North, South and West Europe

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 paragraph 4 and 7 of the resolution, which requested UNEP to develop a report detailing actions taken by governments to promote air quality, this report details some of the major actions being undertaken by governments in North, South and West Europe 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 fuel sulphur content; 4) Tightening vehicle emission standards to at least Euro 4 or its equivalent; and 5) Increasing investments in public and non-motorized transport 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 clean cooking and heating fuels; and 8) Improving access to clean and 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.

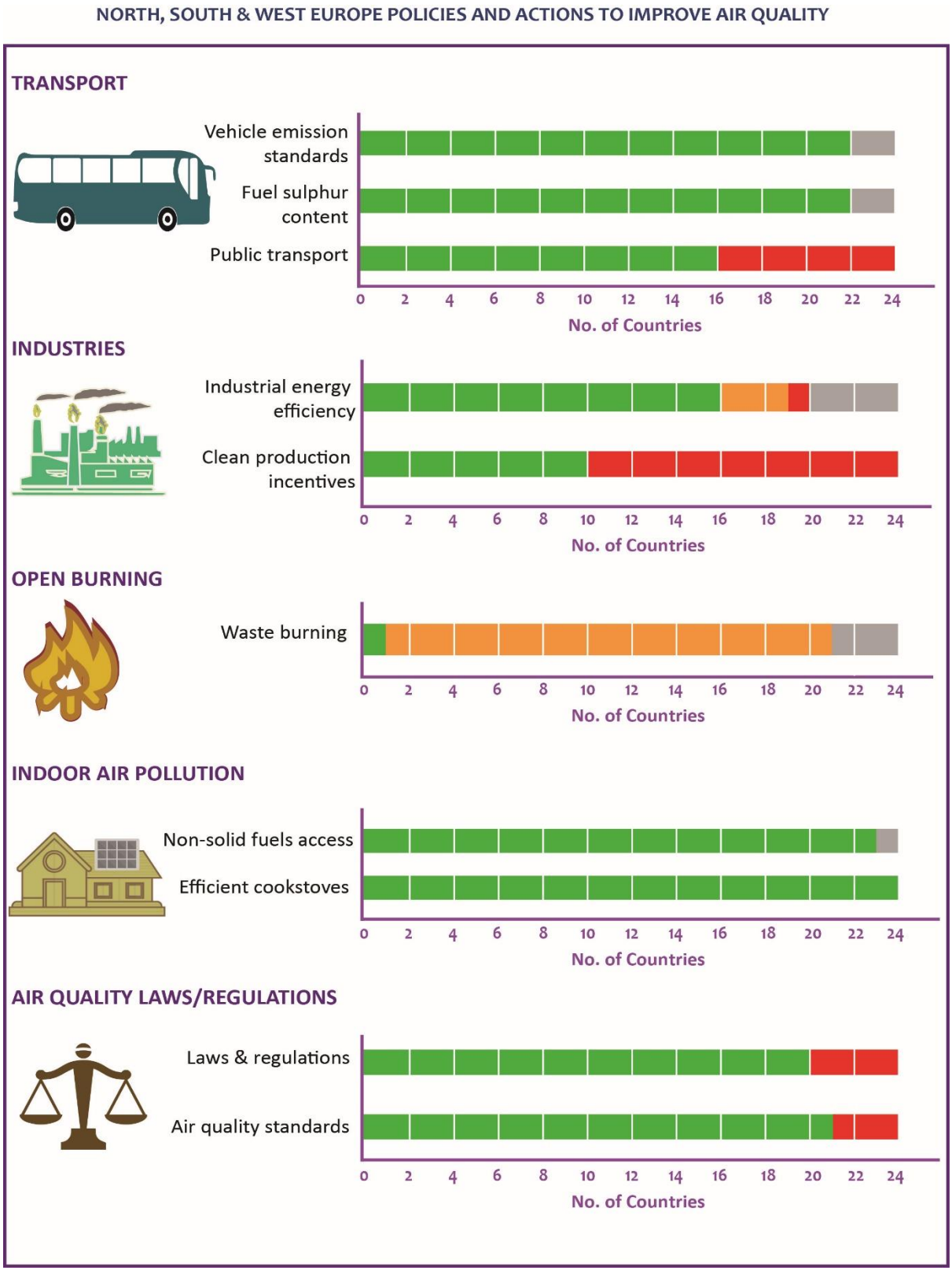

Figure 1: *A summary of actions, programmes, policies, laws and regulations undertaken by governments in the sub-region to improve air quality (green = progressing to best practice; red = action still required).*

2.0 Regional Overview

The sub-region covering North, South and West Europe includes: Andorra, Austria, Belgium, Cyprus, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Liechtenstein, Luxembourg, Malta, Monaco, Netherlands, Norway, Portugal, San Marino, Spain, Sweden, Switzerland and the United Kingdom (UK). Information from air quality monitoring stations across the sub-region, but particularly in the EU countries, indicates that air quality has generally improved in recent years. However, it still remains an issue of concern, causing approximately 170,000 premature deaths annually. In addition, specific exceedances of legal or recommended values in certain places still occur. This is particularly so with respect to nitrogen dioxide (NO2), ozone (O3, in summer) and PM (especially in winter). Concentrations of some air pollutants occasionally exceed the WHO Air Quality Guideline values.

The main sources of air pollution in the sub-region are vehicles, industries, and heating of homes with biomass (particularly wood burning stoves and boilers). Countries in North, South and West Europe have taken several steps towards improving air quality, in all these sectors. To limit emissions from vehicles, the sub-region has over the years invested heavily in public and non-motorised transport. It has also established some of the most stringent vehicle emissions standards and fuel quality standards. For the industrial sector, this sub-region has established industrial emission standards for various emission sources, and it requires all new facilities to employ best available technologies to limit air emissions. In the past the sub-region has also made efforts to improve the efficiency of space heating stoves. Although the efficiency of wood burning stoves and boilers has significantly improved over the years, wood burning is still among the highest polluting methods for space heating. A detailed description of what countries are doing to improve air quality in the sub-region is presented below.

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.

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, 21 out of 24 countries in this sub-region have ambient air quality standards. Twenty countries have some nationwide legislation, law, policy or act 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.

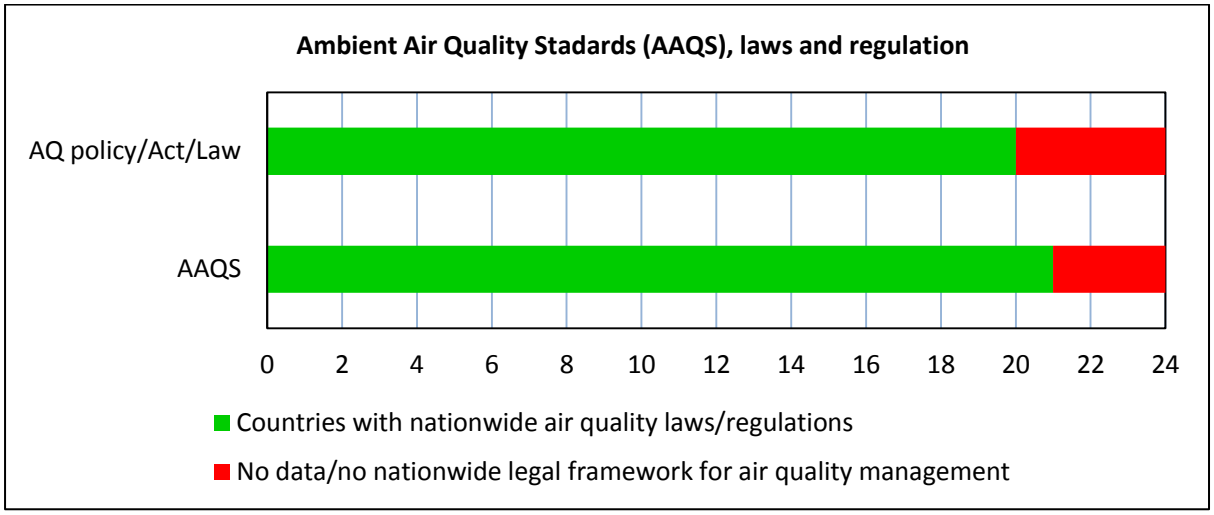

Figure 2: *Number of countries in the sub-region that have enacted some form of air quality (AQ) laws and regulations, and also the number of countries that have enacted and promulgated ambient air quality standards (AAQS).*

The EU member states in the sub-region (Austria, Belgium, Cyprus, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Malta, Netherlands, Portugal, Spain, Sweden and the UK) are all required to meet standards that are contained in the Clean Air for Europe (CAFE) Directive (EP & CEU, 2008) and the Fourth Daughter Directive (EP & CEU, 2004). These Directives also include rules on how Member States should monitor, assess and manage ambient air quality.

The CAFE Directive is the principal legal instrument at European Union level relating to air pollutants, and thus seeks to protect the environment and human health. It sets out

assessment and measurement standards, and reduction targets for the atmospheric concentration of particulate matter.

A review of the EU air quality policy was conducted in 2011-2013. This review led to the adoption of a Clean Air Policy Package in December 2013. The package consists of: a new Clean Air Programme for Europe with new air quality objectives for the period up to 2030; a revised National Emission Ceilings Directive with stricter national emission ceilings for the six main pollutants; and a proposal for a new Directive to reduce pollution from medium-sized combustion installations.

3.2 Transport

Governments in the sub-region are taking several steps to minimise air pollution from this sector. 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. Sixteen out of the twenty-four countries have ongoing initiatives to expand public transport.

For instance the public transportation system in Malta is being improved; recently more buses were added to the fleet, routes were extended and awareness campaigns were carried out. Several other countries in the sub-region have made investments in Bus Rapid Transit (BRT) Systems, as well in commuter trains and trams among others. Figure 3 below shows the number of countries in the sub-region that have made investments to expand public transport system. Most cities in the sub-region are also making investments to encourage walking and cycling, with several countries such as Germany and Netherlands developing national bicycle master plans.

Some of the governments that have embarked on programmes to improve non-motorised transport include the Austrian government which has developed a national master plan for walking and cycling. The government of Cyprus has also embarked on the construction of a bicycle network to connect all major universities in Nicosia with the city centre and also enhance the overall bicycle network. Other similar projects in Cyprus include the construction of bicycle paths in most new road projects proposed in all cities. In the 2016

state budget of Norway, the government proposes to increase budget allocations for bike/walkway with 50%.

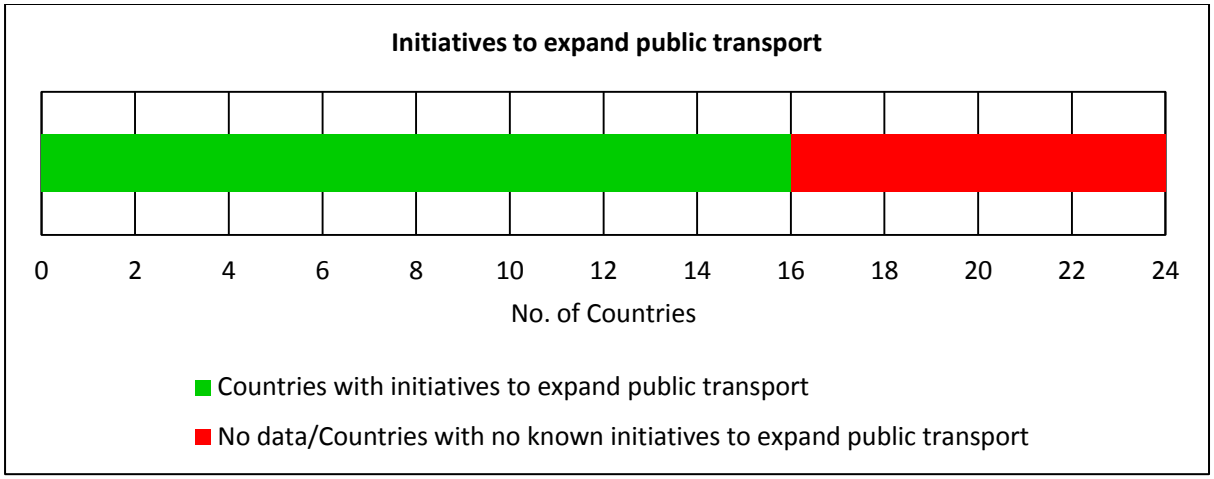

Figure 3: *Number of countries in the sub-region that have initiated programmes and initiatives to expand public transport.*

Other policies aimed at reducing emissions from the transport sector in the sub-region include the promotion of electric vehicles. In Norway for instance, electric vehicles are promoted through several incentives such as; tax exemption for VAT, tax exemption for purchase tax, free parking, and access to bus lanes among others. As a result of these incentives, Norway now has the world's largest share of electric cars in the car fleet. The electric car fleet reached 50,000 units in April 2015. The government decided in May 2015 to prolong the tax benefits at the same level until 2018, and then gradually phase them out. The government also decided to let local authorities decide on other user benefits like free parking and access to bus lanes.

Fuel quality and vehicle emission standards are important for managing air pollution from transport. Twenty-one out of twenty-four countries in the sub-region have vehicle emission standards that are more stringent than Euro 4. Among these are the EU member states (Austria, Belgium, Cyprus, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Malta, Netherlands, Portugal, Spain, Sweden and the UK) which have vehicle emissions standards of Euro VI for both light duty and heavy duty vehicles. In addition, Malta has a scrappage scheme that allows for a 2000 euro grant on the scrapping of a 10-year old vehicle, which would go towards the purchase of a quadricycle. Malta has plans for

a car sharing system and a National Cycling Plan. Figure 4 shows the number of countries in the sub-region that have enacted regulations to limit vehicle emission.

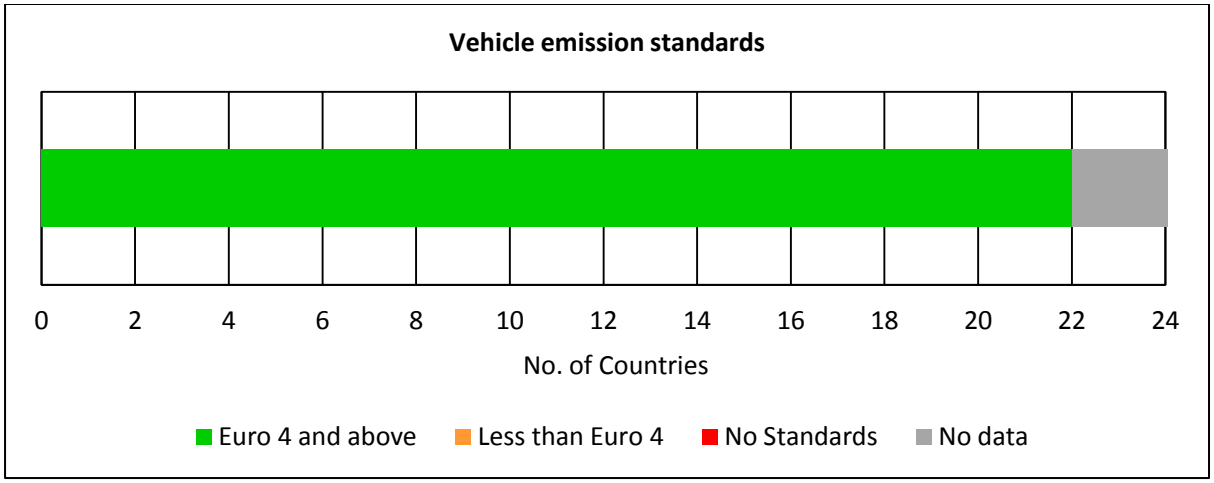

Figure 4: *Number of countries in the North, South and West Europe sub-region that regulate vehicle emission to Euro standards*

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. Since 2009, the maximum allowable sulphur level in the European Union has been 10ppm in petrol and diesel. The majority of countries in the sub-region followed this directive and have ultra-low sulphur fuels. Figure 5 below shows the number of countries within the sub-region that have endeavoured to improve their fuel quality.

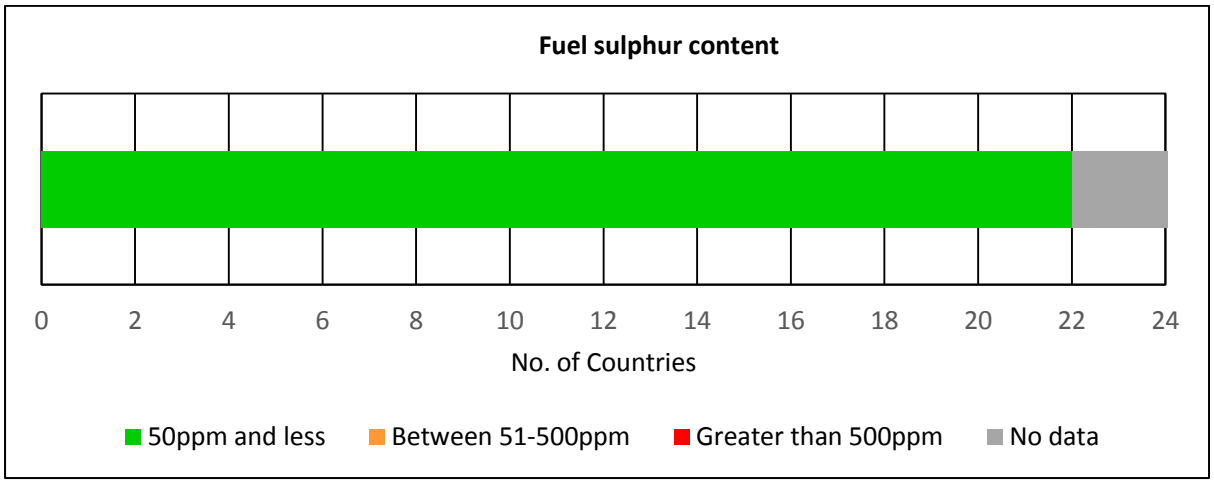

Figure 5: *Number of countries in the sub-region that regulate fuel quality using Sulphur content as a proxy of fuel quality*

Despite the high standards for both fuel quality and vehicles, the sub-region still experiences considerable air pollution from the transport sector. This is partly attributable to the high number of vehicles. For example, although Austria has seen a decline in many of its ambient air pollutants, emission limits for NOx have been breached due to the increase in diesel vehicles in the country. Transport has often been cited by countries as one of the key sources of air pollution, especially in urban areas.

3.3 Open burning of waste

Open burning of agricultural waste occurs to some degree in at least twenty of the twenty-four countries. Burning of agricultural waste, especially crop residues, is practiced as a quick and cost-effective method for land clearing. It is also considered as a means of controlling diseases and pest for some crops. Burning of agricultural waste in the European Union is for the most part banned by EU Legislation, although this regulation does not outlaw the burning of crop products or residues that are burnt after having been used on the farm, e.g. straw used to protect agricultural products during on-farm storage. In the sub-region most of the municipal waste is adequately collected and disposed of appropriately, and therefore none of the countries within the sub-region burns municipal waste in open fires. Figure 6 shows the number of countries in the sub-region where waste burning have been controlled.

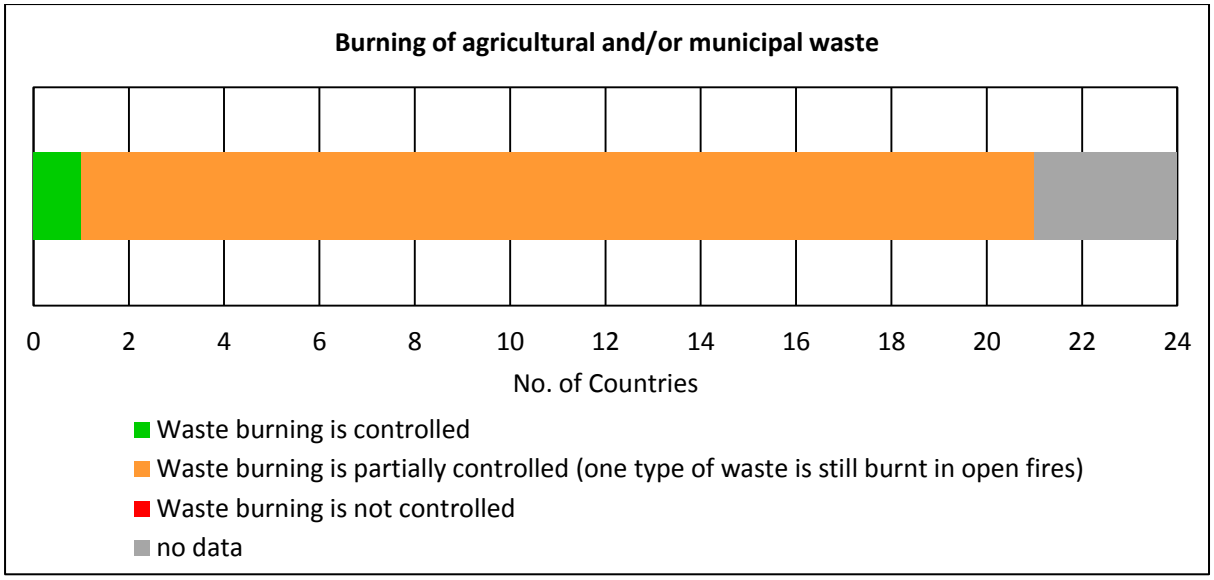

Figure 6: *Number of countries where laws, regulations and actions have been implemented to prevent open burning of agriculture and municipal waste.*

3.4 Indoor air pollution

This sub-region has been able to adequately address the issue of indoor air pollution by ensuring that all its citizens have access to clean energy sources for their domestic energy demands. For instance the electrification and access to non-solid fuels rate in this sub-region is 100%. This suggests that policies and programmes aimed at expanding electrification in all the countries within the sub-region have been effective. Figure 7 below indicates that 100% of the population in this sub-region have access to non-solid fuels.

While reliance on solid fuels for cooking is not common in North, South and West Europe, many households do use solid fuels for space heating during wintertime. For instance, since the financial crisis, air pollution in Athens has been reported to be 15 times higher than the EU recommended concentration; this has been attributed to the increased burning of wood fuel for house heating as a cost-saving measure. New legislation in Greece on particulate matter pollution has been introduced to provide economic incentives that would promote electric heating instead of biomass burning, and replace diesel oil-heating systems with natural gas-heating systems. In Denmark, the number of wood burning stoves and boilers are about 750,000. Although the efficiency of these stoves has significantly improved, wood burning represents the highest polluting form of heating in Denmark. Wood combustion in

small facilities contributes 70% of the national PM emissions. A new statutory order on air pollution from wood stoves and boilers entered into force in January 2015.

The main drivers for emissions from space heating include obsolescence and low efficiency of combustion in heating units. The Ecodesign Directive[1] introduces emission limits for all solid fuel boilers and local space heaters from 2020 and 2022 respectively. This applies across Europe and will therefore help in tackling ambient air pollution emanating from domestic energy demand.

Some countries in the sub-region regulate emissions of air pollutants from households through specific laws and Acts. In the United Kingdom for instance, the Clean Air Act, 1993, gives powers to Local Authorities to create smoke control areas in which it is an offence to emit smoke from the chimney of a building unless using an "exempt" appliance/fireplace or "authorised" fuel. Exempted fireplaces must meet emission standards; in smoke control areas, the appliances and fuels must have passed tests which show they can be used without emitting smoke (or a substantial quantity of smoke).

Germany's amendment to the Ordinance on Small Firing Installations, which entered into force in March 2010, was an important step towards reducing particulate matter emissions from small firing installations such as stoves and tiled stoves. The amended requirements for new installations and the modernization of existing installations will achieve a noticeable reduction in particulate matter emissions, averaging 5 - 10 % in the residential areas concerned.

[1] The Ecodesign Directive provides consistent EU-wide rules for improving the environmental performance of products, such as household appliances, information and communication technologies or engineering. The Directive sets out minimum mandatory requirements for the energy efficiency of these products.

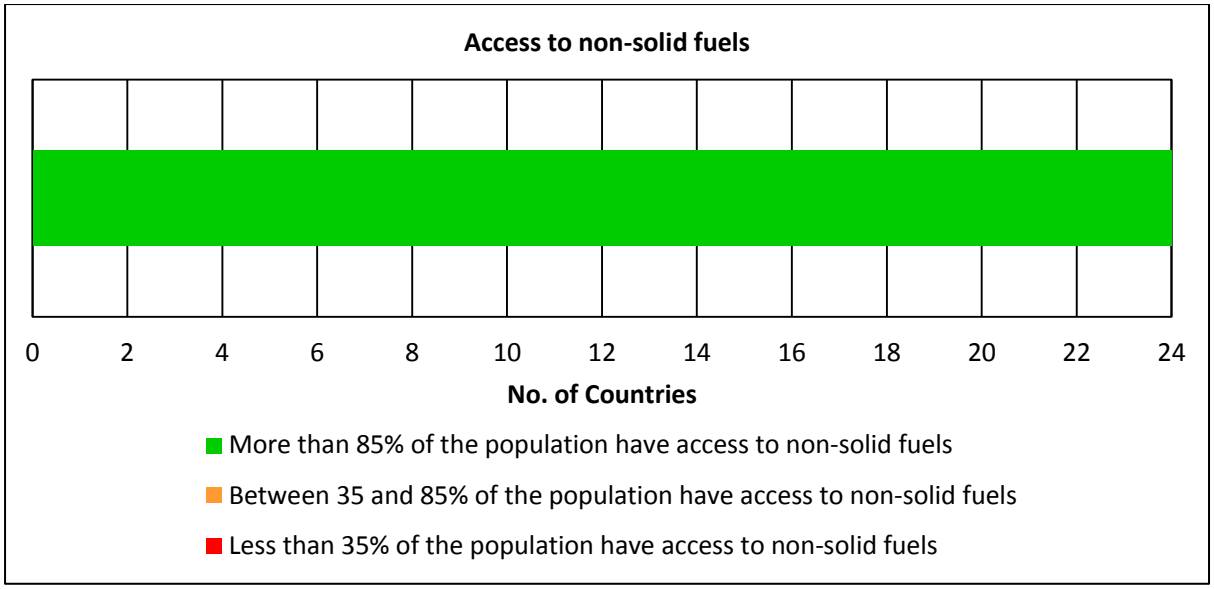

Figure 7: *Number of countries in the sub-region that have implemented programmes and policies to improve non-solid fuels access rate, as indicated by percentage of households with access to non-solid fuels.*

Some countries in the sub-region have embarked on programmes to improve domestic energy efficiency as a way of reducing energy demand at the household level. In Malta, improvements in household energy efficiency will be achieved predominantly by the promotion of energy saving appliances and lighting, and incentives towards the installation of double glazing, solar water heaters and roof insulation. Additionally the Austrian government has introduced the Austrian eco-label awards heating systems including cooking appliances with high efficiency and particularly low emissions. The Austrian-wide information campaign called “correct heating” provides comprehensive information (e.g. folder, flyers and posters) on the subject of indoor heating with wood and a compilation of legal regulation of the federal provinces.

3.5 Industries

Industrial emissions within the EU member states (Austria, Belgium, Cyprus, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Malta, Netherlands, Portugal, Spain, Sweden and the UK) are regulated under the Industrial Emissions Directive (IED), which entered into force in January 2011. The directive’s aim was to achieve significant benefits to the environment and human health by reducing harmful industrial emissions across the EU, in particular through better application of Best Available Techniques. The IED

had to be transposed into national legislation by Member States by January 2013. European legislation establishes air quality objectives (limit and target values) for the different pollutants.

Electricity generation is one of the major sources of air pollution and in terms of electricity generation, there is a growing use of renewable sources. Nine out of twenty-four countries have greater than 30% renewable energy in their mix, with another six having between 11 and 30%. According to the EU Renewables Directive, member countries will have to source 24% of their final energy demand from renewable sources by 2020, up from 17.8% in 2005. Even still, the energy sector is often mentioned as one of the leading sources of air pollutants, although several governments have established policies and incentives to encourage power generation from renewable sources.

Ten of the twenty-four countries use incentives for promoting investments in energy efficiency, renewable energy production, clean technology and pollution control (see Figure 8). For instance, in Austria incentives to support electricity generation from renewable sources include feed-in tariff, investment subsidy for photovoltaic (PV) installations on buildings exceeding 5 kW, and subsidies granted for small PV installations with a maximum capacity of 5 kW. The construction of small and medium-sized hydro-electric power stations is also subsidised by investment grants. In Belgium, electricity from renewable sources is promoted mainly through a quota system based on the trade of certificates).

In Cyprus, electricity from renewable sources is promoted through subsidies combined with a net metering scheme. In Germany, electricity from renewable sources is supported through a feed-in tariff; the criteria for eligibility and the tariff levels are set out in the Act on Granting Priority to Renewable Energy Sources (EEG); Germany provides policies for the promotion of renewable energy sources covering training, certification and research programmes, a self-commitment of public authorities, the support of district heating networks and the introduction of building obligations regarding the use of heat produced from renewable energy. Malta has committed to a renewable energy share target of 10% and renewable energy is promoted through grants paid against capital investment in domestic photovoltaic systems and feed-in tariffs.

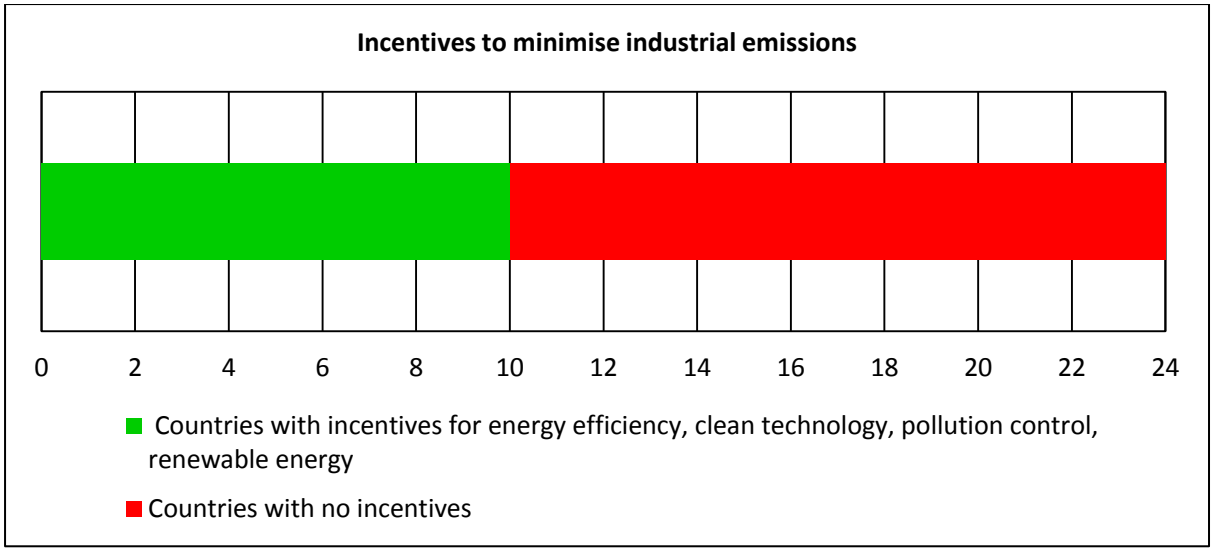

Figure 8: *Number of countries in the sub-region that use economic incentives to stimulate cleaner production*

Other policies and actions being undertaken by governments in this sub-region to limit industrial emissions include encouraging industries to use clean production technologies and to increase their energy efficiency. In the sub-region, industrial energy efficiency is above USD 9 per unit of energy (Figure 9)[2]. This suggests that industrial technology used is current, which in turn translates to low air pollution emissions. An industrial energy efficiency of USD 9 per unit of energy and above is used to indicate better energy efficiency.

In the EU, energy efficiency is regulated and a sample of directives regulating this includes the Energy Efficiency Directive (2012/27/EU) which requires that all large companies must make a survey of their energy use including suggested energy-efficiency improvements. The other directive, Energy Labelling Directive (2010/30/EU), requires that an increasing number of product types, for example oil and gas-fired boilers, have a label showing their energy efficiency.

[2] measured as GDP generated per unit energy

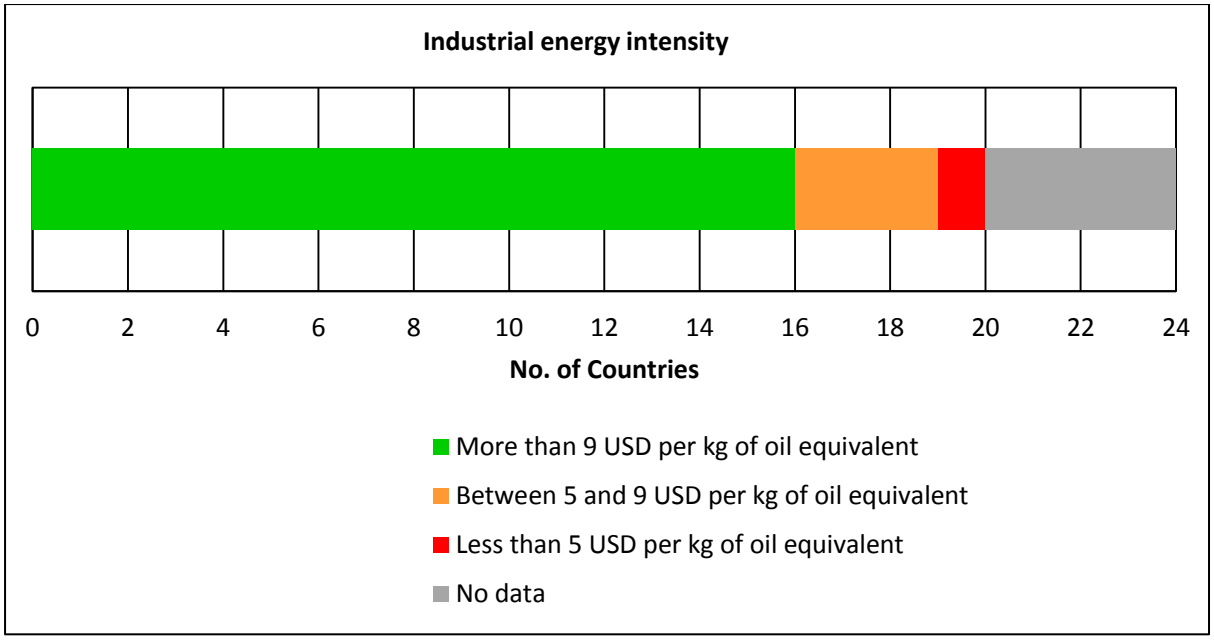

Figure 9: *Number of countries in the sub-region with their corresponding industrial energy efficiency. Energy efficiency is calculated as GDP per unit of energy use at constant 2011 PPP $ per kg of oil equivalent*

Industrial energy efficiency is regarded as an important aspect of industrial production in the sub-region. For instance, energy efficiency has improved significantly in Denmark compared to 1990 levels, with a 26.3% decrease being recorded as of 2010, and overall final-consumer efficiency having been improved by 20.2%. Danish companies are obliged to use the best available technology (BAT). In Ireland, the current Irish National Energy Efficiency Action Plan (NEEAP) targets five key areas for improving energy efficiency in the country: Establishing obligations on public-sector bodies to address consumption, procurement and reporting of energy use; Establishing a national Energy Performance Contracting (EPC) process for the commercial and public sectors, to assist with retrofitting and financing; Introducing appropriate Pay-As-You-Save models for domestic and non-domestic energy efficiency upgrades, Introducing energy-saving targets for energy suppliers, and Establishing a cross-departmental implementation group for the delivery of the NEEAP.

In Sweden, energy efficiency is a factor taken into account when issuing permits according to the Environmental Code (1998:808). Operators should have knowledge of and use the best available technology for energy efficiency. Energy efficiency can be determined by specific permit conditions, including limiting values for electricity and heat. In addition, clean production has been promoted through various taxes. Since 1991, there has been a

Swedish sulphur tax for electricity and heat production which encompasses solid fossil fuels, liquid fuels and peat. The tax is based on the sulphur content of fuels during combustion and can be reduced if the sulphur emissions are limited through exhaust emission control or binding of the sulphur. There is a similar charge on nitrogen oxide emissions. An energy tax on fossil heating fuels has been levied according to their energy content, significantly increasing the tax on LPG, natural gas, coal and coke.

In the United Kingdom a mandatory energy assessment scheme for all large undertakings (employing more than 250 people and/or with annual turnover exceeding €50m and balance sheet exceeding €43m). Requires an audit of energy used in their buildings, industrial processes and transport to identify cost-effective saving measures. The Energy Savings Opportunity Scheme (ESOS) was developed to meet the requirements of EU Energy Directive (2012/27/EU). Businesses do not report data to the government, but are required to report compliance to the Environment Agency, which administers the scheme.

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/