

North 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 North 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.

NORTH ASIA POLICIES AND ACTIONS TO IMPROVE AIR QUALITY

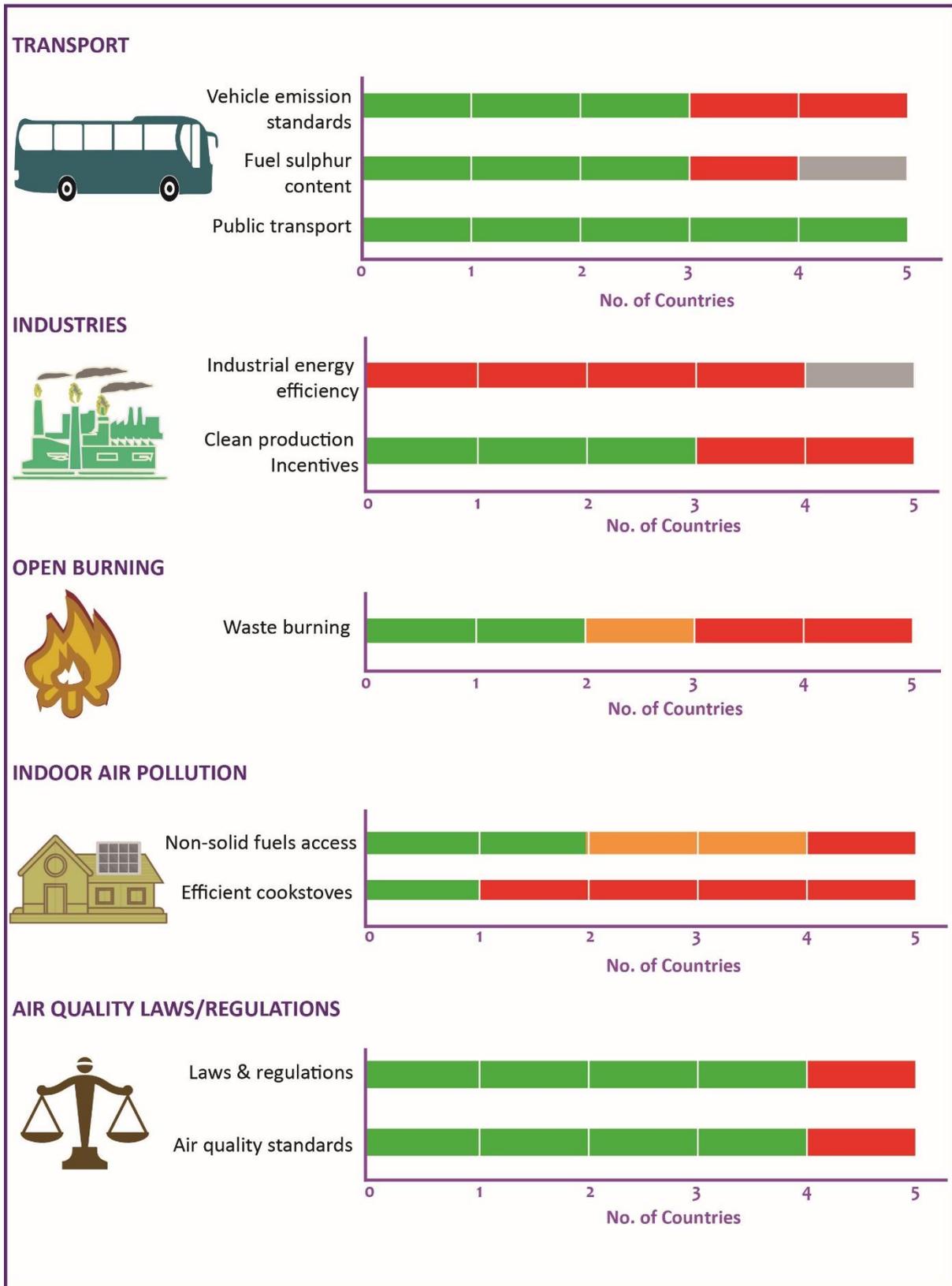


Figure 1: A summary of actions, programmes, policies, laws and regulations undertaken by governments in the sub-region to improve air quality (green = progressing to best practice; red = action still required).

2.0 Regional Overview

The North Asia sub-region includes the following countries: China, Japan, Mongolia, North Korea and South Korea. In the past few decades, some of the countries in the sub-region have recorded considerable improvement in air quality. Despite the progress, WHO estimates that air pollution in the sub-region causes approximately 2.6 million premature deaths annually.

In Japan, air quality has improved dramatically over the past few decades even under continued economic expansion, thanks to stringent regulations. The World Health Organisation (WHO) said Japan has some of the world's least polluted cities.

In China, as a result of stringent emission laws and regulations, the national air quality improved in 2014, with the average annual concentration for PM10 in 338 prefecture level cities decreasing by 2.1% from 2013 levels. The average annual concentration of PM2.5 in 74 cities decreased by 11.1% from 2013 levels. Beijing's particulate matter concentration (PM2.5) has dropped by 20%. Despite this progress, air pollutant emission levels in the Beijing-Tianjin-Hebei, Yangtze River Delta, and Pearl River Delta are 2.9 to 3.6 times higher than the nation's average, and air pollution remains a serious environmental and health issue.

In Ulaanbaatar, small particulate concentrations can reach up to six times the WHO interim standards, and ten times higher than the Mongolian Standards.

In recognition of the importance of air pollution, a number of actions have been taken by governments in the sub-region. China is making heavy investments in expanding public and non-motorised transport. South Korea has regulations on vehicle emissions standards and fuel quality, and provides incentive for clean production investment while simultaneously tightening restrictions on industrial emissions.

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

Four out of five countries in North Asia - China, Japan, Mongolia, and South Korea – have promulgated ambient air quality standards, although most don't meet WHO guidelines, and none have PM2.5 standards. The same four countries have established nationwide legislation or Acts specifically for air quality. Figure 2 shows the number of countries in the sub-region that have established national laws and regulations on air quality management.

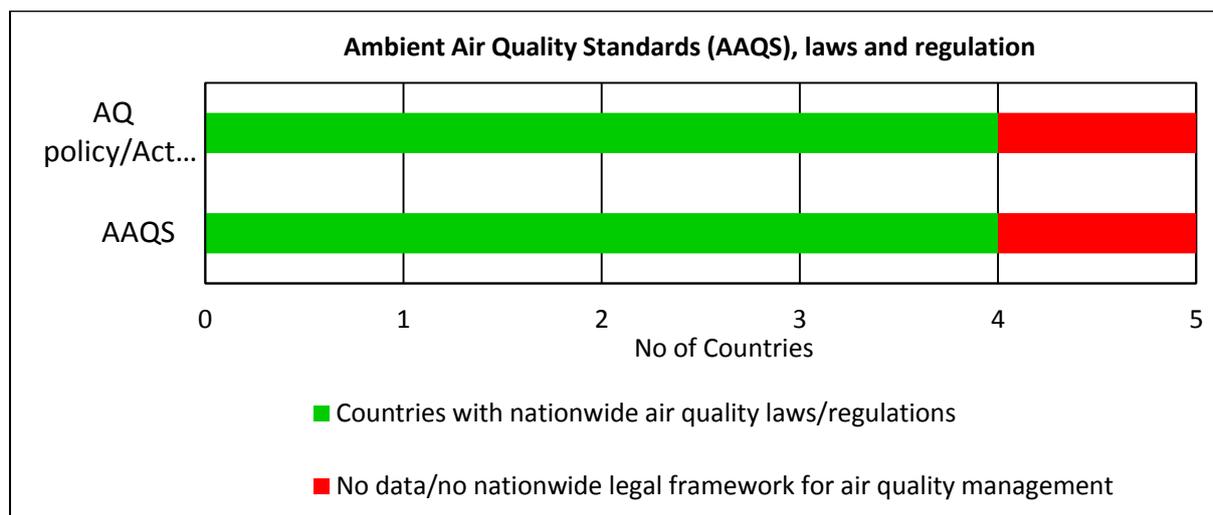


Figure 2: Number of countries in the sub-region that have enacted some form of air quality laws and regulations, and also the number of countries that have enacted and promulgated Ambient Air Quality Standards (AAQS).

Governments in North Asia are taking several regulatory steps to improve air quality. China recently introduced binding pollution reduction targets, various emissions standards have been strengthened, monitoring capacity has been significantly increased, and much of the data generated from monitoring stations has been released to the public. The Chinese Air Pollution Prevention and Control Action Plan (2013) focuses not only on pollution targets, but also industrial restructuring, industrial location, and technological innovation, as well as stronger governance. It will be enforced by linking industrial project approvals to

environment impact assessment (EIA), energy audits, and linkage with senior officials' performance evaluations.

In addition to government efforts, a regional body Asia Pacific Clean Air Partnership has been set up by countries within the wider region to bring together multiple regional initiatives to provide clear policy options based on the best science to support action on air pollution across Asia-Pacific.

3.2 Transport

Transport is one of the leading causes of deteriorating urban air quality in North Asia. 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 for increasing mobility while decreasing transport emissions. All five countries have ongoing initiatives and programmes to expand significantly public transport (Figure 3).

The government of Japan has made considerable investments in railway transport, especially between major cities and within metropolitan areas. 72% of passenger-km in Japan is by rail, while 13% is by motor vehicles. Tokyo has a very extensive and well-used railway network. The city is doubling the amount of bike lanes and promoting biking (already 16% of commuters use bikes); there is a Cycling Embassy of Japan to promote cycling. There are tax deductions and exemptions for environmentally friendly vehicles and fuel efficient vehicles; Japan leads in a KPGM ranking for tax measures that promote the use and manufacture of green vehicles.

China has invested heavily in public transport and electric mobility. Over 300 cities have built more than 1,550 Bus Rapid Transit systems. Mongolia is importing minibuses to strengthen the public transport system. Pyongyang, North Korea is acquiring new subway buses to improve and expand its metro.

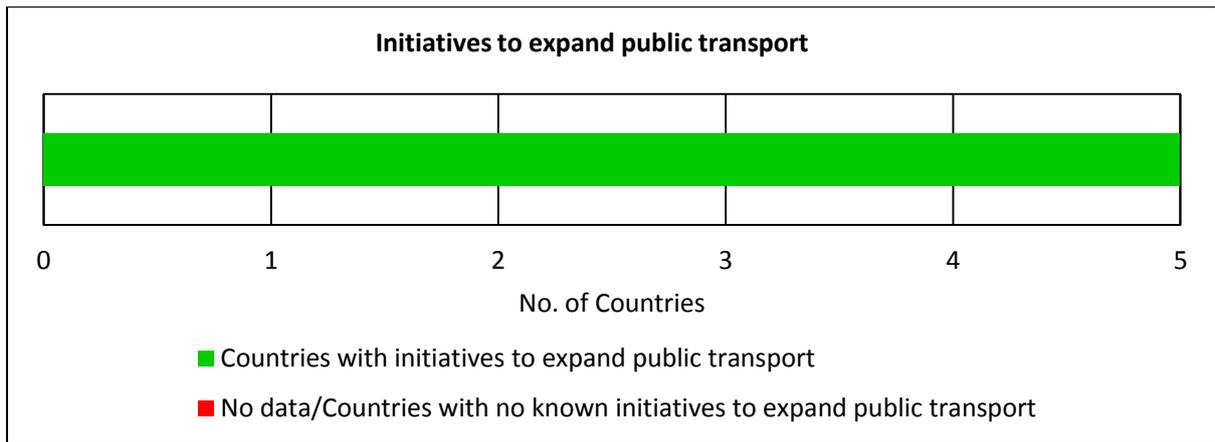


Figure 3: Number of countries in the sub-region that have initiated programmes and initiatives to significantly expand public transport.

Improved fuel quality and implementation of vehicle emission standards are also required to minimise emissions created from transport. Only three countries – China, South Korea and Japan – have vehicle emissions standard equivalent to Euro 4 or higher (Figure 4). Japan’s vehicle emission standards are equivalent to Euro 6. Mongolia meanwhile is experiencing rapid vehicle growth in urban areas, with no standards for new or second hand imports. This poses a major challenge as it might lead to a significant deterioration of air quality in the country as vehicle numbers increase.

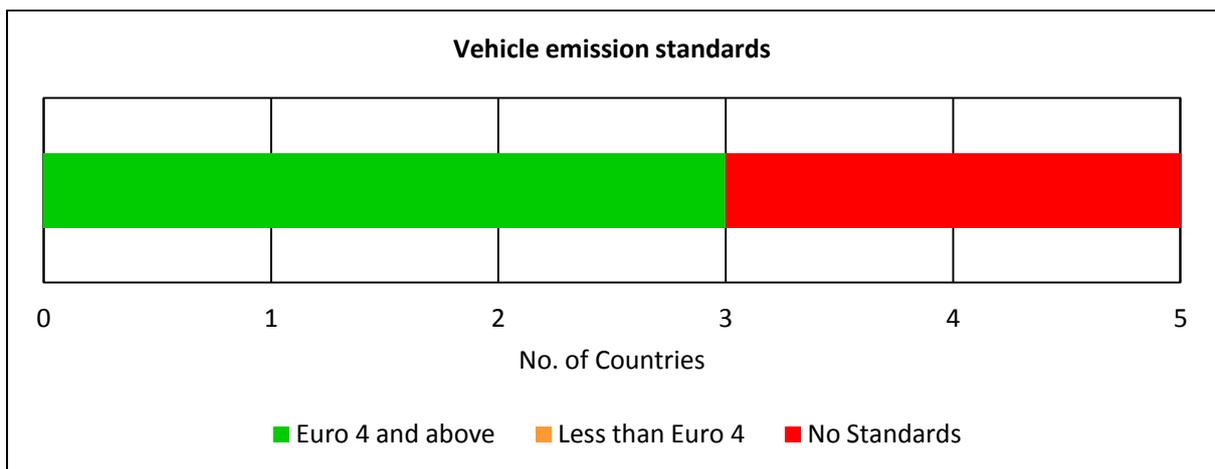


Figure 4: The number of countries in the sub-region that regulate vehicle emissions to Euro standards or its equivalent.

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. Three countries in the sub-region – China, South Korea and Japan – have

established fuel quality standards regulating fuel sulphur content to a maximum of 50ppm (Figure 5).

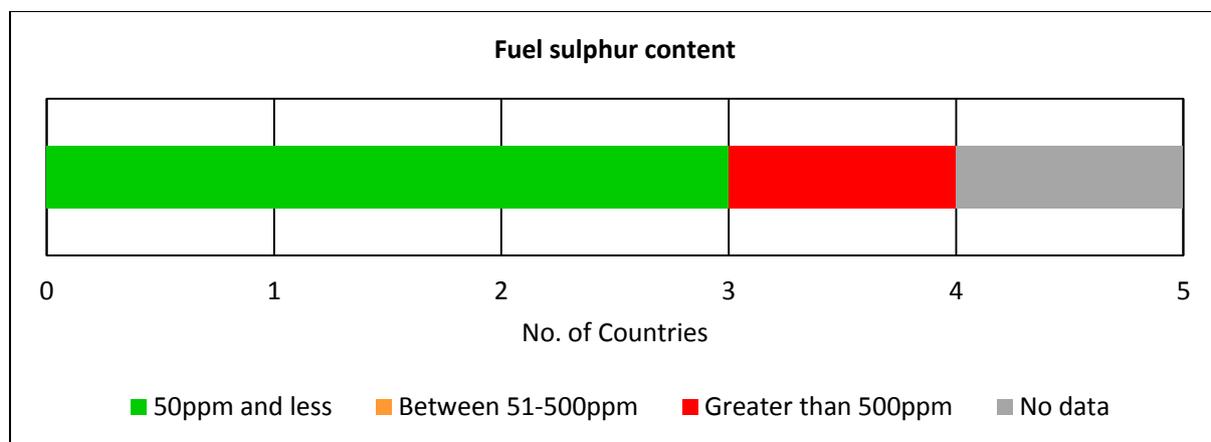


Figure 5: Number of countries in the sub-region that regulate fuel quality. Fuels Sulphur content is used as a proxy of fuel quality.

There is also increased interest in electric mobility. China plans to accelerate the roll-out of electric vehicles to ensure there are one million in the domestic market by 2020. To encourage the uptake of greener vehicles, at least 30% of local governments' newly ordered vehicles must be 'green' or the local governments will face stiff penalties.

Despite the vehicle emission and fuel quality standards, emissions from transport still remain a major source of urban air pollution in the sub-region as the numbers of vehicles continues to rise. In China for example, transport accounts for significant levels of pollution in urban settings; in Guangzhou, they contribute approximately 23% of PM2.5 concentrations. This indicates that fuel and vehicle emissions standards alone are not enough to mitigate against emissions from the transport sector and more initiatives are required, and there needs to be a modal shift away from private vehicles.

3.3 Open burning of waste

Open burning of municipal and agricultural waste, which occurs in three countries in the sub-region, is another significant source of air pollution in both urban and rural settings. Two out of the five countries practice opening burning of both agricultural and municipal waste, while in one country, only municipal waste is burnt in open fires. Two countries –

Japan and South Korea – have successfully managed to regulate open burning of both municipal and agricultural waste. Figure 6 shows the number of countries in the sub-region where waste burning have been controlled.

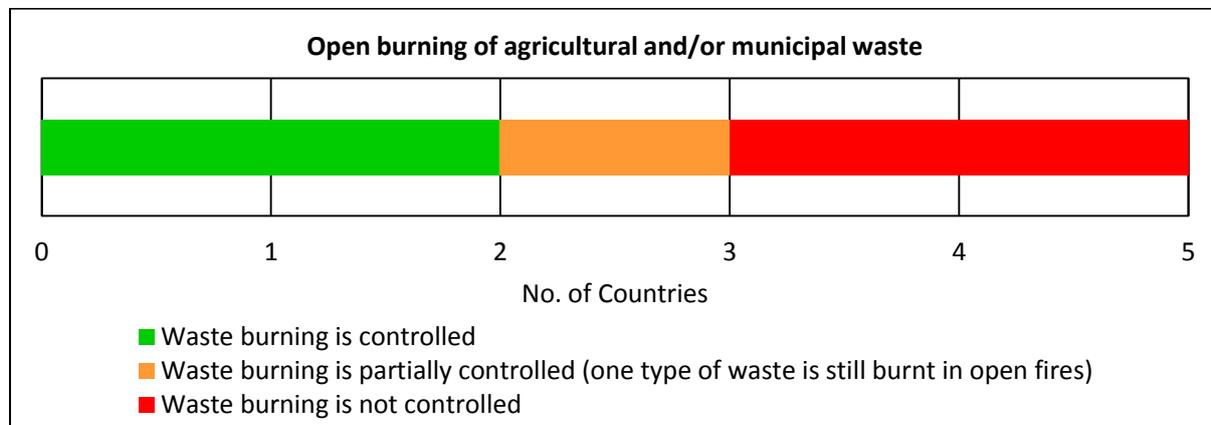


Figure 6: Number of countries where laws, regulations and actions have been implemented to prevent open burning of agricultural and / or municipal waste.

South Korea and Japan discourage open burning of municipal or agricultural waste as a standard practice through laws banning these practices. These laws are then implemented and enforced; municipal waste collection and management systems eliminate the need for residents to dispose of their own garbage.

3.4 Indoor air pollution

Indoor air pollution is the main driver of premature mortality linked to air pollution in the sub-region. This is directly linked to the predominant use of biomass and other low quality fuels 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 biomass for cooking and heating is widespread in the sub-region with three out of the five countries depending heavily on biomass as less than half of their populations have access to non-solid fuels. Only two countries in the sub-region, Japan and South Korea, have managed to increase the percentage of their population with access to non-solid fuels to above 85% (Figure 7).

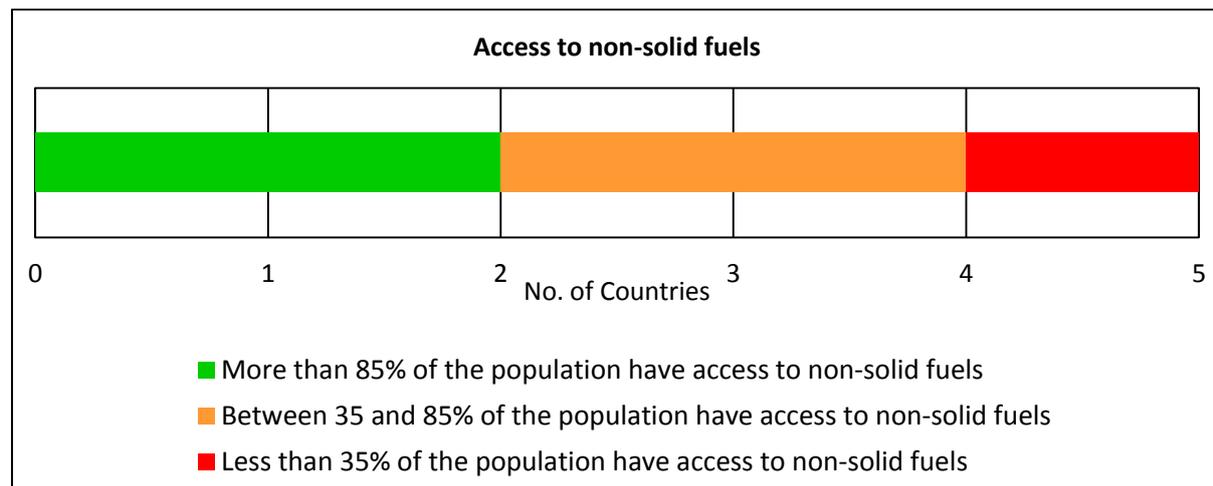


Figure 7: Number of countries in the sub-region that have implemented programmes and policies to improve non-solid fuels access rate, as indicated by percentage of households with access to non-solid fuels.

Some countries in the sub-region are taking steps to improve the efficiency of cook stoves used by the majority of the population. For instance, a partnership between the Government of China and Global Alliance for Clean Cook Stoves aims at supporting the design and development of a cook stove for the government’s programme to provide 40 million Chinese with clean, efficient cookstoves by 2020. This programmes also aims at actively engaging the manufacturing community in the design and production of clean cook stoves that will meet the needs of the domestic and global markets among other objectives.

Mongolia plans to expand the electricity grid, including off-grid solar and wind energy sources for rural households; this should help to lower use of solid fuels within households. The Ulaanbaatar Clean Air Project will assist residents to purchase more energy-efficient stoves and boilers, significant sources of air pollution, particularly in winter. The Project is aimed at assisting the Municipality of Ulaanbaatar, Mongolia to develop a policy and action plan for reducing air pollution, focusing on the residential districts on the outskirts of the

city, where coal and combustible materials are burned in inefficient stoves. These stoves release large volumes of emissions, causing both indoor and significant outdoor pollution.

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.

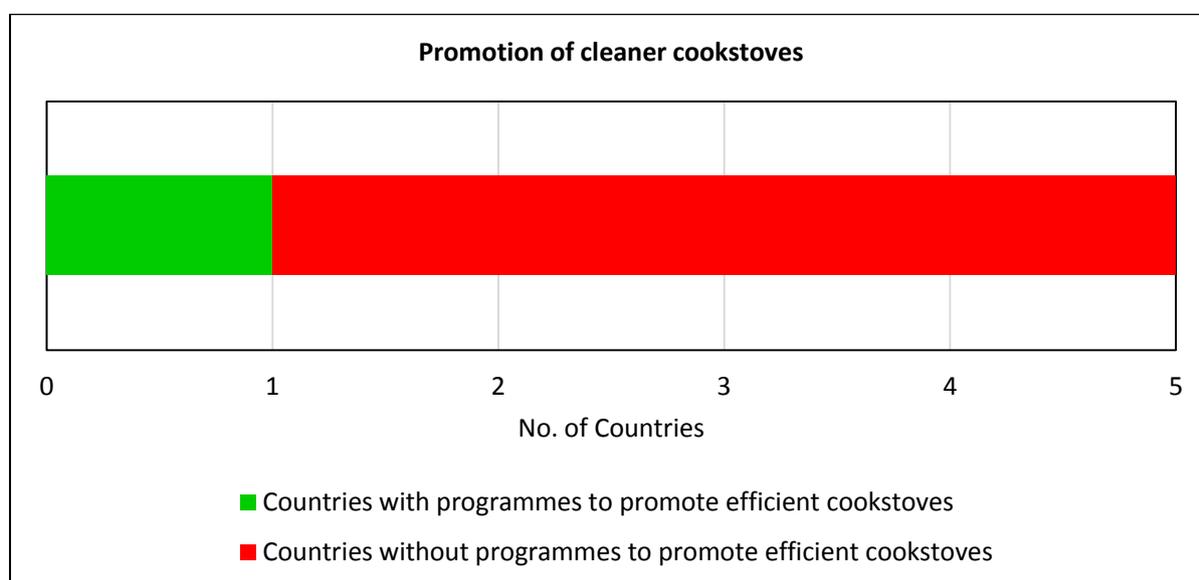


Figure 8: Number of countries in the sub-region that have programmes to promote use of efficient cook stoves. Only programmes aimed at promoting cook stoves that also qualify for carbon trading schemes are represented here.

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

Three out of five countries in the sub-region use various forms of incentives to promote investments into energy efficiency, clean technology, renewable energy and pollution control. China, Japan and South Korea provide incentives to promote renewable energy, energy efficiency, clean technology uptake and / or pollution control investment. Figure 9 shows the number of countries in the sub-region that use incentives to stimulate cleaner production or renewable energy generation.

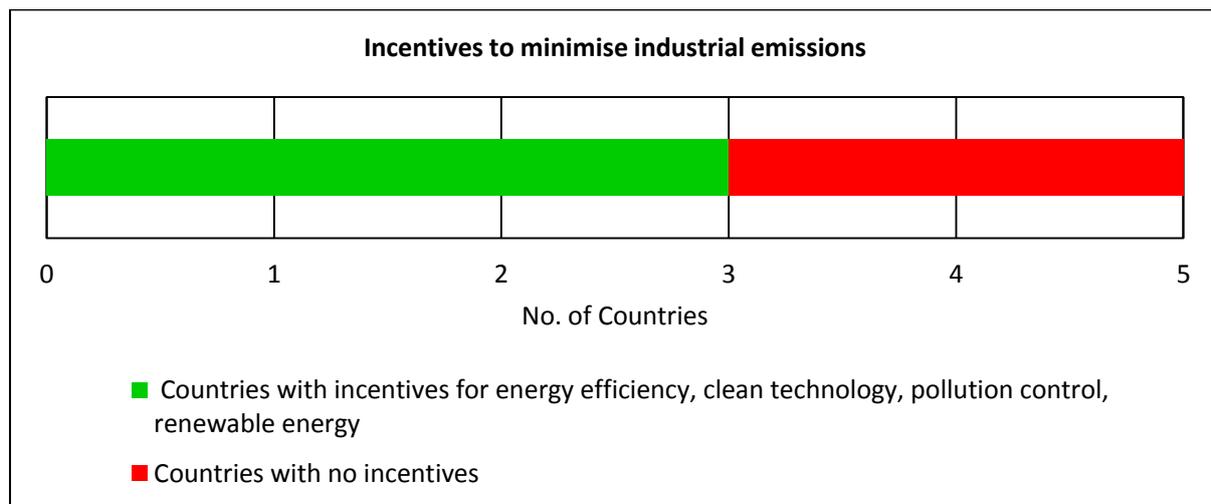


Figure 9: Number of countries in the sub-region that use incentives to encourage industrial investments in cleaner production and renewable energy generation.

Energy generation has traditionally been one of the most important air pollution sources, however in the recent past governments in North Asia have put in to place measures to reduce this. For instance the new emission standards for thermal power plants in China are more stringent than standards in US, Canada, and the EU. In addition, pilot emission trading programmes have been initiated in twelve provinces. China has taken the lead for investments in renewable energy through the production and use of wind power, solar photovoltaic power and smart grid technologies. Some of the incentives employed to increase power production and cleaner production include reduced corporate income tax to qualified renewable energy enterprises, as well as exemptions and deductions for tax on income derived from Clean Development Mechanism projects. To further encourage renewable energy, there is a 50% refund of VAT on sale of wind power and photovoltaic power, and financial subsidies given to qualified green energy projects in rural areas.

However, there is the danger of transferring older, more polluting technology to other areas either within the country or outside. 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.

Because of various incentives, support and standards, South Korea is among the world leaders for clean technology patents. South Korea also ranks highly in the KPMG's ranking of using green taxes, and has a system that favours incentives rather than penalties. South Korea leads the KPMG ranking for green innovation, and is very active in using its tax code to encourage green research and development. There is also a tax on coal imports (which increased the price by 25%) to encourage cleaner fuels, energy conservation, and higher-energy coals.

Other efforts to reduce exposure to industrial air pollutant that are being undertaken include relocation of larger polluting factories to less populated areas.

In North Asia, industrial energy efficiency measured as GDP generated per unit energy is relatively low. This suggests that some of the industrial technology used 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 more efficient equivalent technologies.

While Japan is one of the most energy-efficient countries (GDP/unit of energy), China has experienced a 70% improvement in energy intensity per unit of GDP from 1980 to 2010, accounting for more than half the world's entire energy savings in the past 20 years. Most of this improvement in energy intensity and use can be accounted for by: falling coal consumption in the industrial sector; rising relative energy prices; research and development expenditures; and a decline in the relative weight of China's energy-intensive sectors.

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.

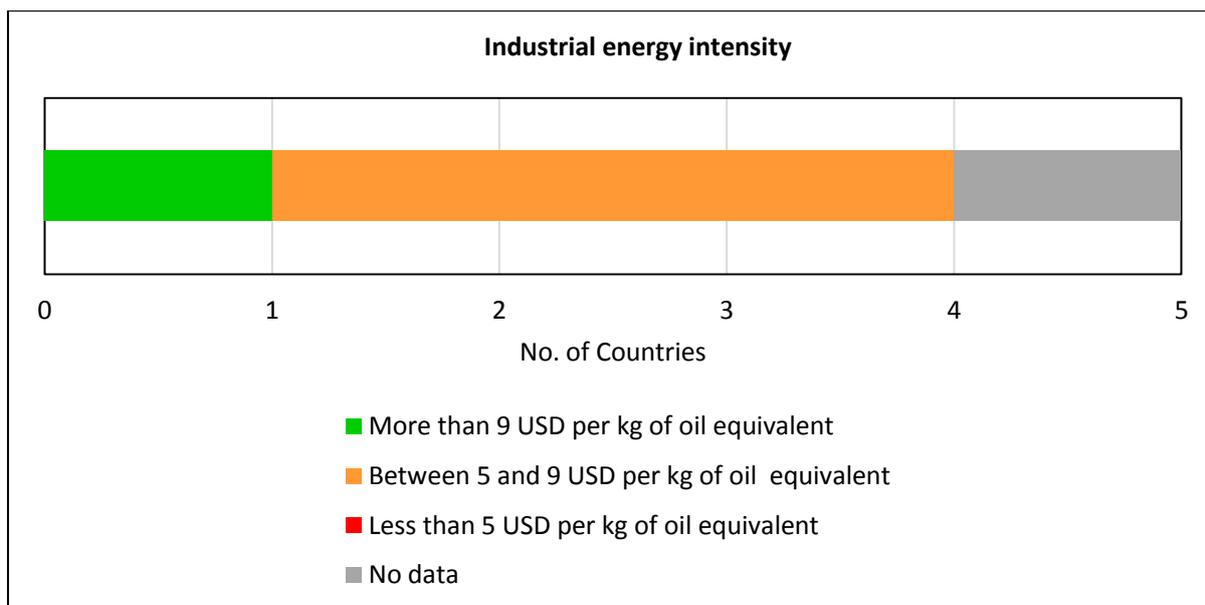


Figure 10: Number of countries in the sub-region with their corresponding industrial energy efficiency. Energy efficiency is calculated as GDP per unit of energy use at constant 2011 PPP \$ per kg of oil equivalent

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/pcfvl/>
- 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/>

- <http://www.sciencedirect.com/science/article/pii/S0928765503000502>