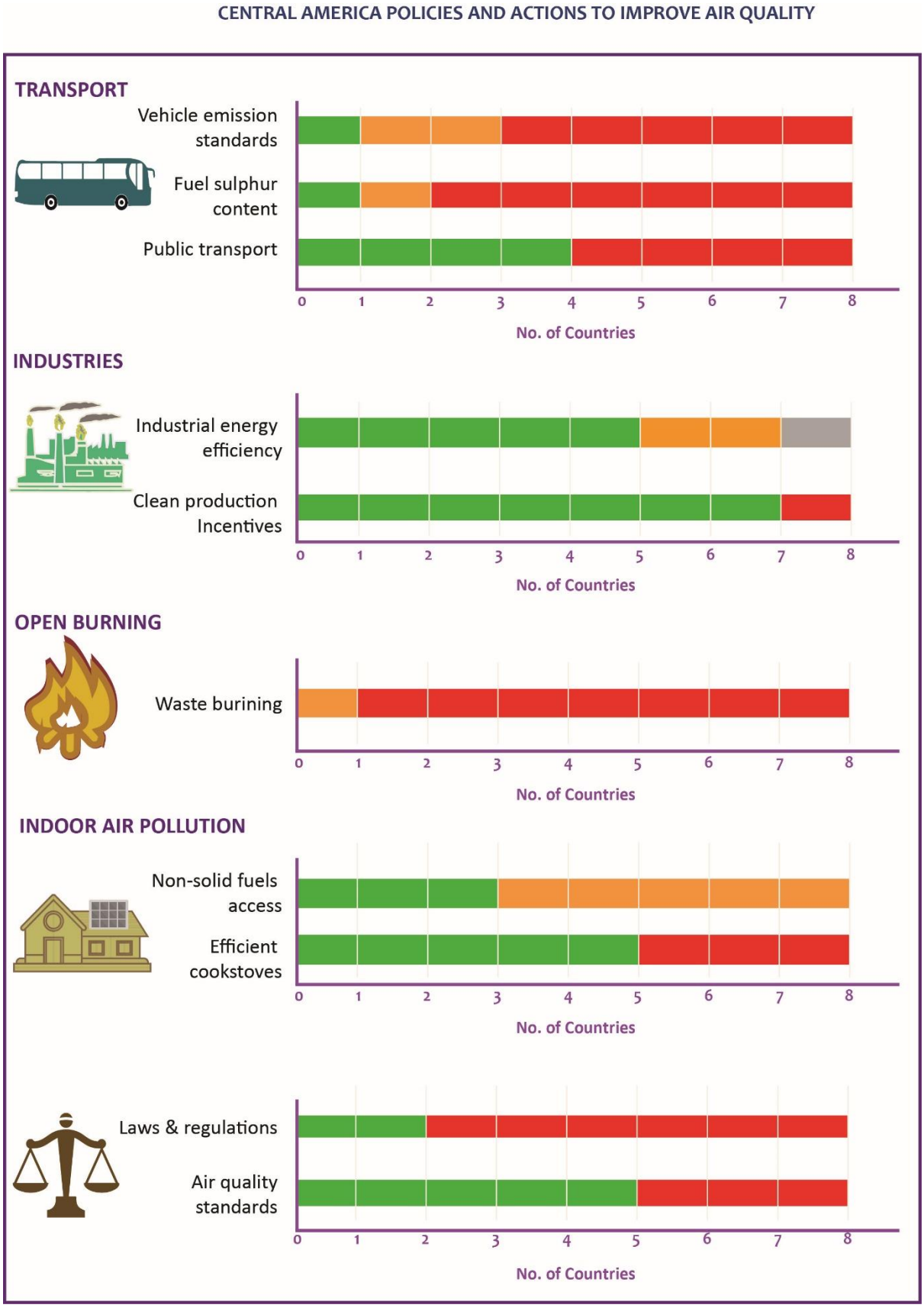


Figure 1: *A summary of actions, programmes, policies, laws and regulations undertaken by governments in the sub-region to improve air quality (green = progressing to best practice; red = action still required).*

2.0 Regional Overview

Central America includes eight countries: Belize, Costa Rica, El Salvador, Guatemala, Honduras, Mexico, Nicaragua and Panama. Governments in the sub-region have enacted laws and regulations on air pollution which are at different stages of implementation. At least two out of the eight countries in the sub-region have a comprehensive ambient air quality standard with accompanying air quality policies, laws and regulations. Air quality still remains an issue of concern: WHO estimates that it causes 30,000 premature deaths annually, with most of those resulting from indoor air pollution exposure.

Use of solid fuels to meet household energy demand is the most important driver of deteriorating air quality, and it is responsible for approximately 90% of all premature deaths linked to air pollution in the sub-region. Use of solid fuels is 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 out of eight countries in the sub-region have a non-solid fuels access rate greater than 85%.

Emissions from other sectors such as transport are also significant in areas where the intensity of activities is high, such as urban areas. The current contribution of vehicular emissions to the overall air quality in countries within the sub-region is marginal. However, this sub-region is still experiencing population and economic growth. It is foreseeable that in the future, vehicle emissions will be an important driver of air pollution as vehicle numbers increase. These countries therefore have an opportunity to ensure that the projected growth in vehicle numbers will not compromise air quality significantly. This can be achieved by expanding public and non-motorised transport infrastructure and systems, and also by enacting laws establishing vehicle emissions standards (Euro 4 at the least) and improving fuel quality.

Industrial emissions are also important drivers of air pollution in the sub-region, especially in major urban areas such as Mexico City where industrial production is more developed. With respect to industrial energy efficiency, five of the countries have a GDP per unit of energy use above nine (estimated as GDP per unit of energy use), which indicates high energy

efficiency in the industrial sector. In addition to energy efficiency, seven out of the eight governments in the sub-region have instituted incentives to encourage clean production in the industrial sector.

Open burning of waste is another major source of air pollution. Open burning of both agricultural and / or municipal wastes occurs in all of the eight countries in the sub-region.

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 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, five out of the eight countries in the sub-region have nationwide ambient air quality standards, although none of the countries have a $PM_{2.5}$ standards as part of their air quality standards. Out of the five countries that have nationwide ambient air quality standards, at least two countries (Costa Rica and Mexico) have national legislation, law, policy or act specifically for air quality. Figure 2 shows the number of countries in the sub-region that have enacted air quality standards or laws/ regulation to manage air quality.

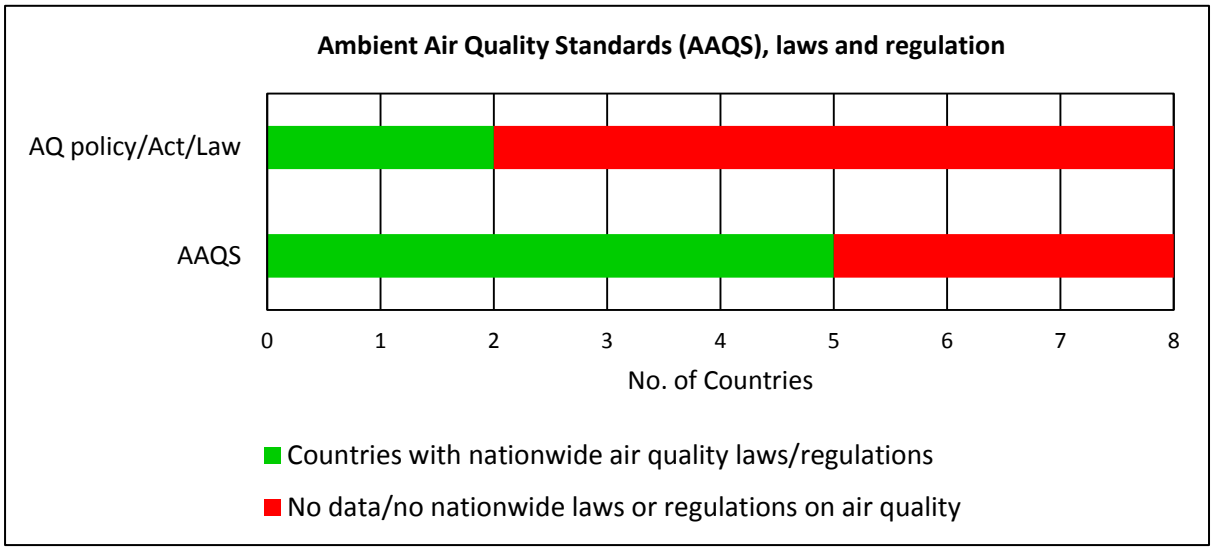


Figure 2: *Number of countries in the sub-region that have enacted nationwide air quality laws and regulations, and the number of countries that have enacted and promulgated Ambient Air Quality Standards (AAQS).*

3.2 Transport

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

In the sub-region a number of countries have made investments towards promoting and expanding public and non-motorised transport infrastructure and systems. Three out of eight countries in Central America have mass public transport projects. Guatemala City for instance has a bus rapid transit (TransMetro) as well as 2km of bicycle paths, with an additional 20km planned for the historical centre. Eight cities in Mexico have a bus rapid transit system, while vehicles have restricted access to downtown and surrounding areas on weekends to encourage bicycle use and walking. The Panama Metro has an urban railway line, and includes twelve train stations, with a second line under construction. Figure 3 below indicates the number of countries in the sub-region that have invested in significantly expanding public and non-motorised transport.

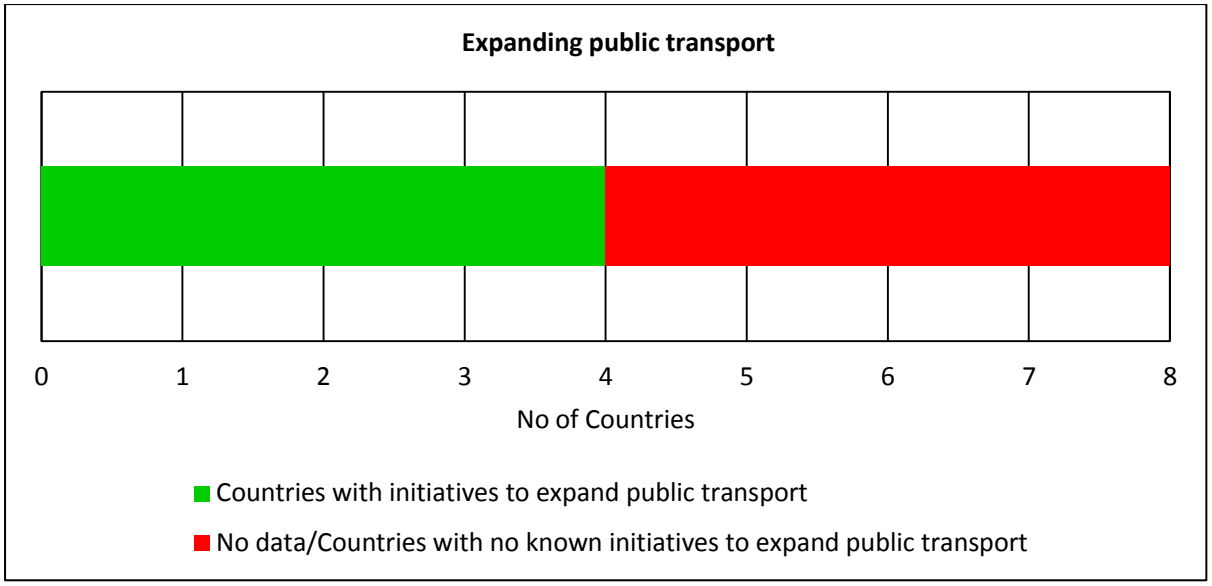


Figure 3: *Number of countries in the sub-region that have initiated programmes and initiatives to significantly expand public transport.*

Improved fuel quality and implementation of vehicle emission standards are also required to minimise emissions created from transport. Other actions being implemented in the sub-region to mitigate against emissions from the transport sector include the establishment of vehicle emission standards. In the sub-region, only Mexico has Euro 4 vehicle emission standards. Two other countries have vehicle emission standards below Euro 4, while five countries do not have an operational vehicle emission standard. Figure 4 below summarizes the number of countries in the sub-region that have enacted policies or regulations to limit vehicle emissions.

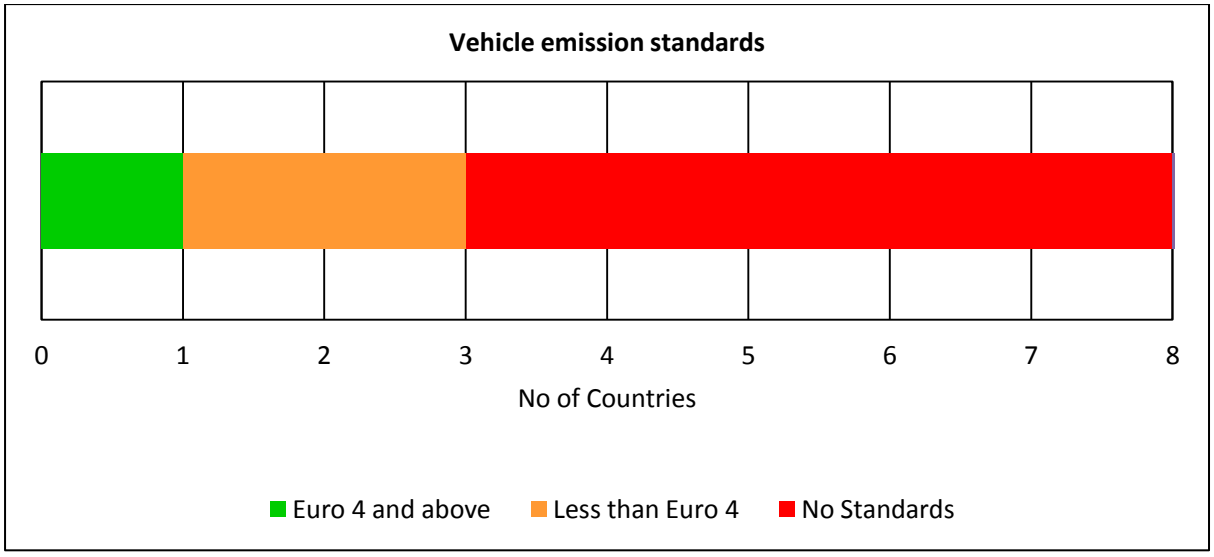


Figure 4: *Number of countries in the sub-region that regulate vehicle emission at Euro 4 (or equivalent) standards*

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. Panama has adopted fuel quality standards that limit sulphur content to below 50ppm. In some countries, the fuel available in the market has lower sulphur content than demanded by the regulations: for example, although Mexico's national standard is at 500ppm sulphur in diesel, ultra-low (15ppm) sulphur diesel is used in three major metropolitan areas (Mexico City, Guadalajara and Monterrey), the northern border cities and eleven national freight corridors. This provides air quality benefits of cleaner fuels to high density population centres until the country can move to a nationwide low sulphur standard. 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.

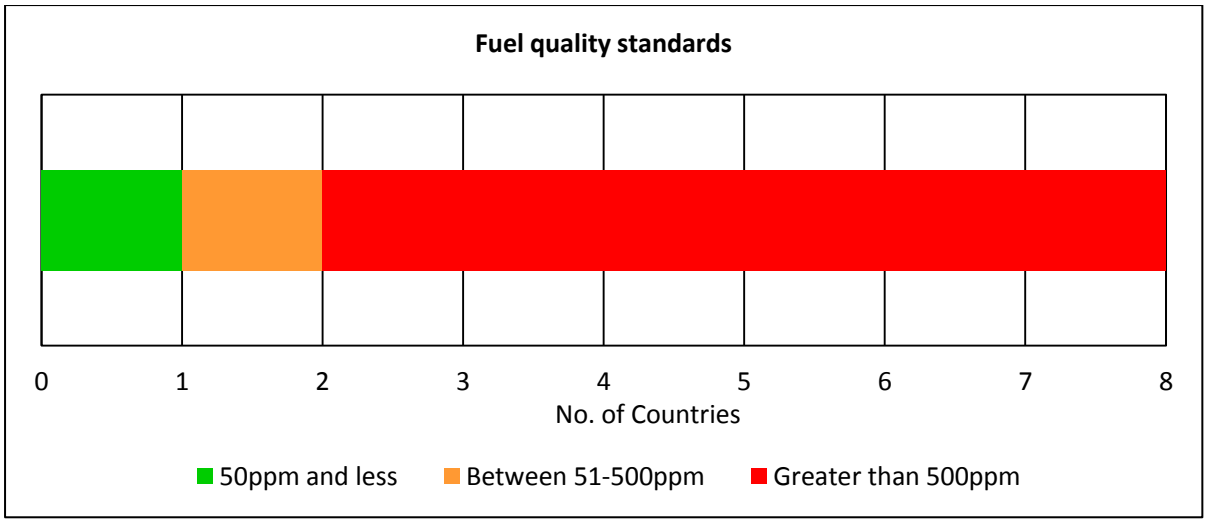


Figure 5: *Number of countries in the sub-region that regulate fuel quality using Sulphur content as a proxy for fuel quality*

3.3 Open burning of waste

Most countries in the sub-region have regulations prohibiting open burning of waste, however these are either not implemented or enforced. In Costa Rica for instance, outdoor burning of municipal waste is banned, but it still does occurs. The burning of agriculture

waste is authorized, although it is governed by a regulation that seeks to reduce this practice. For companies who wish to burn their agricultural waste, special permits are required. Figure 6 shows that open waste burning for both agricultural and municipal waste is commonly practised in the sub-region.

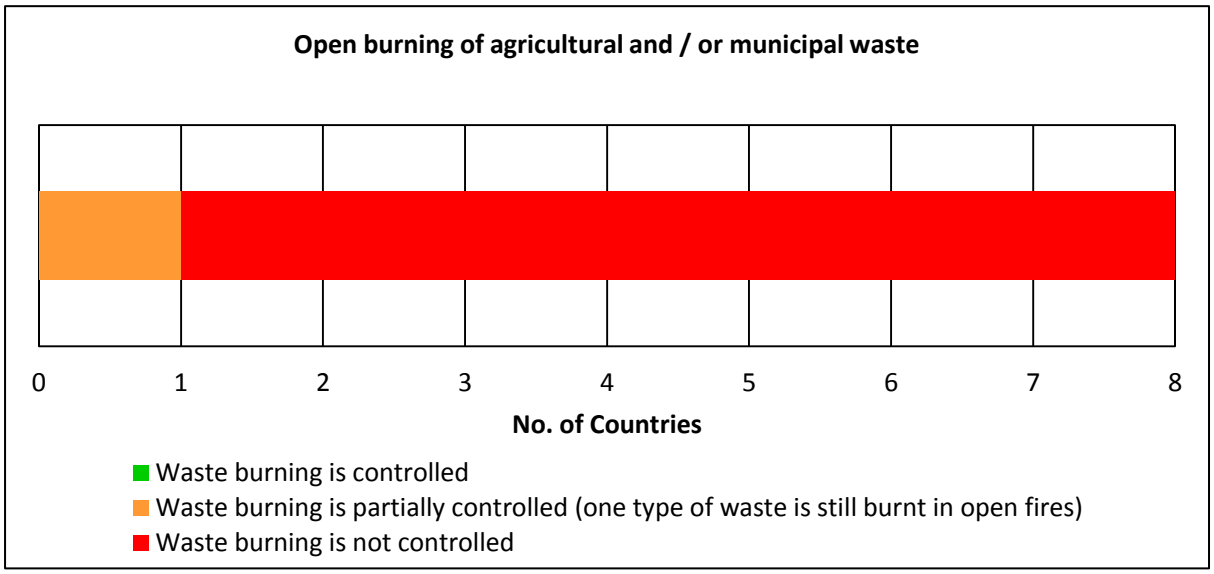


Figure 6: *Number of countries where laws, regulations and actions to ban and regulate open waste burning have been implemented.*

Other countries in the sub-region are emphasising municipal waste collection to minimise instances of open burning of municipal waste. For example, Belize is institutionalizing a national solid waste management plan that includes a sanitary landfill and transfer stations. The first phase covers the western corridor, while the second phase includes the southern and northern corridors of the country. The government is also working with the sugar industry to minimise waste burning.

Incentives are also used, especially in the industrial sector to encourage business to manage their waste appropriately. For instance, as an initiative to promote proper waste management, Mexico City provides tax credit to corporations that recycle or reprocess their solid waste up to a credit of 40% of payroll tax.

3.4 Indoor air pollution

In Central America, indoor air pollution is an important driver of premature deaths. 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 continued use of biomass 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.

Only Panama, Belize and Costa Rica provide access to cleaner energy sources to more than 85% of their households. In Costa Rica, there are tax benefits and subsidies to promote the use of LPG gas for cooking and the national electricity company provides solar panels for lighting to homes that are not connected to the grid.

In all the other countries, the percentage of population with access to non-solid fuels is between 30% and 85%. Figure 7 indicates countries in the sub-region and the non-solid fuels access rate.

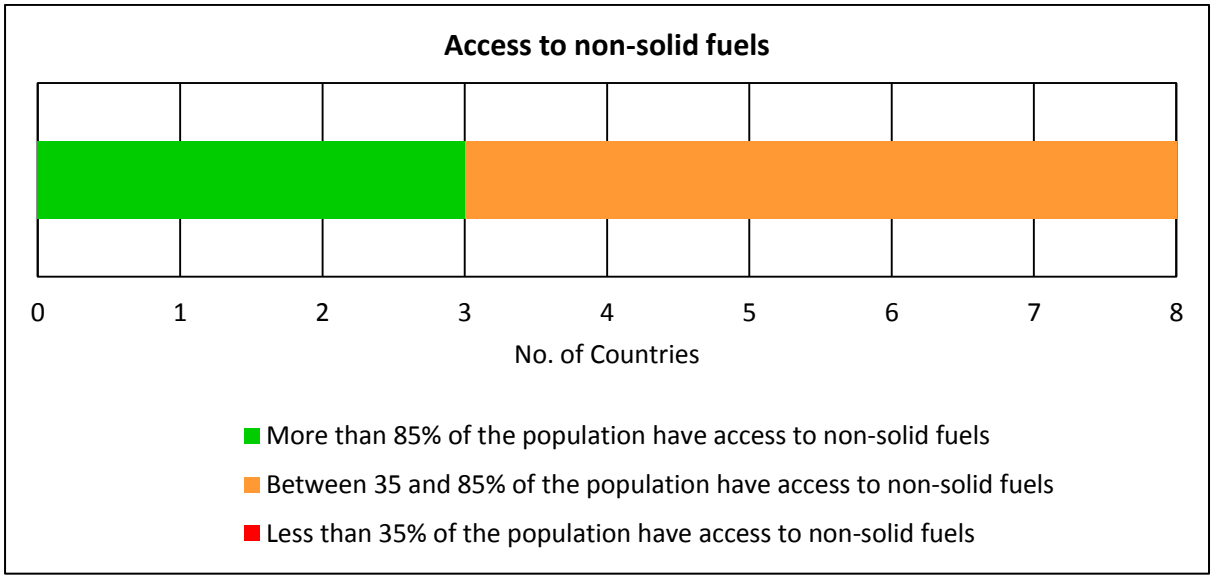
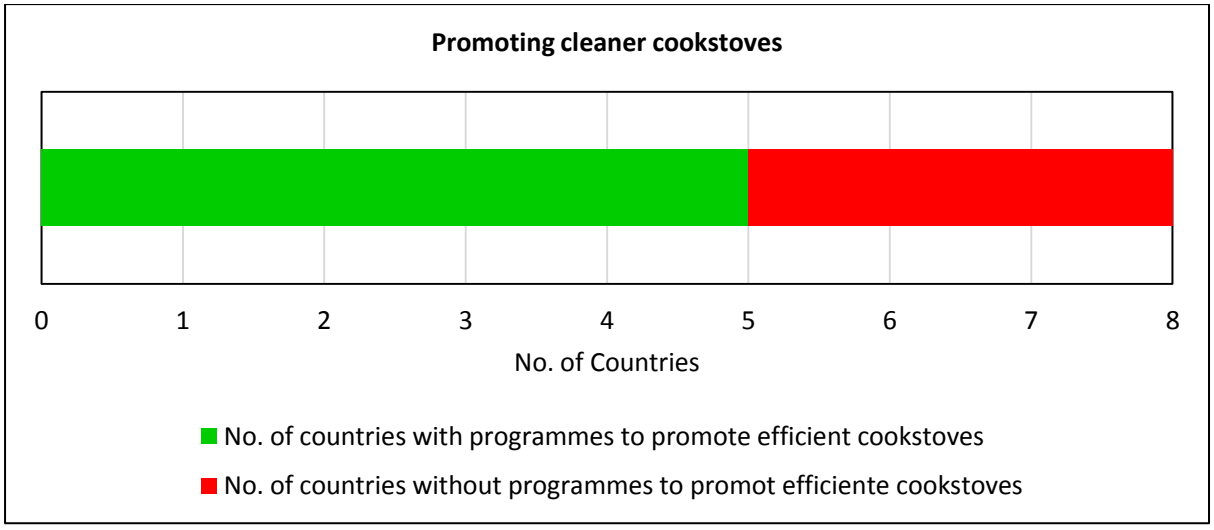


Figure 7: *Number of countries in the sub-region that have implemented programmes and policies to improve non-solid fuels access rate, as indicated by percentage of households with access to non-solid fuels.*

Other initiatives being implemented by governments in the sub-region to mitigate against indoor air pollution include the promotion and provision of cleaner cookstoves. 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[1] 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.

Five out of the eight countries in the sub-regions have initiated programmes that promote clean cookstoves. that also qualify for carbon trading schemes. One of the countries that is promoting cleaner and efficient heating stove is Guatemala, where the governments aims at distributing more than 650,000 clean cookstoves by 2023.



[1] 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 tCO2e (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 seven out of the eight countries in the sub-region. Use of renewable energy sources for electricity generation (both on-grid and off-grid) is high in thesub-region, with five out of eight countries having more than 50% of their electricity generated from renewable energies. However dependence on fossil fuels for energy generation has been growing, from 9% in the 1990s to 38% in 2011. This makes power generation a potentially major driver of air pollution.

Seven out of eight countries have incentives in place for advancing renewable energies: Costa Rica offers income tax exemptions and import/export fiscal benefits, as well as a 13% decrease of tax on renewable technology; El Salvador offers a 10 year tax exemption for projects below 10MW, other import/export fiscal benefits, grid access and soft loans; in Guatemala the Renewable Energy Project Incentives Act instructs the Ministry of Energy and Mines to award incentives such as exemptions from duty, VAT, income tax, and provide transmission discounts for renewable energy investments; Honduras offers income tax and custom tax exemptions; Mexico offers national exemption from some local taxes, priority grid access, some direct funding and investment support; Nicaragua offers exemption from import taxes, VAT and 7 years income tax; and Panama offers exemption from VAT, fuel tax, income tax and import taxes; fiscal incentives up to 25% of direct investment. Figure 9 shows the number of countries in the sub-region that offers incentives to encourage investment in cleans production. In addition to these incentives, all countries in this sub-region have put in place polices and plans to increase investment in renewable energies.

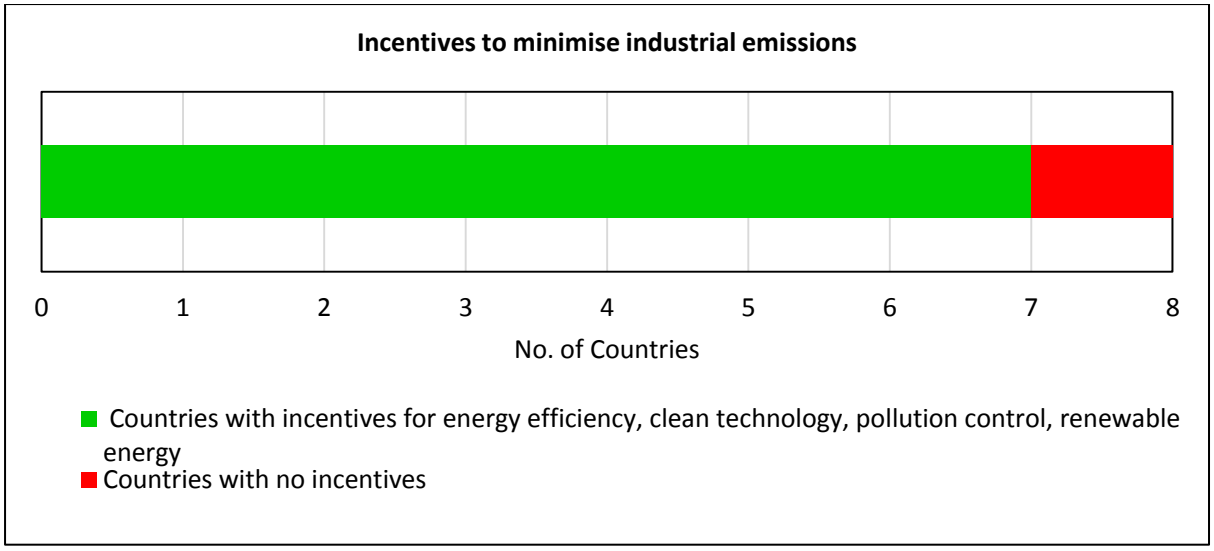


Figure 9: *Number of countries in the Central America sub-region that use incentives to encourage industrial investments in cleaner production and renewable energy generation.*

Most countries in the sub-region have established national targets for the amount of electricity generated from renewable energy: for example, in Costa Rica this target is set at 97% by 2018; in El Salvador the target is 60MW from wind, 90MW from solar PV, 200MW from solar thermal, 60MW from geothermal, 162MW from small hydro, 45MW from biomass and 35MW from biogas by 2026; in Guatemala the target is 60% by 2022; in Honduras the target is set at 60% by 2022; Mexico aims at 50% by 2050; Nicaragua aims at 94% by 2017; and Panama aims at 706MW hydro by 2023.

Other incentives are aimed at minimising the emission of air pollutants from industrial installation. Investments in pollution prevention and control technology in Mexico can qualify for 100% tax deduction.

Other nations within the sub-region have established programmes aimed at increasing energy efficiency. For instance, in Costa Rica tax benefits are offered for investment in energy efficient appliances.

Five out of the eight countries have an industrial energy efficiency[2] greater than USD 9 per unit of energy. This suggests that industrial technology used in the sub-region is efficient. Figure 10 shows a summary of industrial energy efficiency in thesub-region. An industrial

[2] Measured as GDP generated per unit energy, at constant 2011 PPP $ per kg of oil equivalent

energy efficiency of USD 9 per unit of energy and above is used to indicate better energy efficiency.

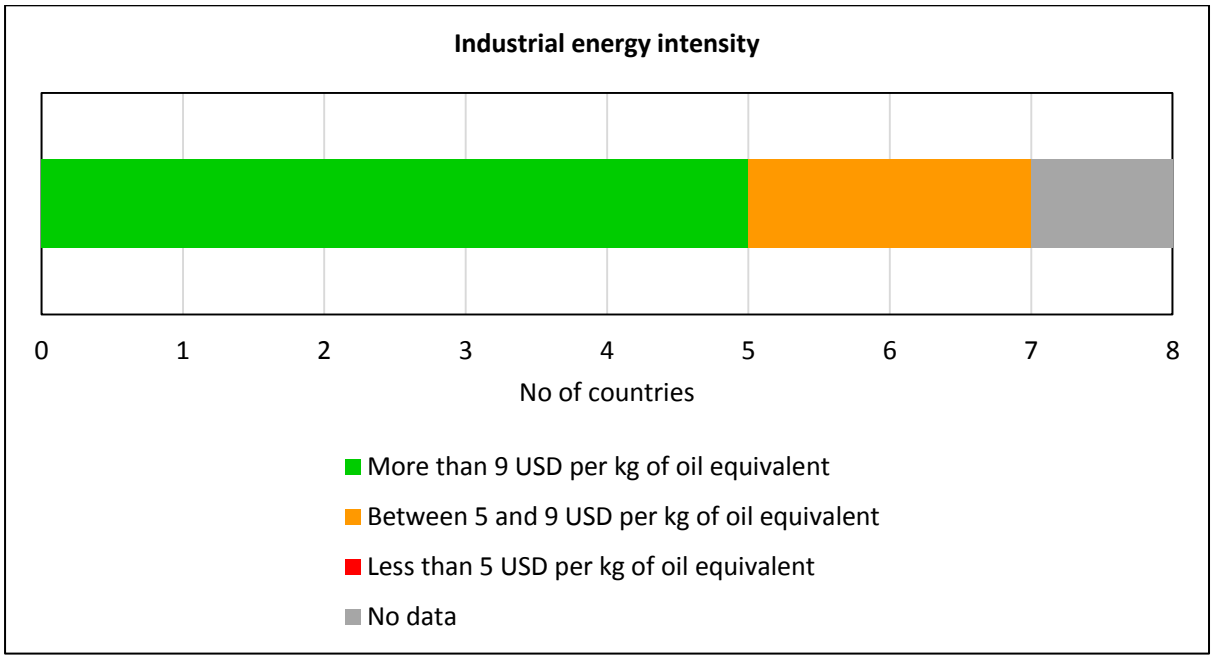


Figure 10: *Number of countries in the sub-region with their corresponding industrial energy efficiency. Energy efficiency is calculated as GDP per unit of energy use at constant 2011 PPP $ per kg of oil equivalent*

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/
- UNEP http://www.unep.org/Transport/new/pcfv/
- Air Quality Catalogue http://www.unep.org/transport/airquality/
- Various government reports, websites
- Energypedia https://energypedia.info/wiki/Main_Page
- Reegle http://www.reegle.info/countries/
- 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/