

Southeast Asia

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 Southeast Asia 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.

SOUTHEAST ASIA POLICIES AND ACTIONS TO IMPROVE AIR QUALITY

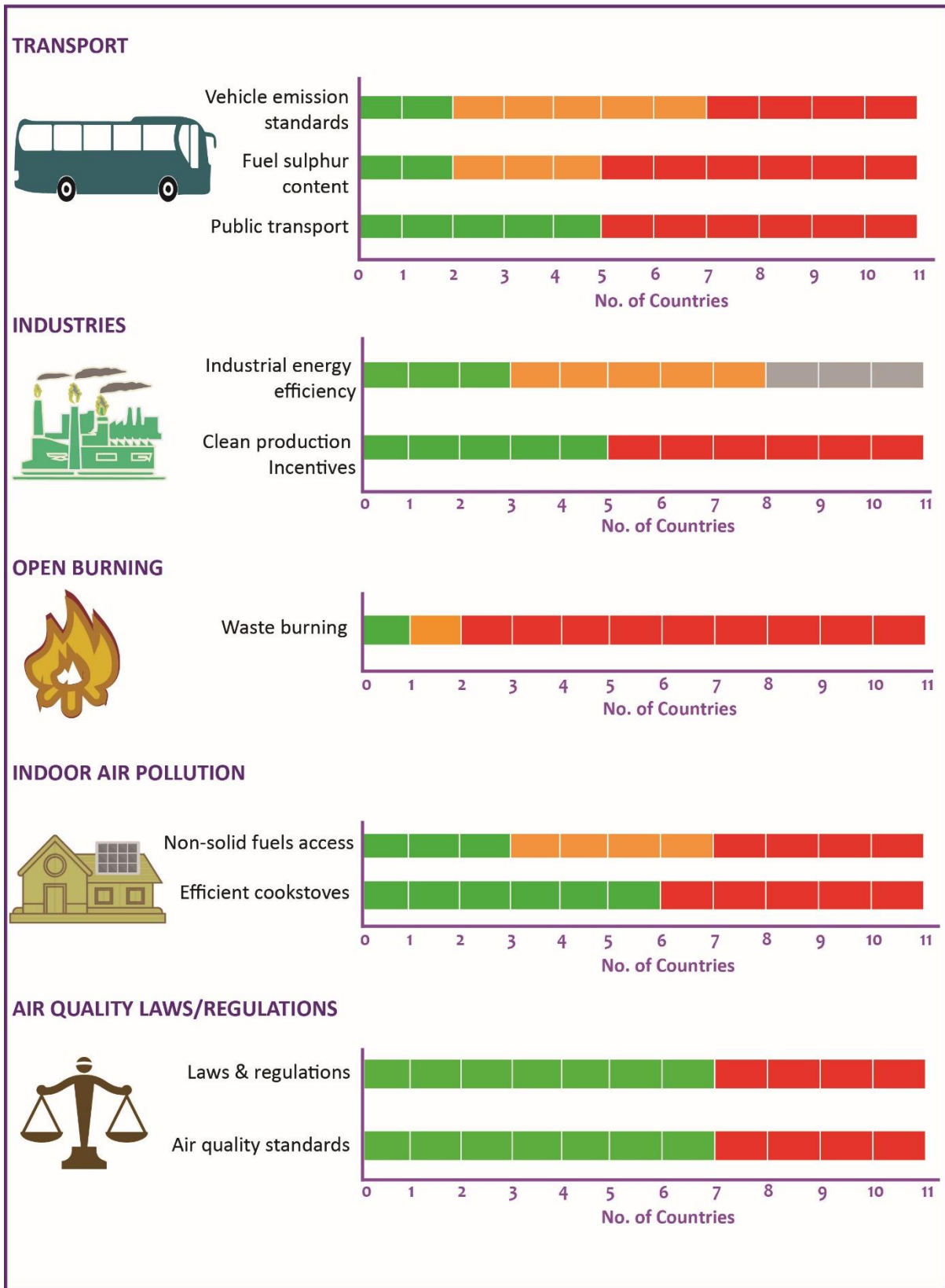


Figure 1: A summary of actions, programmes, policies, laws and regulations undertaken by governments in the sub-region to improve air quality (green = progressing to best practice; red = action still required).

2.0 Regional Overview

Southeast Asia includes Brunei, Cambodia, Indonesia, People's Democratic Republic of Lao, Malaysia, Myanmar, the Philippines, Singapore, Thailand, Timor-Leste and Viet Nam. Air pollution in the sub-region varies widely over space and time: in rural areas, biomass burning is the most dominant source of air pollution followed by vehicle emission, and in urban areas, vehicle and industrial emissions are the most important sources of air pollution.

The impacts of poor air quality are significant with indoor air pollution having the greatest health effect on the local populace. In 2012, the World Health Organisation estimated that indoor air pollution in the sub-region caused more than 376,000 premature deaths; indoor air pollution accounts for more than 75% of the total annual premature deaths. 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 these fuels, governments have put into place several policies, regulations and actions aimed at reducing the use of these fuels.

In the sub-region, outdoor air pollution is estimated to cause more than 149,000 premature deaths annually; this represents a 130% increase from 2004 levels. The moderate increase in outdoor air pollution impacts compared to the indoor impact can be attributed to actions taken by the governments of Indonesia, Singapore and Thailand in the early 2000s to mitigate against ambient air pollution. Some of this actions included banning the use of leaded fuels, enacting laws to regulate fuel sulphur contents, and adopting vehicle emission standards.

Open burning of municipal and agricultural wastes is banned in most countries, yet it continues. Transboundary transport of air pollutants is also an important source that contributes to deteriorating air quality in the sub-region, the most important being the seasonal forest and/or peat fires from Indonesia. Although policies and regulations exist to combat air pollution from open burning, in reality there is poor implementation and enforcement of the laws.

Vehicular emissions are also an important source of outdoor air pollution. Despite its contribution to urban air pollution, Euro 4 (or equivalent) vehicle emission standards and a

maximum 50ppm sulphur limit in fuels are only found in two countries. Three other countries have plans to improve standards over the next few years. Aggravating the situation is the absence of regulation on second-hand imports in some of the countries, exposing them to “dumping” of older, less efficient and more polluting vehicles.

While better fuel and vehicle standards are crucial to improve the cleanliness of the vehicle fleets, air pollution from transport will still increase in the future unless action is taken to tackle the growth in the numbers of vehicles. There is a pressing need to improve and increase public and non-motorised transport options, and to encourage a shift from private to public modes. While public transport is generally left to the city government to manage, a strong national framework and support may be required to ensure that this happens.

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

Seven out of the eleven countries have ambient air quality standards, although not all of them meet WHO guidelines. Malaysia and Singapore have established and implemented comprehensive sets of national air quality-related standards and regulations that contribute to improving air quality. Brunei, the Philippines, Viet Nam, Indonesia and Thailand have standards and some regulations; however the implementation and enforcement needs improvement. Figure 2 shows a summary of the number of countries that have enacted some form of national air quality laws and regulations.

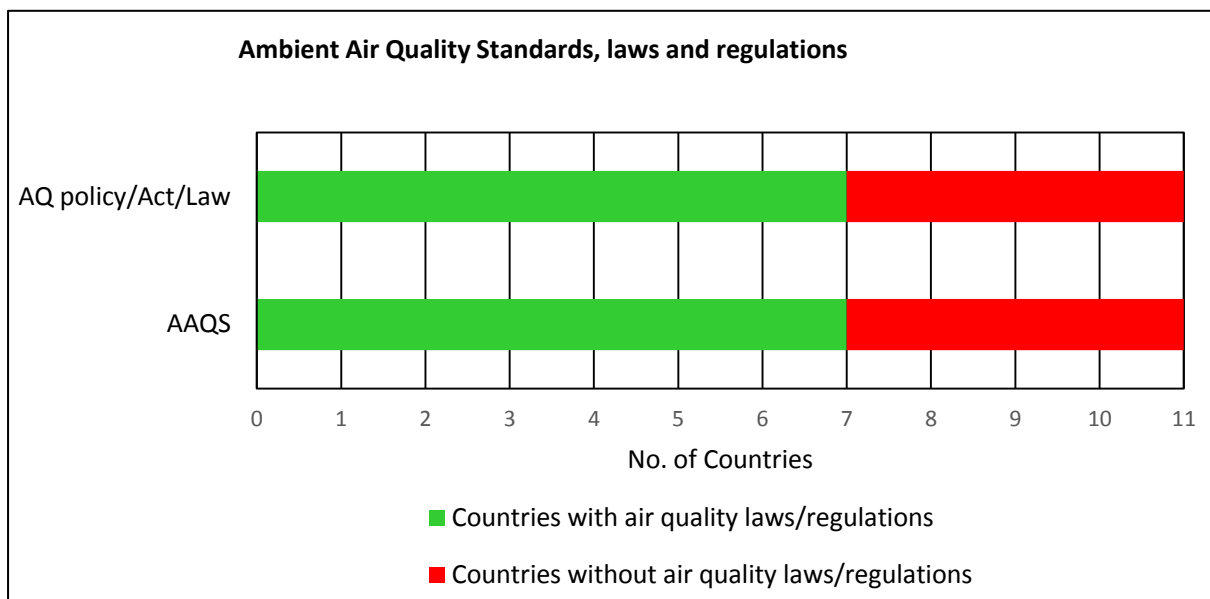


Figure 2: Number of countries in the sub-region that have enacted some form of air quality laws and regulations, and also the number of countries that have enacted and promulgated Ambient Air Quality Standards (AAQS).

While Singapore does experience seasonal haze from the Sumatra fires, its air quality still compares well with other major cities. The Economist Intelligence Unit called it Asia’s greenest city. There are several factors that contribute to this, including policy, climatic reasons (in the form of favourable winds), and the fact that the country is ranked as one of the least corrupt in the world. The absence of rampant corruption assists with enforcement of regulations.

Malaysia has developed its capacity to manage air quality during its longer history of managing environmental issues. While progress has been achieved within the country, up to 70% of its air pollution comes from outside the country in the form of transboundary haze. Similarly, although Brunei has a Pollutant Standards Index (PSI) below USEPA, EU and WHO guidelines, transboundary haze from agriculturally-related burning in neighbouring countries is a problem during the dry season.

While Indonesia doesn’t have a specific policy on air quality, its regulatory framework covers most of the issues impacting air quality. However, implementation, monitoring and enforcement need improvement. Air pollution remains a significant issue, especially in urban areas, with key sources being transport (increase in number of vehicles, poor fuel and

lack of vehicle emission standards) and open burning of wastes, all of which are aggravated by limited enforcement of regulations.

The Philippines' Environmental Performance Index (EPI) ranks third in the Southeast and North Asian sub-regions, next to Japan and Singapore, and ties with Australia for 8th place in the whole Asia-Pacific region. There is an Air Quality Management Fund to finance 'clean up' operations in air pollution cases, and a Clean Air Act with implementing rules and regulations, including national emission standards for industries. There has been some progress made in recent years, such as a 30% decrease in total suspended particulates from 2004 to 2008 nationwide, viewed as resulting from the Clean Air Act. The main challenge is not in the policies so much as in the implementation and enforcement.

In Viet Nam, 98% of the population is exposed to PM2.5 at levels exceeding WHO guidelines. The country has plans to develop a Law on Clean Air.

In Myanmar, there is no air quality policy or ambient air quality standards. An Environmental Conservation Law has been passed, but the regulations and standards to implement and enforce the law have not been developed.

In Cambodia, a sub-decree on air pollution control was issued in 2000, including air quality standards for ambient air quality and emission limits for stationary and mobile sources. However, there is a need for further development in the legal framework in order to implement the decree. Laos meanwhile has no ambient air quality standards and no specific air pollution control law or legal framework.

3.2 Transport Sector

Transport is a significant and growing contributor to air pollution in all the countries, particularly in urban areas. Given the increased congestion experienced in many urban areas, maintaining and increasing the modal share of public and non-motorised transport is essential for increasing mobility while decreasing transport emissions.

There is a concerted effort in Bangkok to expand mass transit, add more routes to subway and sky train services, and provide flat-rate ticket prices to encourage increased ridership.

There is also a plan to invest in high-speed, inter-city trains. Bangkok plans to amend regulations to allow access to electricity chargers at petrol stations. There is a 10% decrease in excise tax on electric vehicle components, as part of a plan to promote Electric Vehicles in Thailand. Actions to promote non-motorized transport are listed in the National Transport Master Plan.

Transport produces up to 80% of the air pollution in Metro Manila, the Philippines; in recognition of this, there are some actions being taken to promote cycling and walking at the city level. There is also a project to replace 200,000 conventional tricycles with electric versions. Singapore on the other hand has a comprehensive public and non-motorized transport system with a citywide network of walking and biking paths, trains and buses. Currently, Singapore's public transport network includes a Mass Rapid Transit system, a Light Rapid Transit system and buses. The Transport Master Plan will double rail network by 2030 to 360km, increase the number of trains, buses and bus routes, and give buses priority on the road. In addition, the city will build 200km of sheltered walkways, add more integrated transport hubs so people can easily switch between different modes, and expand the cycling path network to over 700km in length.

Other countries have plans to upgrade public transport. The Ninth Malaysia Plan recognised the importance of public transport and focused on a modal shift, leading to increased investment in bus rapid transit systems, with one bus rapid transit system being built in Kuala Lumpur. The Land Transport National Master Plan 2006-2025 for Brunei includes plans for a rapid bus transit network, and other improvements to public transport to decrease reliance on private vehicles.

In Viet Nam, traffic is responsible for up to 70% of urban air pollution. The government is directing more investment into public and non-motorised transport systems, including a rapid transit network being built in Ho Chi Minh and a metro rail project in Hanoi. There are also tax exemptions for buses that use clean energy. Bus enterprises receive various tax and fee exemptions if their buses use clean energy.

In Indonesia, there is increasing investment in rail networks for passengers and freight, which will hopefully move some of the road traffic onto rail, and a Bus Rapid Transit system in Jakarta. The Low-Cost Green Car initiative provides a lower tax rate for cleaner cars.

However a higher tax on public transport vehicles (20% for buses versus 10% for private vehicles) helps to discourage replacement of an aging bus fleet.

In Myanmar, the railway system is still a dominant but gradually declining mode for both passenger and freight, as is the waterway system. The aging railway system needs upgrading if it is to retain passengers, some of whom are starting to shift toward road transport, including private vehicles. Figure 3 shows the number of countries in the sub-region that are investing in significantly expanding public transport.

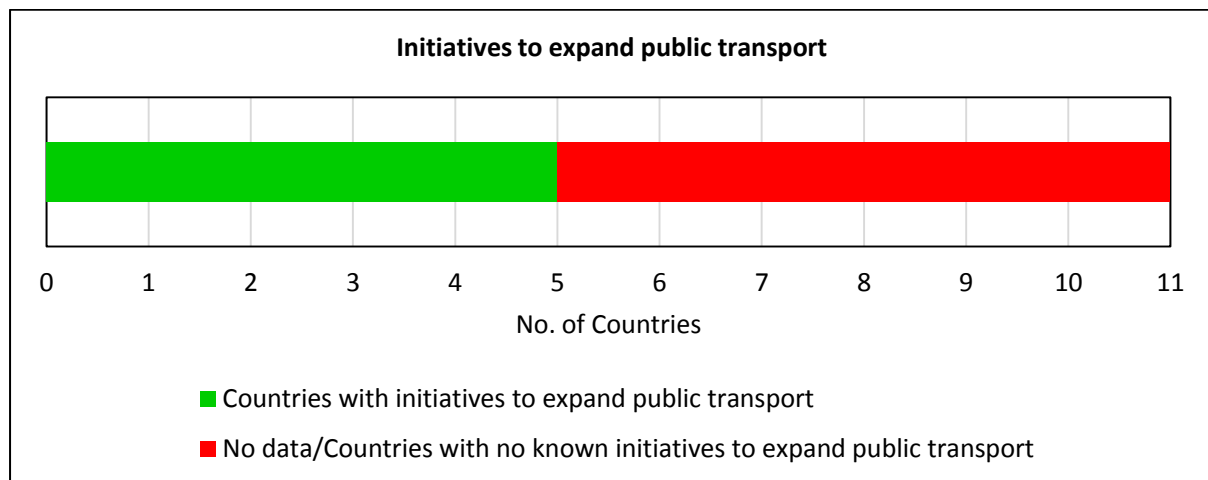


Figure 3: Number of countries in the sub-region that have initiated programmes and initiatives to significantly expand public transport.

Improved fuel quality and implementation of vehicle emission standards are also required to minimise emissions created from transport. Singapore and Thailand are the only two countries that currently have Euro 4 vehicle emission standards. Five other countries – Brunei, Indonesia, Malaysia, the Philippines and Viet Nam – have some vehicle emission standard in place. Figure 4 shows the number of countries in the sub-region that have established emission standards for vehicle.

Other countries are planning to improve to introduce or tighten their vehicle emission standards. For instance, Philippines plans to tighten its vehicle emission standards to Euro 4 by 2016. In Viet Nam, there are plans to improve vehicle emission standards to Euro 4 by 2017. In Malaysia, there are plans to tighten vehicle emission standards to Euro 4 in 2016.

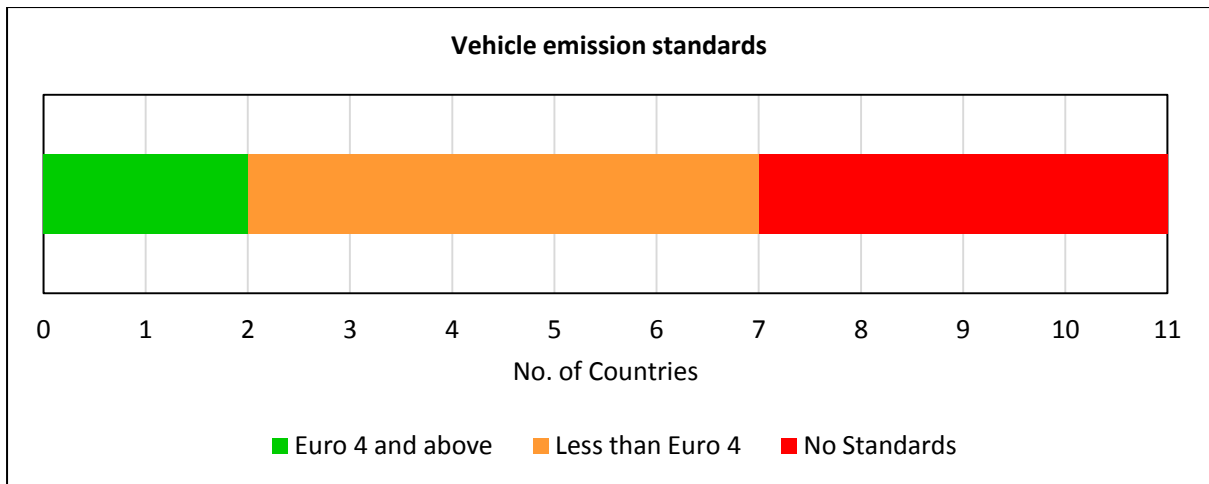


Figure 4: Number of countries in the sub-region that regulate vehicle emission at Euro 4 (or equivalent) standards.

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. Singapore and Thailand are the only countries that currently have a fuel standard limiting the maximum sulphur content to 50ppm. Other countries in Southeast Asia are planning to improve their fuels standards gradually. The Philippines for instance plans to lower the maximum sulphur content to 50ppm in 2016.

In Viet Nam, there are plans to improve fuel quality by lowering the maximum fuel sulphur content to 50ppm by 2018. In Malaysia, fuel sulphur content will be lowered to 50ppm in 2016. Figure 5 summarises fuel sulphur content for the fuel that is currently available in the sub-region.

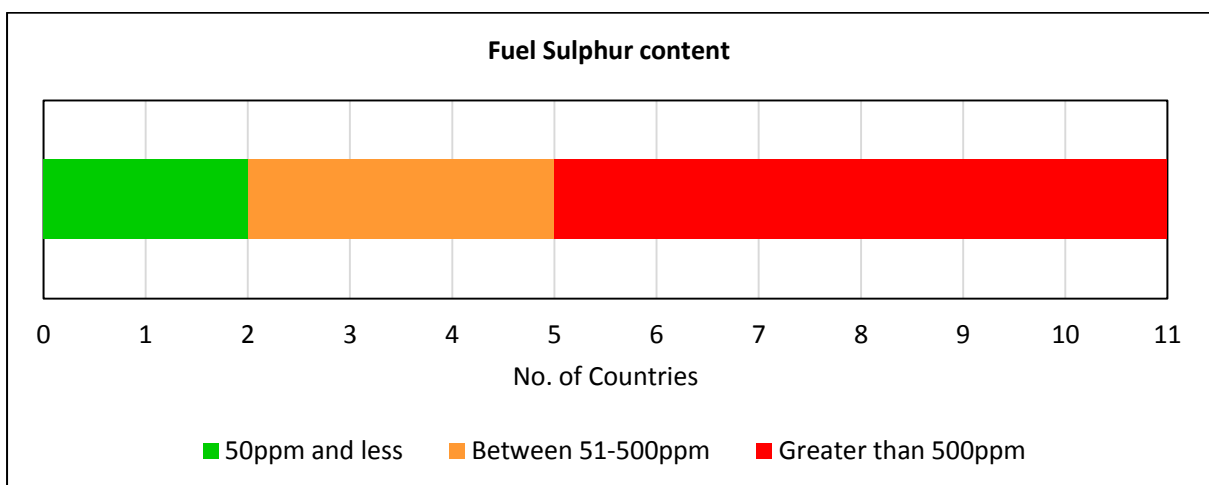


Figure 5: Number of countries in the sub-region that regulate fuel quality using Sulphur content as a proxy for fuel quality

3.3 Open burning of waste

Open burning of wastes (municipal and / or agricultural) happens in ten out of the eleven countries, despite legislation prohibiting open burning in five of the countries (see Figure 6). Singapore effectively managed to enforce their ban by handling its municipal wastes through an integrated solid waste management system that includes recycling, collection and sanitary disposal.

Malaysia has made progress in tackling local sources of burning through increased governmental cooperation and a well-developed air quality monitoring network, both of which assist in identifying local, illegal fires and enforcing anti-burning regulations.

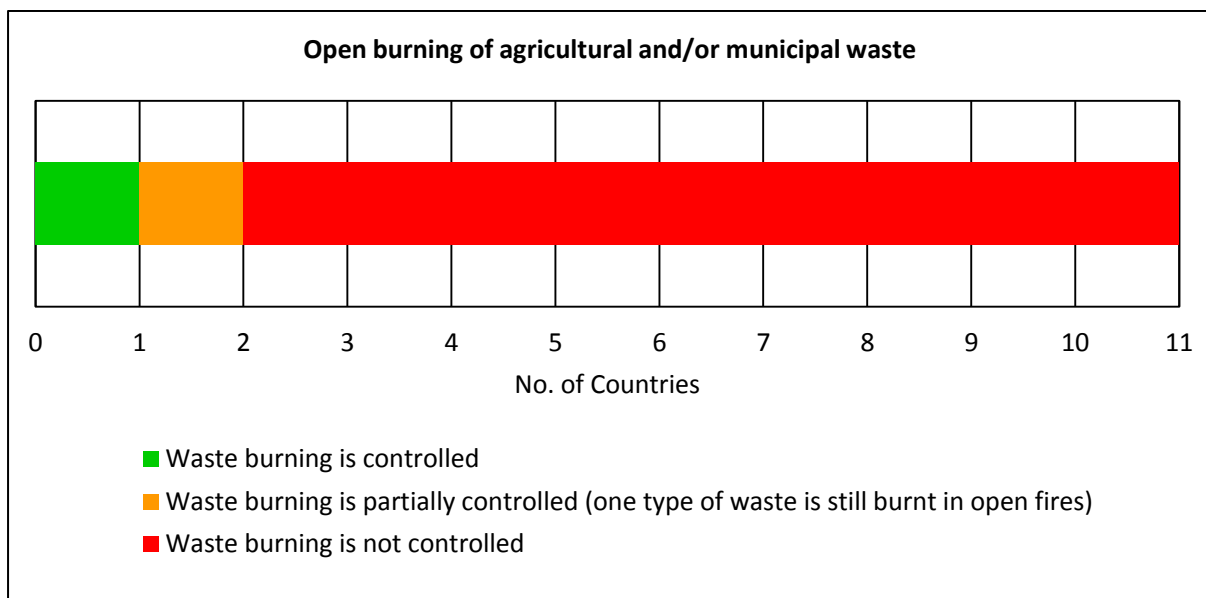


Figure 6: Number of countries where laws, regulations and actions to ban and regulate open waste burning have been implemented.

Although land clearing isn't specifically covered under open waste burning, reference needs to be made to the widespread use of burning for land clearing in Indonesia, given its significant impact. Open burning is a common practice, leading to serious haze across the sub-region in the dry season. Indonesia's 1999 Forestry Law prohibits all forms of land clearing by burning, but enforcement needs to be improved.

3.4 Indoor air pollution

More than 50% of the population in five of the eleven countries, and between 21-50% of the population in another three countries, rely on solid fuels (wood and charcoal in particular) for cooking (Figure 7). This exposes people to high levels of pollution from the open, indoor fires and inefficient stoves.

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.

Brunei Darussalam, Malaysia and Singapore are the three countries in which residents use cleaner, non-solid fuels or electricity for cooking. Singapore benefits from a high per capita GDP which could be a factor in the use of non-solid fuels. Malaysia and Brunei have provided subsidies for petroleum products, including cooking fuels, which contributed to the uptake of cooking gas.

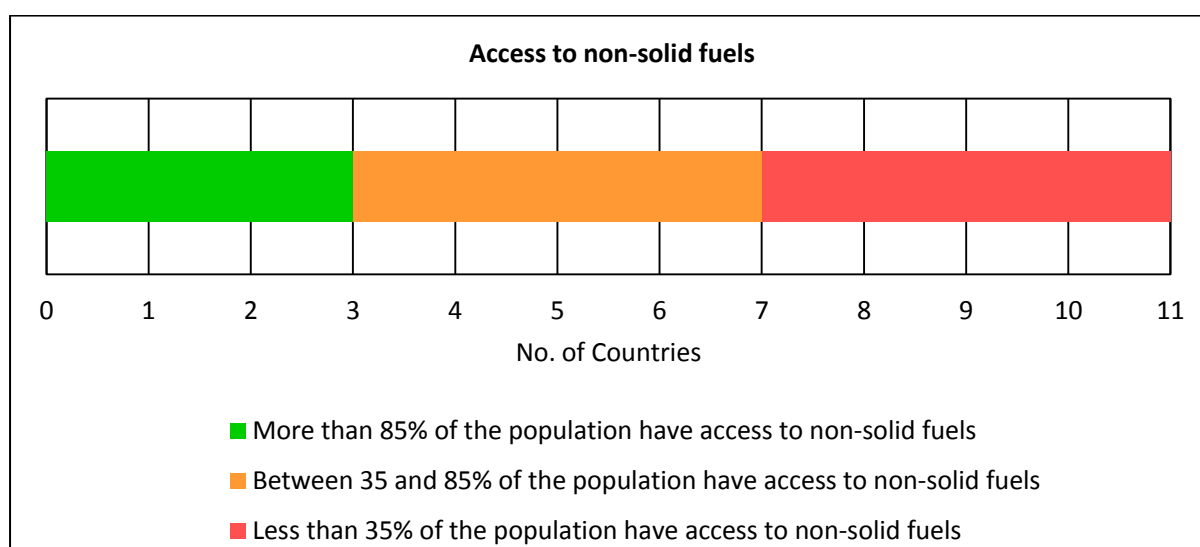


Figure 7: Number of countries in the sub-region that have implemented programmes and policies to improve non-solid fuels access rate, as indicated by percentage of households with access to non-solid fuels.

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 cookstove¹ 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.

In Vietnam, the government officially joined the Global Alliance for Clean Cookstoves in 2012 with the aim to promote cooperation between the public and private sector for the production and distribution of clean cook stoves in Vietnam.

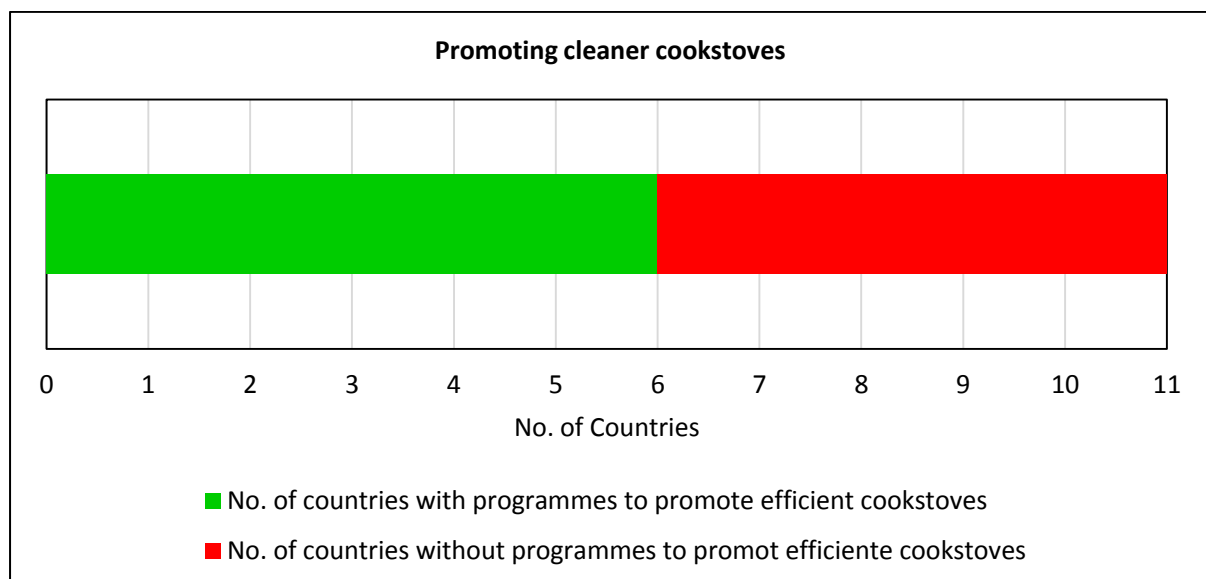


Figure 8: Number of countries in the sub-region that have programmes to promote use of efficient cook stoves. Due to lack of reliable data on clean cook stove, only programmes aimed at promoting cook stoves that also qualify for carbon trading schemes are represented here.

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.

3.5 Industries

The use of incentives for promoting investment in energy efficiency, clean technology, renewable energy and / or pollution control are found in five of the eleven countries in the sub-region. Singapore provides tax incentives to encourage the switch to cleaner, energy efficient equipment and to install pollution control equipment. There are industrial CCTV systems and telemetric in-stack, continuous monitoring systems for stationary sources, to monitor pollution emissions. Air quality data is updated hourly on the National Environment Agency's website.

Brunei is also planning to introduce a feed-in tariff to encourage investment in renewable energy systems by offering long-term contracts to renewable energy producers. The government will take a leading role in identifying land for utility-scale solar projects and developing a waste-to-energy project using municipal solid waste.

The Thai government's 10-year Alternative Energy Development Plan aims to increase alternative energy usage to 25% of total energy consumption. To assist in this, tax breaks are provided for solar power systems. The Philippines meanwhile is the world's second largest generator of geothermal energy after the USA, and is first among ASEAN countries to invest in large-scale solar and wind technologies. The Philippine Development Plan 2011-2016 and Renewable Energy Plan both include strong renewable energy goals, and provide income tax holidays for investors, duty-free import of equipment etc.

Perversely, Indonesia and Laos plan to increase the share of coal in electricity generation. In 2009, Timor Leste purchased and relocated three second-hand, heavy oil power plants from China to the country; the plants were more than twenty years old.

Figure 9 below shows the number of countries in the sub-region that use incentives to reduce emissions from industrial installations.

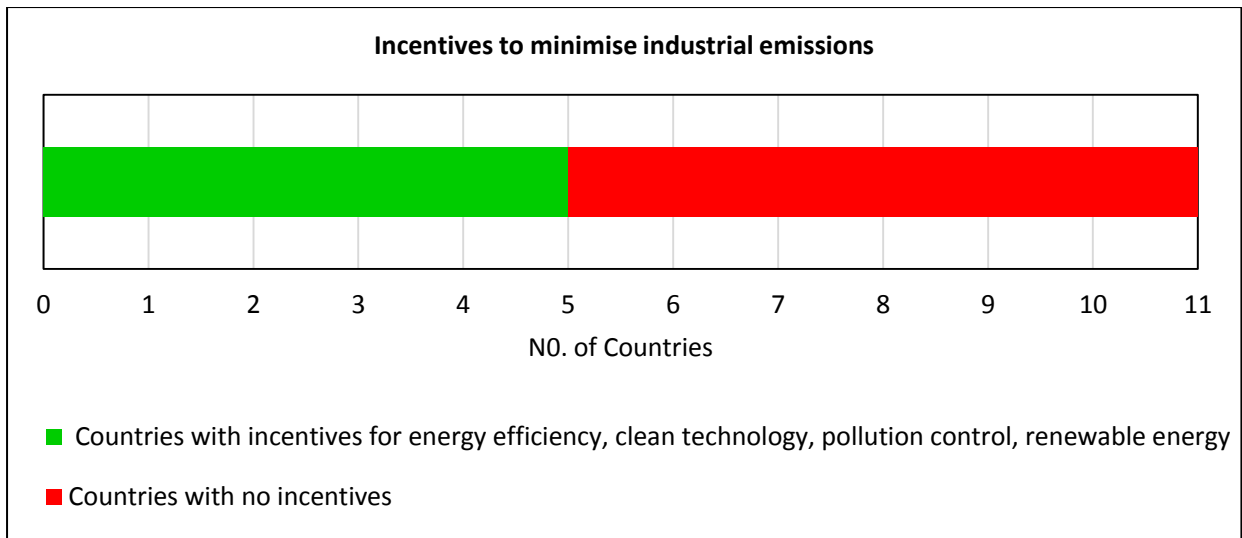


Figure 9: number of countries in the sub-region that use economic incentives to stimulate cleaner production in the industrial sector.

The industrial energy efficiency (measured as GDP generated per unit energy) in Southeast Asia is relatively low for majority of the countries. This suggests that industrial technology used in some countries within the sub-region is outdated, which translates to energy wastage and unnecessary air pollution emission from these facilities. Generally low efficient industries tend to emit more air pollutants directly and indirectly compared to equivalent more efficient technologies. Figure 10 shows a summary of industrial energy efficiency. An industrial energy efficiency of USD 9 per unit of energy and above is used to indicate better energy efficiency.

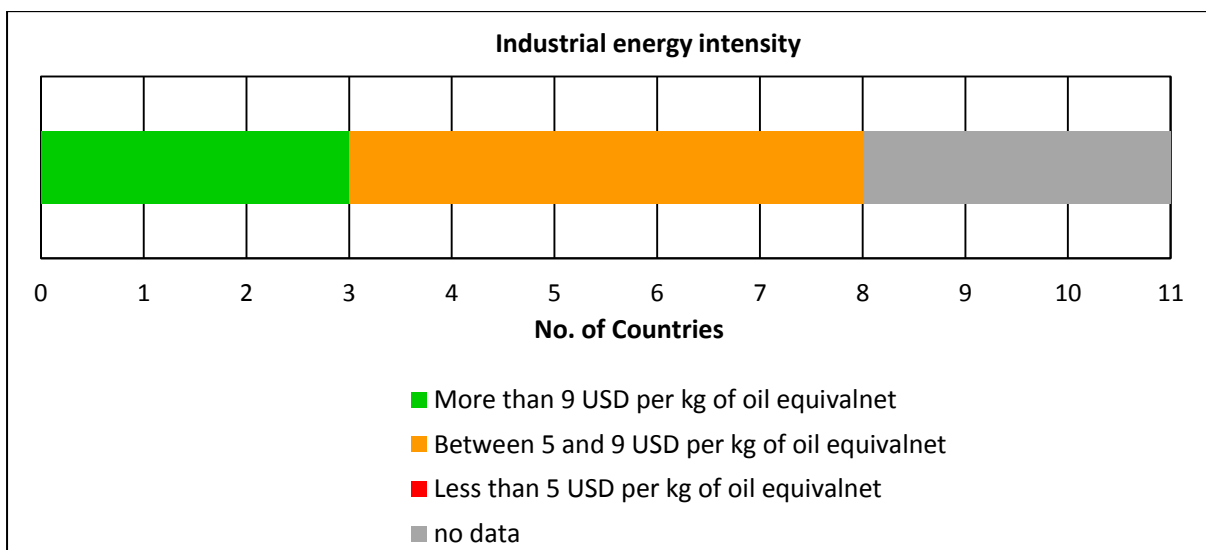


Figure 10: Number of countries in the sub-region with their corresponding industrial energy efficiency. Energy efficiency is calculated as GDP per unit of energy use at constant 2011 PPP \$ per kg of oil equivalent

Other initiatives being implemented by governments in the sub-region to minimise industrial emissions includes. Legislation requirements, which are for instance used in Malaysia and the Philippines, where new industrial projects are required to use Best Available Techniques to minimise emissions. In the Philippines, sources that can emit greater than 100 tons/year of air pollutants must install continuous monitoring systems; sources that emit less than 100 tons/year do not need to install continuous monitoring systems, but their emissions are regulated.

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/pcf/>
- 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/>