

Towards a green fiscal reform in the Slovak Republic

**Proposals for strengthening the role of market-based
environmental policy instruments**

COUNTRY STUDY

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Abstract

Environmental fiscal reforms are an essential building block to steer countries onto a sustainable long-term development path. This paper develops proposals for strengthening the role of market-based environmental policy instruments in the Slovak Republic. The paper discusses reform options aimed at mitigating air pollution and climate change, improved waste management and biodiversity conservation. This includes measures such as introduction of automatic indexation of environmentally related taxes, differentiation of energy tax rates by emission intensity of fuels, broadening tax bases to include all emission sources and reforming preferential fiscal treatment of household fuel use – a major source of local air pollution. In the waste management domain, raising the landfill tax to better reflect external environmental costs of particular tax bases would help encourage diversion of waste from landfills. A complementary waste incineration tax would help incentivise waste prevention, composting and material recycling. Finally, reforming biodiversity-harmful incentives, including certain budgetary support measures and preferential fiscal treatment, such as on synthetic fertilisers and pesticides, is needed to provide stronger incentives for the conservation and sustainable use of biodiversity.

Executive summary

Air pollution, solid waste management and biodiversity conservation have been identified as the three main environmental challenges in the Slovak Republic. The human health impacts of poor air quality are staggering with almost 3200 premature deaths in 2017 alone. Most of these deaths and many illnesses are caused by exposure to ambient PM_{2.5}, followed by exposure to residential PM_{2.5} and ambient ozone. The associated welfare cost for the Slovak Republic amounts to approximately USD 9.7 billion, equivalent to 6% of GDP. Moreover, exposing people to air pollution can exacerbate vulnerability to pandemics like the Covid-19.

Yet, current public policies are inadequate to fundamentally make a difference: Current policies will not avert further environmental degradation, avoid severe public health consequences and ensure provision of essential ecosystem services on which the economy and people's well-being depend. Progress in these domains is also key to meeting the country's commitments towards the EU, the Paris Agreement and achieving the Sustainable Development Goals by 2030.

Urgent reform is needed to radically improve the environmental effectiveness of public policies in the Slovak Republic. Shifting away from regulatory (command-and-control) measures to more incentive-based instruments would allow achieving the environmental protection and public health objectives more cost-efficiently. Moreover, wider use of pricing instruments could raise additional budget revenue and help finance improvements in the country's waste management and nature protection systems.

It is notable that revenue raised from environmentally related taxes in 2016 has reached the lowest share of GDP since 1995. In 2016, the revenue raised from such taxes represented about 6.1% of the total tax revenue in the Slovak Republic, equivalent to 2% of GDP. This is below the OECD Europe average and is the second lowest level among the neighbouring countries. The taxation system continues to place a substantially greater burden on labour than on environmentally harmful activities.

This paper presents a series of environmental fiscal reform proposals. It argues that automatic indexation is a minimal requirement for effective implementation of environmentally related taxes in order to keep up with the rate of inflation, as the tax bases are usually defined in physical units. Moreover, taxes on motor fuels and other energy carriers are currently differentiated by fuel type and do not reflect their environmental damages. Instead, the tax rates should reflect the carbon and air pollutant emissions intensity of the different fuels. Taxation of pollution emissions by medium and large stationary sources should be considerably strengthened. The preferential fiscal treatment of households – a major source of local air pollutant emissions – should be reformed to provide effective incentives for households to change their environmentally harmful behaviour, complemented with targeted measures to address possible social impacts.

Policies aimed at waste management, biodiversity conservation and prevention of land and soil degradation should make greater use of pricing instruments such as taxes and charges. For example, the landfill tax should increase faster to reflect the external environmental costs caused by a particular tax-base. This would help encourage diversion of waste from landfills. A complementary waste incineration tax would help incentivise waste prevention, composting and material recycling.

Concerns over conservation and sustainable use of biodiversity are rapidly rising to the top of domestic and international policy agendas. Reforming biodiversity-harmful incentives is a logical first step. Government measures such as direct budgetary support and preferential fiscal treatment of biodiversity-harmful production and consumption need to be reformed or gradually phased out.

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1. Introduction

Air pollution, solid waste management and habitats and species conservation have been identified as the three main environmental challenges in the Slovak Republic (Ministry of the Environment of the Slovak Republic, 2019). Concentrations of fine particulate matter (PM_{2.5}) in ambient air remain high, leading to significant health impacts in terms of increased morbidity and premature deaths, and related economic costs due to lost labour productivity, increased health care expenditure, etc. The associated welfare costs resulting from high levels of PM_{2.5} and several other air pollutants in the Slovak Republic have been estimated at USD 9.7 billion (10⁹) in 2017 (OECD, 2019a). Most of PM_{2.5} and NO_x emissions in the country originate from residential heating and the transport sector. The recycling rate of municipal solid waste ranks among the lowest in the European Union (EU) and landfilling remains the dominant waste management strategy. Unsustainable management of forest resources negatively affects the ecosystem stability (EC, 2019). According to the Nature Protection Agency, excessive logging in protected areas has caused a decline of the stock of capercaillie, classified among the most threatened bird species in Slovakia (State Nature Protection of the Slovak Republic, 2018).

Despite the significant improvements in environmental quality achieved since the beginning of the transition in 1990, progress in recent years has been more limited and the country is unlikely to meet some international goals. For instance, the Slovak Republic will probably not reach the EU target of recycling a minimum of 50% of its municipal waste by 2020 (in 2017, only 29.3% of household waste was recycled). The country has reduced greenhouse gas emissions by 45% compared to 1990, mainly due to the closure of inefficient highly energy-intensive manufacturing facilities during the transition period and the adoption of more energy-efficient technologies across the Slovak economy. However, emissions have stagnated since 2015 and it is estimated that without additional measures emissions will actually slightly increase by 2030, especially in sectors not covered by the EU Emissions Trading Scheme. Moreover, the Slovak Republic is at risk of not meeting targets for renewable energy and energy efficiency (Table 1.1).

Table 1.1. The Slovak Republic is at risk of not meeting its climate policy commitments

	2011	2012	2013	2014	2015	2016	2017	National target 2020	National target 2030
Total GHG emissions (% change against 1990)	-30	-36	-38	-45	-43	-44.4	-44.7	-	-20
GHG emissions in sectors not in the ETS (% change against 2005)	-0.8	-4.5	-4.6	-10.5	-9.1	-10.6	-10.6	13	-20
Renewable energy in gross final energy consumption (%)	10.3	10.4	10.1	11.7	12.9	12	11,5	14	19,2
Final energy consumption (% change against average of 2001-2005)	-5.3	-9.6	-7	-12.3	-11.4	-8.8		-11	-11

Note: The Slovak Republic still needs to set the 2030 targets for energy efficiency and renewable energy. The 2020 target for GHG reduction in sectors not in the EU-ETS (e.g. transport, residential sector) allows a positive % growth, i.e. GHG emission in non ETS sectors could increase. However, in line with climate policy ambitions, the target should be treated as a ceiling rather than a floor.

Source: Eurostat, European Environmental Agency, National Reform Programme of the Slovak Republic

There are also concerns over the implementation of the goals of the Convention on Biological Diversity (CBD) with its 2020 Aichi biodiversity targets, and the post-2020 biodiversity framework. The awareness about the need for biodiversity protection and the mainstreaming of biodiversity protection into other sectors has been slightly improving; nevertheless, the status of biodiversity protection is generally

unsatisfactory and even significantly decreasing.¹ Better co-ordination with economic and sectoral policies and introduction of a more coherent policy mix involving economic instruments covering all sectors will be key to achieving further progress.

The objective of this paper is to review the options for the introduction or improved design of market-based policy instruments to address negative environmental externalities in a more environmentally effective, socially inclusive and economically efficient manner. A number of proposals for policy reform are put forward, focusing on ensuring that environmental policy continues to provide stringent, flexible and predictable signals to firms and households over the long run, through strengthened environment-related taxation and other pricing mechanisms and faster phasing-out of support measures harmful to human health, climate and biodiversity. The paper concludes by highlighting that implementing such a reform agenda requires integration of environmental considerations across all branches of the government. A dedicated section provides a more comprehensive set of policy proposals directed at mitigating air pollution. Making proposals for the appropriate level of taxation is beyond the scope of this paper. However, this is important information and should be subject of future research.

2. Environmental policy reform options

Public policy must provide incentives for polluters to internalise the environmentally harmful impacts of their activities, e.g. through the introduction of production or consumption constraints or by otherwise changing the opportunity costs of pollution. Such policies will bring about changes in the behaviour of firms and households that will lead to a reduced negative environmental impact, e.g. through substitution of human and produced capital for natural resource inputs or through structural changes in the consumption and production patterns. Such internalisation of external environmental costs, also known as the “polluter-pays principle”, allows the environmental market failure to be corrected and lets the polluters, rather than the society at large, bear the full costs of their actions.

2.1. The share of environmentally related taxes in total tax revenue has been declining in the Slovak Republic

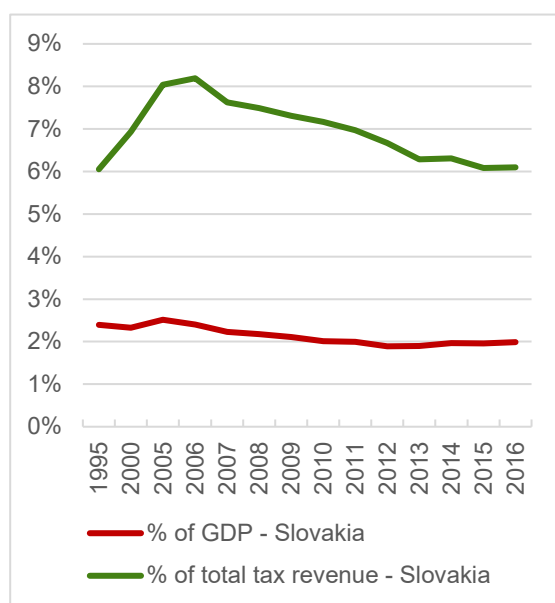
The share of environmentally related taxes (ERT) in total tax revenue has been declining. In 2016, ERT revenue was 6.1% of total tax revenue (Figure 2.1, left panel). This is below the OECD Europe average of 7 % and is the second lowest share compared to neighbouring countries. After an initial increase in the 1990s and up to the mid-2000s, the ERT share has been gradually declining since 2006. When compared to GDP, ERT revenue in 2016 has reached the lowest levels since 1995. Moreover, the ERT revenue growth is slower than other tax revenues (Figure 2.1, right panel). This negative trend can be explained by the lacking indexation of tax rates and introduction of no new tax instruments in the past decade. Countries such as Turkey, Slovenia or Estonia on contrary have enhanced the role of ERT in their tax systems. The

¹ According to an assessment by the OECD, the Slovak Republic has achieved 15 of the 169 targets for the UN Agenda 2030 and its Sustainable Development Goals (SDG) (OECD, 2019b). Among the environmentally related goals, the country outperforms, relative to the OECD average, on goals such as Water (6), Energy (7) and Climate (13). Conversely, it is relatively further away on goals such as Sustainable Production and Consumption (12) and Cities (incl. urban air pollution) (11). However, these results remain preliminary and partial, subject to existing data gaps.

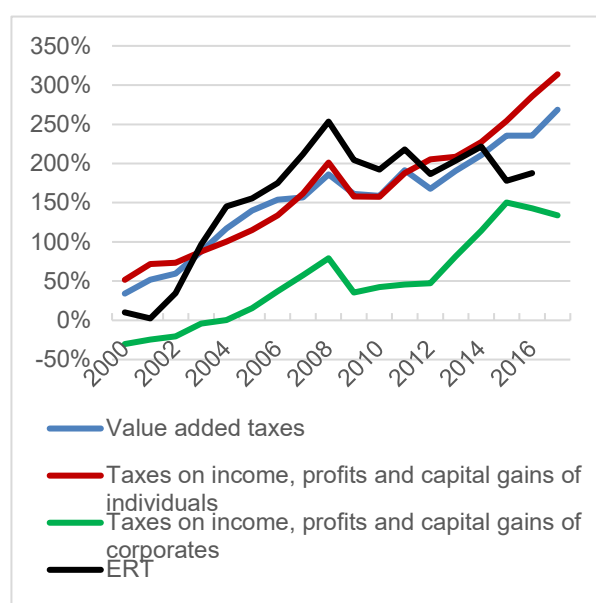
share of their ERT revenue in total tax revenue has more than tripled between 2000 and 2016 due to the introduction of new environmentally related duties as part of their fiscal reforms and a shift of the tax burden from labour to ecologically damaging activities (OECD, 2017a).

Figure 2.1. The share of environmentally related taxes has dropped to levels last seen in 1995

Share of ERT in total tax revenue and compared to GDP



Tax revenue in the Slovak Republic, change against 1995

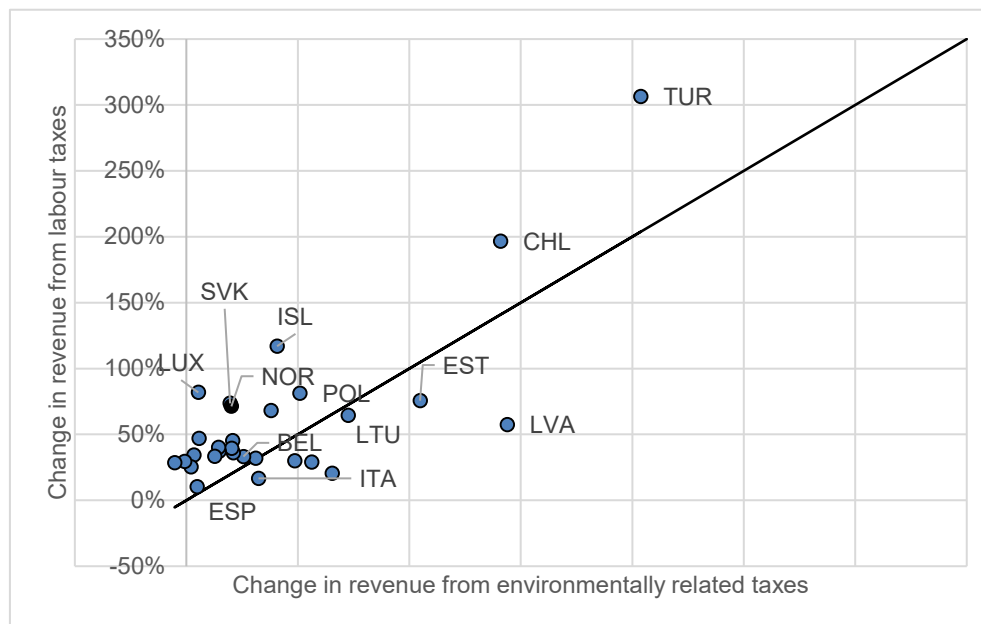


Source: OECD (2018) Green Growth Indicators (database)

There has been no significant progress in shifting the tax burden from labour towards the environment and natural resource use. The revenue raised from labour taxes in 2016 was approximately 9 times higher than the ERT revenue. Other countries face similar challenges and few OECD countries have seen their ERT revenues increase compared to labour tax revenue (Figure 2.2.). As discussed below, all sources of emissions should be addressed, for instance, by extending carbon taxation to international air and maritime transport or by linking vehicle tax rates to their emissions of greenhouse gases and air pollutants.

Figure 2.2. Sailing the wrong course: The tax burden increasingly weighs on labour

Change in revenue from labour taxes and environmentally related taxes between 2005 and 2016 in OECD



Source: OECD (2019) *Tax Statistics (database)*; OECD (2019) *Environment Statistics (database)*

2.2. The role of environmentally related pricing measures should be strengthened

The implementation of market-based policy instruments directed at environmental policy objectives remains limited and regulatory approaches (e.g. emission limits, technology standards) are often preferred even when better alternatives exist. While the use of ERT has been growing in other OECD countries, the Slovak Republic has not recently introduced any environmentally related tax instruments.

Strengthening the role of environmentally related taxes and charges² has several attractive properties: i) a tax leaves the polluter flexibility to choose the best means of abating pollution and therefore allows a given environmental objective to be achieved at the lowest cost³; ii) emission taxes provide continuous abatement incentives down to zero emissions⁴; iii) a pollution tax does not increase the total volume of pollution over time⁵; iv) a tax is a relatively simple instrument and can be implemented using existing tax administration systems; v) taxes can be implemented in a clear and transparent manner⁶; and vi) taxes generate additional public revenue which may be of particular interest in times of fiscal restraints and rising public budget deficits. (For a discussion on policy instrument choice and design, see e.g. Johnstone et al., 2010; OECD, 2011b; OECD, 2011c.)

However, in specific cases regulatory (command-and-control) instruments can be a preferred alternative, particularly for split incentives and asymmetric information problems (e.g. minimum energy efficiency

² Most of the discussion in this paragraph applies equally to taxes (unrequited payments) as well as to fees and charges (requited payments).

³ Contrary to e.g. prescriptive technology standards.

⁴ Contrary to e.g. performance standards that provide no incentive to improve performance beyond a limit value.

⁵ Contrary to e.g. subsidies for fuel-efficient vehicles that increase the market size in the long-run.

⁶ Contrary to e.g. granting of subsidies for environment-related investments or permitting systems that prescribe emission limits or specific technologies.

standards for buildings and consumer goods) or in situations of steep damage functions (e.g. a ban on the use of hazardous or toxic chemicals).

2.2.1. Automatic indexation of tax rates is a minimum requirement for maintaining the level of stringency of environmentally related taxation

For environmentally related taxes, the tax rates are typically tied to tax bases defined in physical units (e.g. per tonne), and consequently the revenue generated tends to fall over time in real terms due to inflation. This is different, for instance, with income and consumption (value added) taxes which tend to grow nominally more-or-less with the rate of inflation. For this reason, it is important to introduce automatic indexation of environmentally related tax rates in order to keep up with the rate of inflation and ensure the level of stringency of such taxes is maintained over time. Automatic indexation also ensures that the policy signal is transparent and predictable over the longer run, which is important to help guide investment decisions of firms and households. Automatic indexation was introduced, for instance, in France for the General Tax on Polluting Activities (TGAP) in 2013, and in several other European countries for fuel taxes (e.g. Denmark, Sweden). In the Netherlands excise duties and energy taxes are automatically adjusted every year to inflation.

2.2.2. The phasing out of fossil fuel subsidies needs to continue

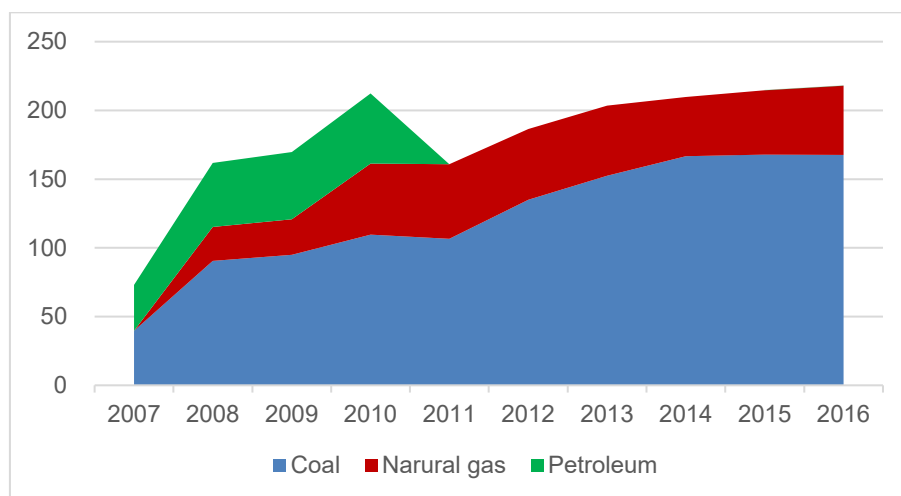
Fossil fuel subsidies undermine the effectiveness of environmental policy by bringing down the already low costs of pollution, and hence exacerbate occurrence of health-related diseases linked to air pollution (see Section 4) and augment the costs of the transition to a zero-carbon economy. Moreover, they impose a strain on public budgets, by either increasing public expenditure or by reducing tax revenue, thus diverting scarce public funds away from alternative uses (e.g. education or health care).

Despite the partial shift in energy generation from fossil fuels to renewables in the past decades, support to fossil fuel consumption in the Slovak Republic is growing, mostly as a result of doubling feed-in tariff support for domestic lignite due to increases in the price of EU ETS allowances (OECD, 2018a). In 2016, the support for all fossil fuels amounted to EUR 217 million with a predominance of support directed at coal (Figure 2.3); this represents the second largest percentage of total tax revenue among neighbouring countries.

In addition to the feed-in tariff, support for coal includes also coal allowances for former miners and miners' widows, and budgetary transfers and exemptions from coal excise taxes for consumers. Recently, the Slovak Republic has made an important step forward and has committed to phasing out the coal support starting in 2023 (Ministry of Economy of the Slovak Republic, 2018).

Besides coal, natural gas also benefits from environmentally harmful government support. Natural gas is exempt from excise taxation, mainly for final consumption by households but also for other purposes, such as the processing of minerals and in combined heat-and-power plants (OECD, 2019c). Support to natural gas amounted to between 43 and 52 million EUR during 2010-2016. This environmentally harmful subsidy must be equally phased out. A portion of the additional revenue could be recycled on targeted means-tested measures in order to address possible negative distributional impacts on vulnerable households.

Figure 2.3. Harmful support for fossil fuels continues to go up in the Slovak Republic (million EUR)



Source: OECD Inventory of Support Measures for Fossil Fuels; OECD (2019) Green Growth Indicators (database)

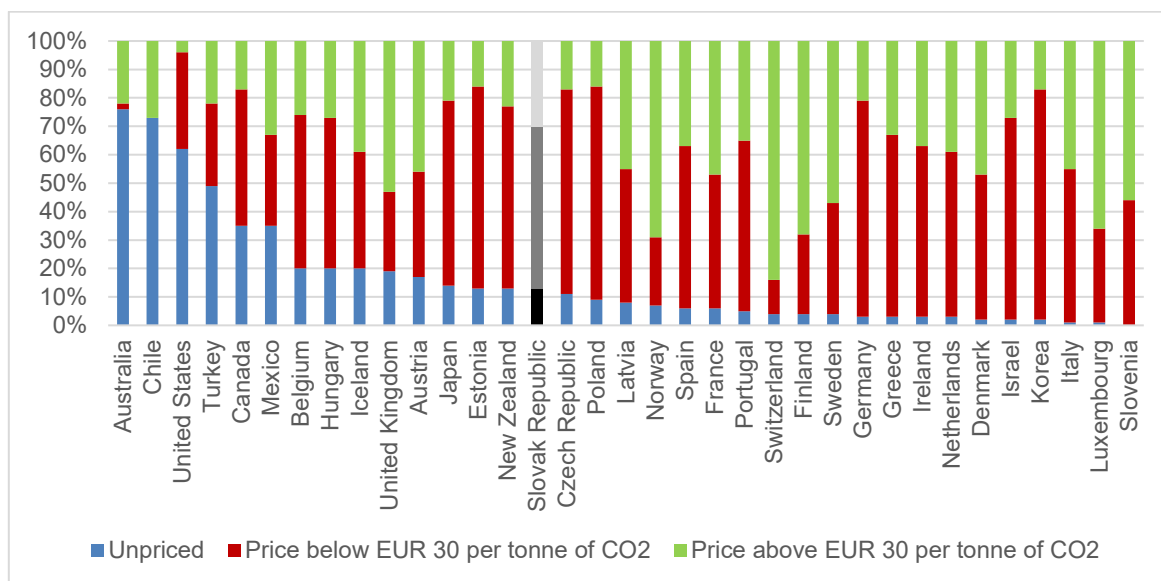
2.2.3. Consider introduction of an explicit carbon tax to trigger investments in zero-carbon alternatives

The EU Emissions Trading Scheme (ETS) and domestic fuel excise taxes are the core economic instruments for GHG mitigation from fossil fuels in the Slovak Republic. As a member state of the European Union, the country participates in the EU ETS⁷ that is now in its third phase. The second type of instruments for reducing GHG emissions is excise taxes on energy carriers, including coal, natural gas and mineral oils used for stationary combustion and transportation. Although the primary objective for introducing such taxes was their revenue-raising potential, they clearly also influence fossil fuel consumption, and hence provide incentives for reduction of GHG emissions.

In 2015, 13% of Slovakia's carbon emissions from burning fossil fuels for energy were unpriced, below the OECD unweighted average of 16% (Figure 2.4). Unpriced emissions were emitted by sectors that are not covered by the EU-ETS, in particular by small emitters in electricity and industry sectors, followed by residential and commercial sectors (Figure 2.5). The remaining emissions face a low price signal, with **only 30% of carbon emissions from energy use priced above EUR 30 per tonne of CO₂ – a low-end estimate of the social cost of carbon** (OECD, 2018a). Thus, polluters are not held accountable for the damages their CO₂ emissions caused, and the policy signal remains too weak to trigger investments in low-carbon alternatives.

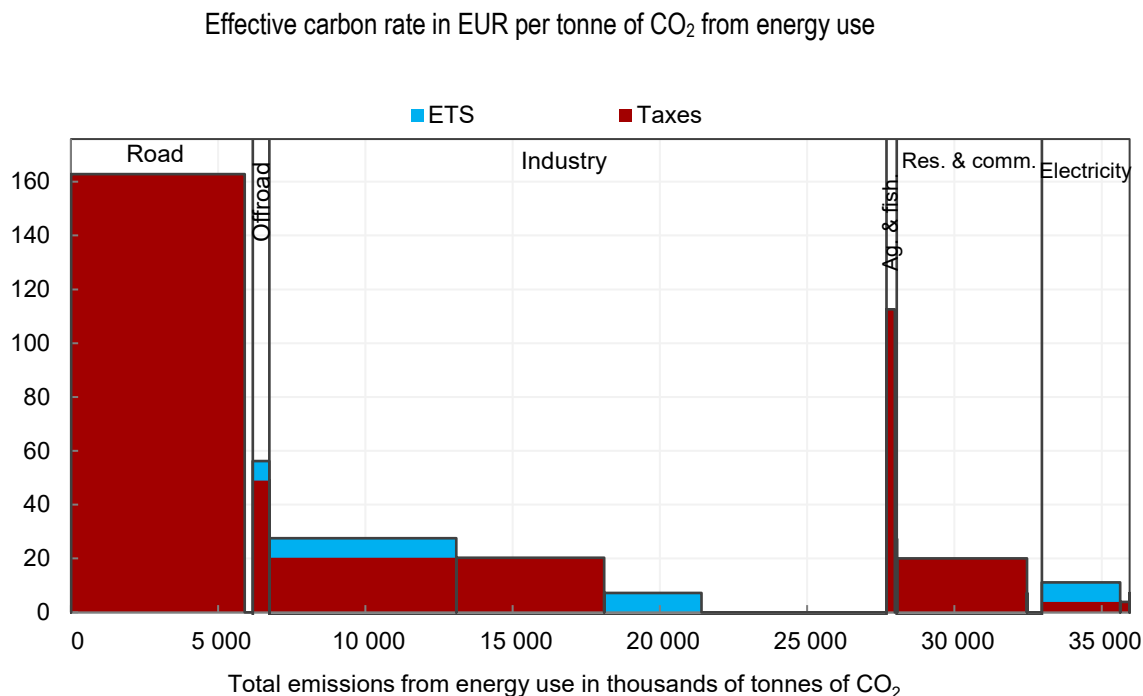
⁷ The EU ETS is a "cap-and-trade" scheme with a set of continuously reduced annual ceilings for the volume of emissions emitted by selected sectors.

Figure 2.4. Around 13% of CO₂ emissions from fossil energy use in the Slovak Republic remain unpriced



Note: Excluding emissions from the combustion of biomass in the emission base.
 Source: OECD (2018a) *Effective carbon rates*

Figure 2.5. Industry, electricity, residential and commercial sectors should face a stronger price signal



Note: Total CO₂ emissions from energy use including the combustion of biomass. For information about the methodology, see OECD (2016).
 Source: OECD (2018a) *Effective carbon rates*

Differentiation of excise tax rates by the carbon content of fuels would be an important step towards strengthening the policy signal. Currently, excise taxes distinguish the type of fuels but do not reflect their carbon content. This is in contrast to practice in countries such as Finland, Sweden and many others, and despite the OECD recommendations (OECD, 2019d). Under a carbon tax firms face greater certainty as the cost increase would be specified by the tax rate. On the other hand, there is uncertainty over the amount of emission reductions achieved in response to the tax. Tax evasion and administrative costs are much lower for energy taxes than for other taxes. For instance, the United Kingdom reports a rather low energy tax evasion rate of about 2%, especially in comparison to the 17% evasion rate for income tax (EEA, 2016). In addition, current excise taxes do not properly reflect other negative externalities related to transport, such as air pollution, noise, congestion and accidents. Addressing these externalities could double the current tax rates in the Slovak Republic (Santos, 2017).

In addition to combustion and manufacturing emissions, there is a whole range of GHG emission sources that are currently not addressed at all – that is, from agriculture, forestry and land use (AFOLU) (see e.g. (IPCC, 2019)). The GHG emissions from land degradation (due to deforestation, soil erosion and urban sprawl), synthetic fertiliser use, livestock agriculture and meat consumption would be important aspects to address in the Slovak Republic.

Possible policy instruments include land taxes differentiated by land- and soil-based carbon sinks, feebates (hybrid tax-subsidy schemes) to incentivise carbon sequestration by forestland owners and preservation of soil carbon stocks⁸, incentives for use of wood-based materials and products (e.g. in construction), phasing out the use of synthetic fertilisers, promotion of best practices in livestock and cropland management, restoration of degraded land and cultivated organic soils, reducing food waste and directing dietary choices towards low-GHG alternatives. Concerning the latter, there are important human health benefits associated with lower dietary risk from reduced consumption of meat and processed meat (GBD, 2019a). In the Slovak Republic, around 370 premature deaths were attributable to diets high in meat and processed meat in 2017 (GBD, 2019b). Several OECD countries have introduced taxes on meat, livestock, slaughter and slaughterhouses (e.g. France, Italy, Austria, Hungary) that provide important incentives in this direction.

Box 1.1. A revenue-neutral “green fiscal reform” would help address environmental challenges while maintaining the competitiveness of the economy

There is a real potential for government to undertake a revenue-neutral “green fiscal reform” by introducing new (or more stringent) taxes on polluting products and activities, extraction of natural resources and the use of ecosystem services, and simultaneously reduce other existing taxes (e.g. personal income taxes or social security contributions).⁹ Such reform would allow the country to address its environmental challenges while at the same time support the competitiveness of its economy. Phasing out environmentally harmful subsidies should form an intrinsic part of such a reform.

The objectives of the reform should be: i) environmental effectiveness, ii) desirable set of policy instrument characteristics (stringent, predictable over the longer-run, and allowing flexibility in the means of compliance), iii) removal of environmentally harmful subsidies that are economically wasteful and disturb the policy signal provided. Revenue-neutrality could be a complementary objective leading to an additional benefit of a green fiscal reform – the potential welfare gains from replacing pre-existing distortive taxes (e.g. on labour) by new corrective taxes (i.e. on environmental externalities).

⁸ A well-known application of a ‘feebate’ is the French bonus-malus system, in which revenues raised from a CO₂-differentiated tax on purchases of combustion-based vehicles are used to provide subsidies for electric vehicles.

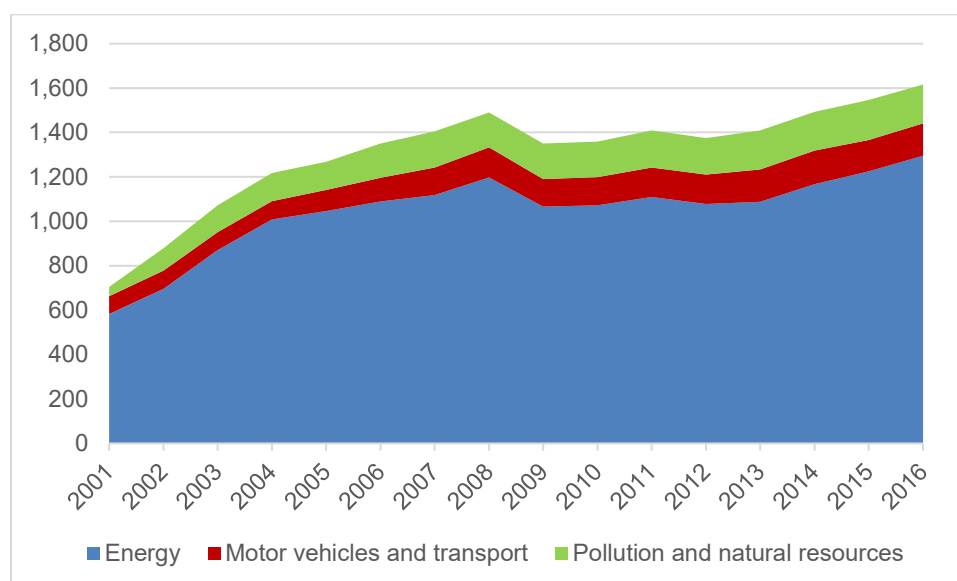
⁹ The (OECD, 2019d) *Economic Survey of the Slovak Republic* recommends that an increase in environmentally related taxes could help finance cuts in labour taxes.

Finally, a careful implementation of such reform is warranted. One should i) ensure that progressivity of personal income taxation is maintained; ii) address the potential distributional impacts on vulnerable households in a manner that does not undermine the underlying environmental policy incentives, for instance, by providing targeted means-tested transfers through existing social welfare schemes (revenue recycling) (see e.g., Mackie and Hašič, 2018).

2.3. Environmentally related tax bases should be broadened to help address solid waste, land degradation, biodiversity loss and emerging environmental concerns

The post-2008 financial and economic crisis has caused a fall in economic activity leading to lower tax revenue from environmentally related taxes, essentially due to reduced energy tax revenue (Figure 2.6). In fact, **almost three quarters of Slovakia's environmentally related tax revenues are generated from energy taxes, followed by transport taxes**. This is broadly in line with the situation in most other OECD countries. Taxes on other tax bases, such as pollution and natural resources, have been growing steadily but still remain rather limited in scope. This means that they are either addressed through other policy instruments (e.g. air and water pollution), are subject to very low tax rates, are limited to narrow tax bases, or simply remain unpriced – meaning that related externalities are not internalised. There is a need to examine how pricing measures (taxes, fees, charges or feebates) can help provide sustainability incentives into domains such as waste generation, land degradation, biodiversity conservation, extraction of natural resources, and sustainable use of ecosystem services.

Figure 2.6. Energy taxes prevail in ERT revenues in the Slovak Republic (million EUR)



Source: OECD (2019) Environmentally related tax revenue (database)

2.3.1 Raising the landfill tax would provide stronger incentives for diverting waste streams away from landfills

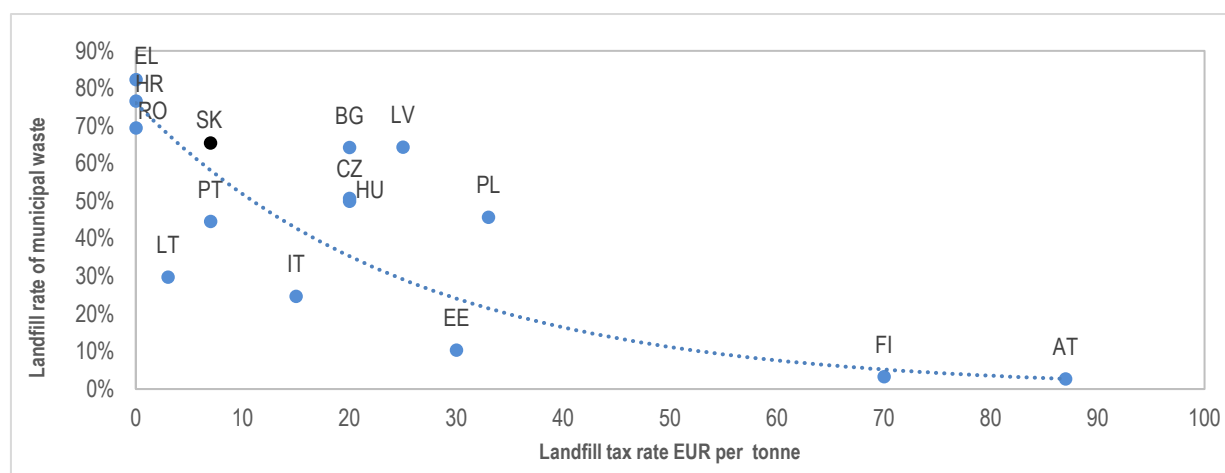
Landfill rates in the Slovak Republic are too high and recycling rates too low compared to other countries. Only 29% of waste was recycled in 2017, a level well below the EU average of 46%. According to recent

estimates, the country is at risk of not meeting the 50% recycling target for municipal solid waste by 2020 (EC, 2019). Moreover, as much as 61% of waste volume in 2017 was still disposed in landfills.

The tax on landfilling of municipal waste should increase significantly to ensure that solid waste is diverted away from landfills. A landfill tax is the most common instrument directed at landfill diversion across OECD countries. Several studies show that higher landfill taxes decrease landfill rates and encourage material recycling, although the price elasticity is rather low (Fogarty, 2014). As the Slovak landfill tax remains one of the lowest in the EU (Figure 2.7), the government initiated its gradual increase in January 2019. Although this is a step in the right direction, the planned increases of the landfill tax will not be sufficient to decrease the landfilling rate to 25% – the national target set in the new Environmental Strategy of the Slovak Republic 2030 (Haluš et al. 2018).

A suitable mix of policy instruments is the key to successful landfill diversion. Besides the increase in landfill tax rates, other complementary instruments are needed to change the behaviour of consumers and producers. This could include pay-as-you-throw systems in order to make waste sorting more financially attractive; a tax on waste incineration (e.g. in Austria) in order to prevent diversion from landfilling to incineration; taxes on packaging (e.g. in Belgium and Latvia) and similar measures to encourage reduction in waste generation. More effective action against illegal dumping is also needed in the Slovak Republic as well as awareness raising and sharing of best practices for residential waste separation (Haluš et al. 2018). Such policy instrument mix would help overcome the low price elasticity of waste generation and help divert waste streams towards more environmentally friendly modes of waste treatment (e.g., material recycling and composting).

Figure 2.7. Countries with higher landfill taxes have lower landfill rates of municipal waste (2016)



Source: *Ako menej skládkovať*, Ministry of Environment of the Slovak Republic

2.3.2. Biodiversity-harmful subsidies need to be reformed or removed

Market-based instruments are a cost-efficient means to achieve biodiversity conservation goals, including safeguarding functioning ecosystems and essential life-support services on which human well-being depends. Although the Slovak Republic has put in place levies on some activities that pose a risk to biodiversity, such as charges on air pollution or wastewater discharges, what is missing is a coherent mix of pricing instruments directed at negative ecosystem impacts of land use and land use change, biodiversity conservation and sustainable use of ecosystem services. Instead, the Slovak Republic applies a mix of taxes, charges, regulations, penalties, subsidies and financial compensations for conservation management. The market and non-market components of these policy “mixes” should complement each other (OECD, 2004).

As a starting point, biodiversity-harmful subsidies need to be reformed or phased out because they are economically wasteful and they undermine the effectiveness of biodiversity policy signals. For instance, price controls and subsidies in agriculture, explicit or implicit support for certain types of urban development and transport infrastructure, and a lack of coherence in the pricing of water and energy resources introduce cost distortions that undermine the conservation and sustainable use of biodiversity (Table 2.1). Reforms of biodiversity-harmful support have already taken place in several countries. For example, Switzerland reformed its agricultural subsidies in order to meet its ecological targets, and successfully integrated biodiversity considerations into agricultural policy. In France, growing concerns over the risks of pesticide use to human health and ecosystems have become an increasingly important driver of introduction of taxes on synthetic pesticides (OECD, 2017b).

Table 2.1. Examples of potentially biodiversity-harmful direct and indirect subsidies

Domain	Support type	General examples
Agriculture	Preferential treatment	Reduced abstraction charge for irrigation water
	Payments on variable inputs	Subsidies on synthetic fertilisers and pesticides
	Direct and potential transfer of funds	Market price support, payments based on commodity output
Renewable energy		Feed-in tariff/premium for crop-based biomass energy and in-stream hydropower
Water resources	Lack of full cost pricing	Below cost recovery for wastewater treatment
	Preferential treatment	Different prices of water supply for industry, households and agriculture
Cities and transport	Provision of general infrastructure	Provision of free parking by municipalities or as employee benefits
	Foregone government revenue	Untaxed soil sealing which prevents rainwater seeping and aquifer recharge
	Lack of full cost pricing	Land use change charges do not include the value of impacts on biodiversity and ecosystems
Recreation and leisure	Foregone government revenue	Unpriced recreation in nature

The introduction of taxes on synthetic pesticides and fertilisers would help reduce the negative impacts on human health and ecosystems. The primary goal of such taxes would be to discourage the use of such products by farmers, municipalities and households. Nordic countries, France and Mexico have already started introducing taxes on pesticides and fertilisers. The tax rates usually vary according to the toxicity of the substance. France has introduced a ban on retail sales of synthetic pesticides with the aim of completely phasing out their use by municipalities and households and introduced a ban on their retail sales. In the Slovak Republic, such taxes are not yet in place although there are regulations of the use of pesticides to reduce negative effects on humans, animals and ecosystems.

The environmentally harmful effects of recreation and leisure activities should also be taken into account, e.g. by introduction of entrance fees to national parks. Such new revenue streams could help alleviate the underfunding of protected areas (IEP, 2017). Some countries, such as the Czech Republic, Poland and Austria, charge entrance fees in national parks. In Croatia, the fee can go up to 35 euros per single entry, and thus helps to reduce the high number of visitors.

The support for renewable energy generation should prioritize environmentally friendly sources. Support mechanisms for renewable energy may exacerbate risks to biodiversity, soil degradation or water stress and pollution. For instance, feed-in tariff schemes supporting electricity from crop biomass or in-stream hydropower put pressure on the use of land and water bodies and may lead to landscape fragmentation. In addition, favouring certain crops reduces landscape diversity and may exacerbate loss of farmland species.

Land use change charges should reflect the value of impacts on biodiversity and ecosystems. The area of arable land has a decreasing trend in the Slovak Republic since 2000 (Enviroportal, 2019). Agricultural and forest land has been increasingly converted to other uses, driven by urban sprawl and soil sealing, with important consequences for ecosystem functions and biodiversity. The existing charge on land use change applied in the Slovak Republic is more-or-less an administrative fee and should be reformed to allow managing land use change more effectively. A similar instrument with higher rates is in place in the Czech Republic, yet still relatively low in comparison with the market value of land and hence its effect on landowner behaviour is limited (EC, 2006).

2.3.3. Water charge rates should reflect water scarcity and enforce the user-pays principle

The intensity of freshwater abstraction in the Slovak Republic, compared to GDP, population or internal resources, is lower than in most other OECD countries (OECD, 2017c). Surface water and groundwater resources are still relatively abundant and continue to meet the country's water needs, although some regions could suffer water shortages in the future (Enviroportál, 2018). More effective and cost-efficient water resource management would help increase the country's resilience vis-à-vis looming climate-related risks (e.g. increased frequency of droughts and extreme heat).

The abstraction cost of groundwater should reflect its scarcity rent to not put at risk the sustainable use of this exhaustible resource. Although groundwater should serve primarily as a source of drinking water, its unit prices in the Slovak Republic are lower than those on abstraction of surface water. This provides incentives for users to shift from surface sources to groundwater (Water research institute, 2011). This is in contrast to the trends in water pricing in other OECD countries where unit prices of groundwater are typically higher (OECD, 2017d). Concerning the pricing levels, water abstraction charges are generally low although they vary by country and users (OECD, 2015). Importantly, water abstraction charges are based on physical units and are currently not indexed to keep pace with the rate of inflation.

The unit price of water for agricultural use is too low. Agriculture was integrated in the Slovak water charge scheme in 2017 with a unit price of EUR 0.001 per m³. The share of water abstraction for agricultural purposes is around 10% (Eurostat, 2018). Industry and public supply withdraw similar volumes of water, but industrial users pay three times more per unit of water used than the public. According to the "user pays principle", water charges paid by users should reflect the marginal external costs (environmental damages) from water abstraction (see e.g. Gruère and Le Boëdec, 2019e). For instance, Luxembourg, Belgium or Estonia do not distinguish across users and the abstraction charge is the same for all (EC, 2014a). This is, however, not common among other OECD countries. Some countries apply progressive water pricing (higher unit price for greater volumes of water consumed) in order to encourage water saving.

2.4. Environmental considerations should be mainstreamed into a whole-of-government approach

An environmental policy reform should be guided by the country's long-term policy objectives for achieving environmentally and socially sustainable development. For instance, in the area of climate change this could involve a medium-term objective of (i) full decarbonisation of the economy and achieving carbon neutrality (net zero GHG emissions), complemented with more short-run goals of (ii) phasing out all fossil fuel subsidies and (iii) terminating coal use in electricity production and residential heating. A similar set of objectives could be developed for a more effective conservation of biodiversity and sustainable use of ecosystem services, and one directed at mitigating environmental impacts on human health from pollutants and chemicals (e.g. exposure to endocrine disruptors, microplastics and nanoparticles via air, water, food, cosmetics and other consumer goods). The objectives should be linked with international goals, such as the UN Sustainable Development Agenda for 2030, the UNFCCC Paris Agreement, the CBD Aichi

biodiversity targets and the post-2020 Biodiversity Framework, as well as the UNCCD Land Degradation Neutrality target.

Policy coherence across all branches of government is key to achieving ambitious environmental objectives. Therefore, the framing of country's strategic objectives should be accompanied by a set of policy reform proposals and actions implemented jointly across a range of government agencies. Efforts to reduce environmental impacts of the country's production and consumption decisions should not be consigned exclusively to the Ministry of Environment. Rather, environmental considerations should be integrated in all branches of government, including Ministries of finance, economy, transport, construction, energy, agriculture and forestry, etc.

In other words, environmental considerations should be integrated into economic and sectoral policies. In this respect, it could be helpful to set up a coordination mechanism to ensure a greater policy coherence across work of individual ministries and agencies. Sustainability criteria could be integrated into regulatory impact assessment procedures for new legislation. Tools such as environmental impact assessment, strategic environmental assessment and cost-benefit analysis should be more systematically used to assess the inter-linkages between sectoral policies and the environment, and to inform decision-making (see e.g. OECD 2018b; OECD 2012).

3. Special focus: Improving local air quality

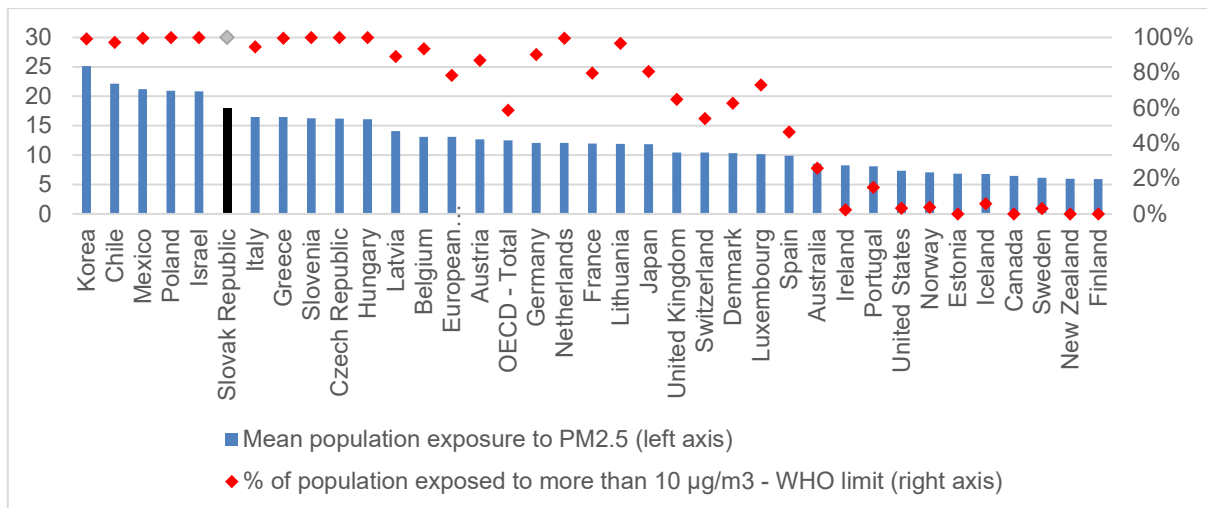
Almost 3200 premature deaths in the Slovak Republic were attributable to poor air quality in 2017. Most of the premature mortality effects were caused by exposure to ambient (outdoor) PM_{2.5}. Exposure to residential (indoor) PM_{2.5} and ambient ozone caused almost 300 deaths (OECD, 2019a). According to the World Health Organization, fine particulate matter (PM_{2.5}) is the most serious pollutant globally from a human health perspective. Long-term exposure even to moderate levels of PM_{2.5} substantially increases the risk of respiratory diseases, heart disease and stroke, diabetes and kidney diseases – the leading causes of death in OECD countries (The Global Burden of Disease Study 2017; (OECD, 2017a).

The associated welfare costs for the Slovak Republic amount to approximately USD 9.7 billion (10⁹), equivalent to 6% of GDP in 2017. This value represents only the cost of premature mortalities due to the four pollutants listed above, excluding any morbidity impacts, such as labour productivity losses, health care costs and willingness-to-pay to avoid pain and suffering from illness. Excluded are also impacts other than those on human health, e.g. on built structures, agricultural productivity and ecosystem health (OECD, 2019). Accounting for these other damages would further increase the costs. In addition, other pollutants, such as NO_x, SO₂ or CO, have also a negative impact on human and ecosystem health, with corresponding economic costs.

Virtually every Slovak resident is exposed to high levels of PM_{2.5} concentration. Despite a decrease in the past three years, mean exposure to PM_{2.5} remains above the OECD average. Although the mean concentration is slightly below the limit value for ambient air quality agreed at the EU level (18 µg/m³), the guideline value recommended by the WHO (10 µg/m³) has yet not been achieved. Among the European OECD members, only Poland ranks worse than the Slovak Republic (Figure 3.1).

Figure 3.1. Air pollution by fine particulate matter is dangerously high in the Slovak Republic

Population-weighted annual mean exposure to PM_{2.5} (µg/m³)

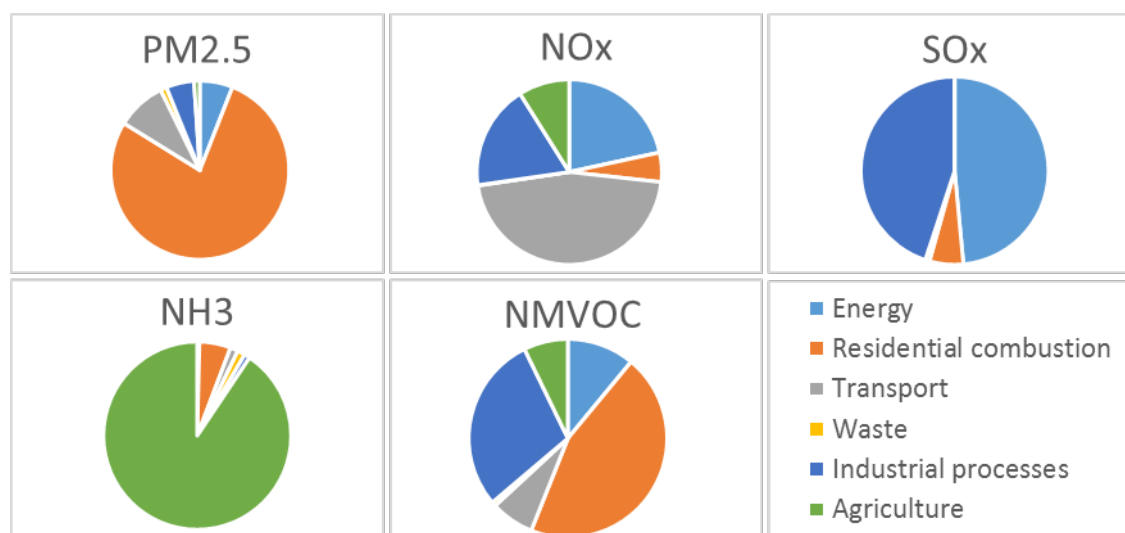


Source: OECD (2019) Environment Statistics (database).

The main sources of air pollution in the Slovak Republic are households and transport. Almost 80 % of total primary PM_{2.5} emissions originate from combustion in the residential sector. This is primarily due to household use of inefficient and high-emission boilers and heaters, and burning of poor-quality fuel such

coal, wet wood or waste. Poor insulation of houses can further aggravate this problem, by increasing the energy use required for heating. Transport, as the second largest polluter contributes 9% to the total primary PM_{2.5} emissions. However, transport is also responsible for 46% of all NO_x emissions, which contribute to the formation of secondary PM (esp. heavy good vehicles, buses and diesel cars). Finally, the energy and industry sectors are the main sources of SO_x emissions (Figure 3.2).

Figure 3.2. The emission profile of sources varies by pollutant (Slovak Republic, 2017)

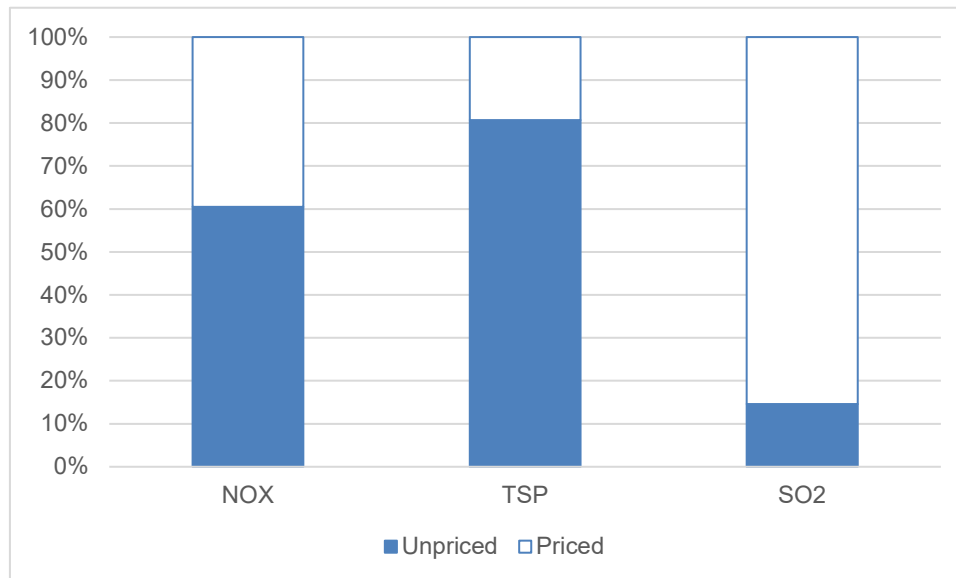


Source: Eionet (2019), Reporting Obligations Database

The majority of air pollutant emissions remain unpriced. Large sources emit the majority of SO₂ emissions and these are priced through air pollution charges. This contrasts with NO_x and PM_{2.5}, for which the share of priced emissions is low and essentially due to taxation of transport fuels (Figure 3.3). Households – the biggest emitters of PM_{2.5} – do not bear any external costs. Transport is responsible for NO_x and partially for PM_{2.5}.

Figure 3.3. Most air pollutant emissions in the Slovak Republic remain unpriced

The share of unpriced emissions in total emissions (2017)



Note: The figures shown above reflect only the air pollution charges.

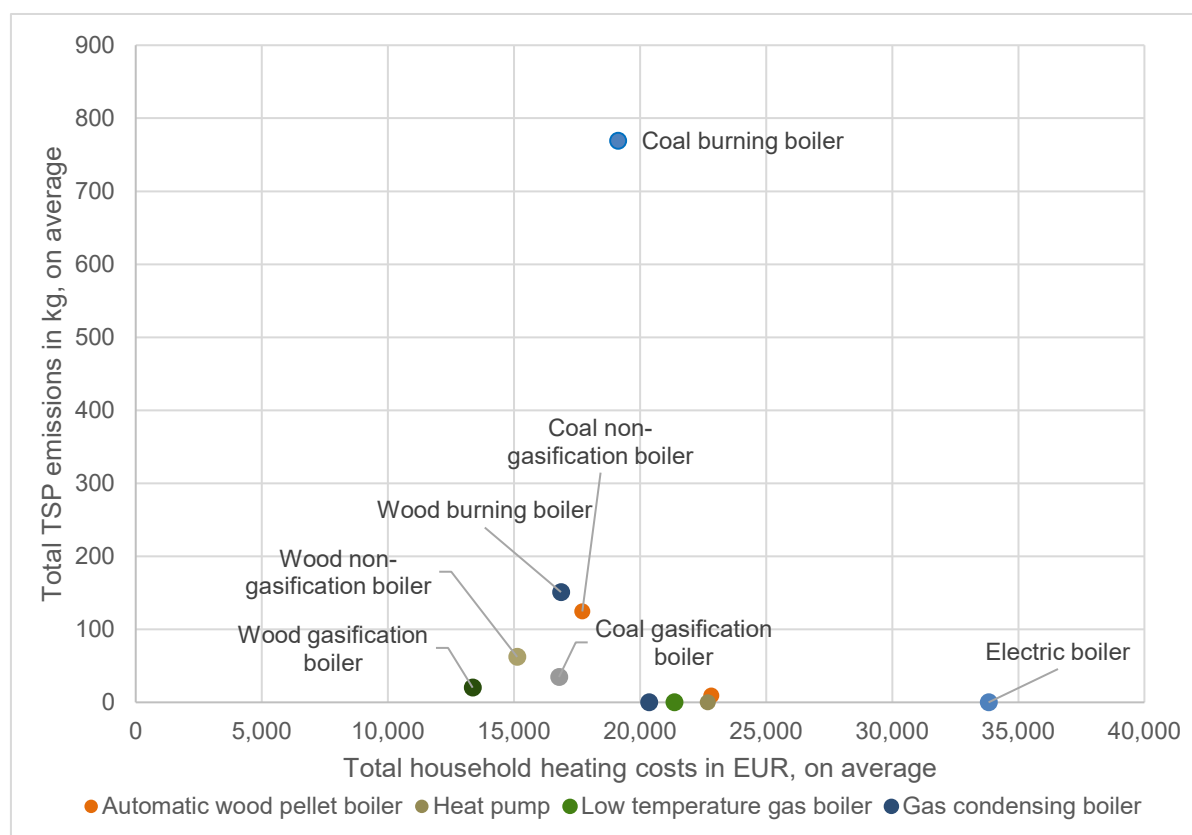
Source: Authors' calculation

Air pollutants can be transported across long distances and thus affect potentially large areas. The relation between local emissions and local concentrations depends on scattering conditions, solar irradiation, weather and landscape topography. For instance, the massive reduction of national emissions of ozone precursors in recent years has not resulted in a corresponding reduction of ground-level ozone concentrations in the Slovak Republic. For these reasons, it is important to collaborate with the neighbouring countries in efforts to achieve air emission reductions at the regional level, and support relevant efforts by the EU and beyond.

3.1. Heating fuels for household use should be taxed based on their carbon content and implicit air pollutant emissions

Burning wood is the cheapest option for residential heating in the Slovak Republic but it is more environmentally harmful than other available alternatives. While conventional coal burning is by far the most emission-intensive heating option, it is followed by conventional wood burning and other coal-based boilers. Newer alternatives such as wood gasification boilers generate lower levels of emissions and are also less costly compared to the above. The cleanest way to heat a household (in terms of local air pollution impacts) includes natural gas boilers, heat pumps and wood pellet boilers but these are also relatively more costly for households (Figure 3.4). However, fuel quality (e.g. moisture) and factors such as building insulation and target room temperature will also determine the actual volume of emissions.

Figure 3.4. Less environmentally harmful alternatives to conventional wood-based heating are available at a relatively modest cost increase



Note: Type of boilers by emission released (kg) and heating costs after 10 years of operation including purchase costs (EUR).

Source: Slovak Environment Agency

The use of wood and biomass for heating is rising. Nearly 20% of households use firewood (MoE, 2017). Moreover, the use of wood for energy generation in the Slovak Republic has doubled since 2005. Wood prevails as an important source of energy in many rural areas. As a low-cost option, wood burning is common mostly in central and eastern Slovakia. Municipalities with non-existent or only limited natural gas supply have the highest share of wood burning (SHMU, 2018). At the same time, there is an increasing trend of biomass use as a secondary or supplementary source for heating in the so-called ‘pleasure stoves’ even in urban areas.

Carbon content and implicit air pollutant emissions should determine the pricing of heating fuels.

Households, as any other user, should bear the external costs of pollution they generate by using fuel for heating. While carbon taxes on fossil fuels are increasingly common in OECD countries, this is not the case for taxes on firewood. Moreover, households in the Slovak Republic are exempt from excise duties on electricity, coal and natural gas. These exemptions should be abolished and wood logs (firewood) and charcoal should be taxed. This would provide incentives for wood logs to be rather directed to sectors with higher value added and where carbon remains sequestered (e.g. furniture, construction material) and, instead, encourage the use of fuel based on wood residues such as chips, pellets and briquettes.

The policy signals should be set up in a manner that will encourage (i) investment in energy-efficient technologies, (ii) emergence of a fully decarbonised energy system based on solar PV and solar heat, wind power, heat pumps and geothermal energy, complemented by heating systems utilising residual wood.

3.2. Well-targeted subsidies for households may facilitate the adoption of low-emission and energy-efficient boilers

A typical solid fuel boiler used in the Slovak Republic is fairly old, polluting and inefficient. The average age of boilers is 12 years; masonry and built-in tile stoves are even older, around 21 years (Slovak Hydrometeorological Institute, 2018). Firewood is the most common type of solid fuel. However, some households use coal or even illegally burn waste. Almost half of all households use unseasoned (moist) firewood. Besides the negative environmental impacts, poor quality of fuel can also result in higher fuel consumption and needs for stove maintenance (Slovak Hydrometeorological Institute, 2018).

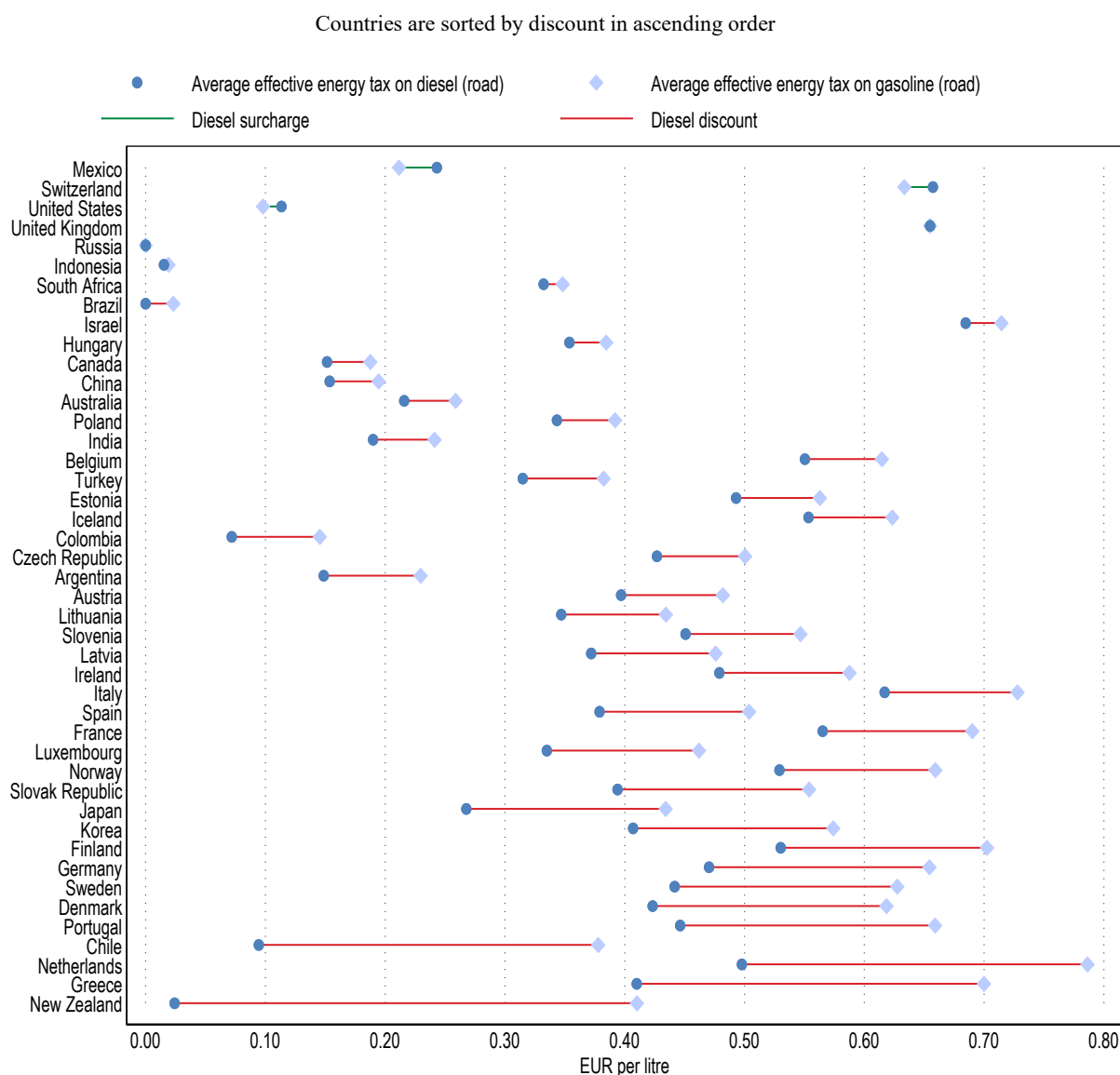
Well-targeted subsidies for households may facilitate the adoption of low-emission and energy-efficient boilers. The scheme could be defined in terms of the energy efficiency and emission intensity of boilers. Financial support to households to replace a polluting and inefficient boiler should be means-tested, targeting only households meeting certain income or wealth criteria and could be implemented through the existing social welfare scheme. The literature suggests that means-tested transfers are more efficient than lump sum transfers (see e.g. Flues and Van Dender 2017). Similar subsidies have been introduced in several OECD countries, such as the Czech Republic, Austria and the Nordic countries. See also Greene and Braathen (2014) for a related discussion on the design of some subsidy schemes.

Inefficient heating equipment should be phased out from the market. Although new, stricter emission requirements for fossil fuel boilers will be in place in 2022, they will not apply to wood burning boilers. Therefore, in the absence of complementary measures, inefficient boilers could continue to be sold in the future. For instance, in the Czech Republic, high-emission boilers have been banned since 2017 and their operation will not be allowed after 2020 subject to financial sanctions.

3.3. Taxation of transport fuels and motor vehicles should reflect their emission intensity

Slovakia should close the gap between petrol and diesel excise taxes. Apart from countries such as Mexico, the United States and Switzerland, most OECD countries apply higher tax rates on petrol than on diesel (OECD, 2017a). This is despite the higher carbon and air pollutant (nitrogen oxides and fine particulates) emissions from diesel combustion compared to petrol. Such preferential tax treatment of diesel fuel is, unfortunately, also in place in the Slovak Republic, which records one of the highest differences in excise tax rates of petrol and diesel (Figure 3.5). The diesel discount is diminishing in most OECD countries except for six countries including the Slovak Republic (OECD, 2019e). Cities across the EU increasingly introduce driving restrictions to discourage the use of diesel vehicles in urban areas. Looking ahead, there is a risk that the Slovak Republic, and other countries with relatively attractive fiscal treatment of diesel, might end up serving as “residual markets” for such polluting vehicles. When considering potential policy responses, it is typically more efficient and more fiscally responsible to tax polluting vehicles and fuels rather than to subsidize selected cleaner alternatives.

Figure 3.5. The Slovak Republic is among countries with a considerable spread between diesel and petrol excise tax rates

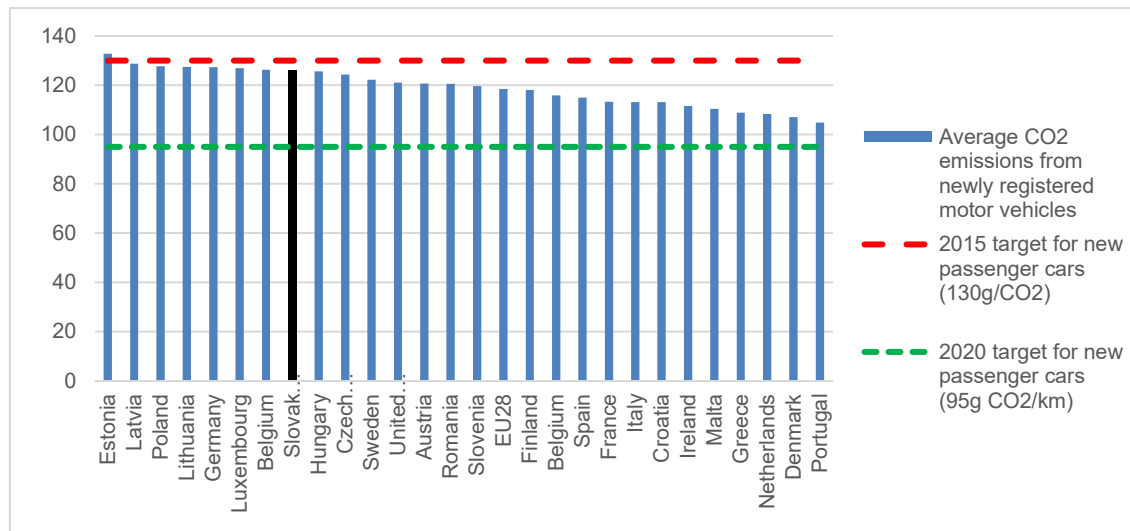


Source: OECD (2019e) *Taxing Energy Use 2019*

Existing vehicle-related taxes should be differentiated to account for CO₂ and air pollutant emissions. The Slovak Republic has made some progress in greening the annual motor vehicle tax for businesses and the car registration fee. Although the tax and fee rates are halved for low-emission vehicles, nevertheless they are still based on engine size rather than on emissions. Moreover, the Slovak Republic should consider extending the annual vehicle tax also to other motor vehicle owners, including households, and differentiate it by vehicle emissions. Such a tax is in place in Belgium and Norway, for instance.

The average age of the vehicle fleet across all categories is 13.4 years in the Slovak Republic, which is well above the EU average of 10.7 years (ACEA, 2017). In addition, newly registered cars are still relatively emission-intensive, the number of new alternative-fuel vehicles is still low (EEA, 2019) (see Figure 3.6) and the use of public transport has a decreasing trend.

Figure 3.6. CO₂ emissions from newly registered motor vehicles are above the EU average



Source: EEA (2019) Monitoring of CO₂ emissions from passenger cars (Database)

Air pollution from transport is primarily an urban problem. Passenger cars and heavy duty vehicles produce more than 70% of all NO_x emissions from transport. In addition to combustion emissions, road abrasion, tyre and brake wear contribute significantly to local particulate pollution (SHMU, 2018). Based on the EC estimations, the cost per tonne of discharged emissions from transport in Slovak urban areas is almost six times higher than in rural areas (EC, 2019b). **Transport taxes should ensure that the drivers bear the external costs.** In addition to air quality benefits, introduction of transport charges can help reduce noise, car accidents and congestion in urban areas and improve public open space. Currently, transport-related taxation in the Slovak republic takes mainly the form of fuel taxes. There is considerable scope for fuel taxes to better reflect transport-related external costs; this will also raise more revenue in nearly all cases. Moreover, in an effort to improve the quality of life, cities such as London, Brussels, Gothenburg or Milan have been introducing different charges for car drivers reflecting their contribution to urban pollution and other external costs of driving. For instance, in Milan the charge is differentiated based on the vehicle emission class, ranging from EUR 2 to 10 per daily access or EUR 50 to 250 annually. In 2012, after one year of operation, the results were substantial. The traffic fell by 31% and daily average PM₁₀ and NO_x concentrations decreased by 18% (Cascade, 2012).

3.4. Taxes on industrial air emissions ought to be considerably increased

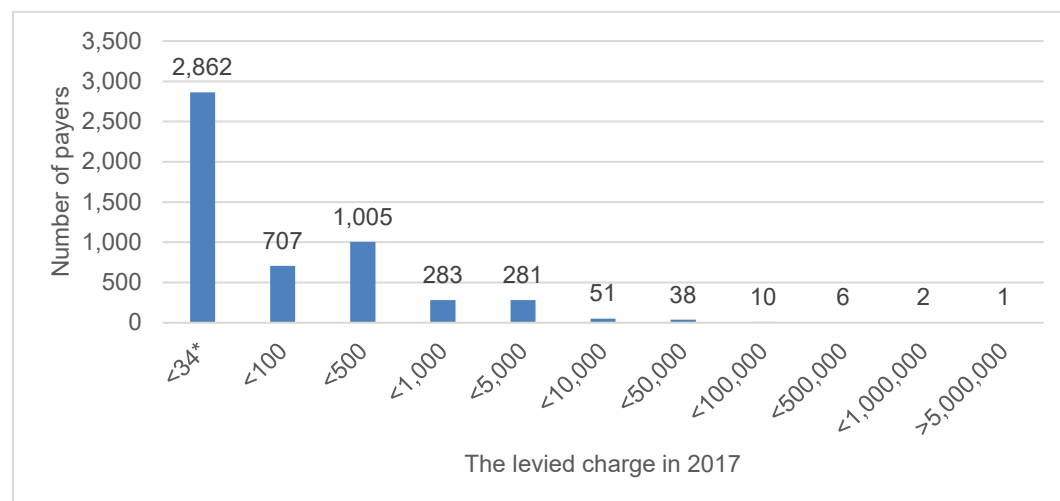
Available data suggest that air emissions from medium and large combustion sources have been trending downward in the Slovak Republic (except for carbon monoxide emissions). Large sources have considerably reduced emissions through measures such as switching to high-quality fossil fuels, adoption of exhaust gas separation technology and closure of inefficient combustion units in power plants (OECD, 2011a). The ten largest emitters alone release on average as much as 63% of all emissions from medium and large sources.

Several policy instruments and measures target industrial air emissions from medium and large sources in the Slovak Republic. This includes regulations such as the best available technology (BAT) requirements for large sources, maximum emission limits and air quality standards in line with the EU legislation. In addition, an air emission charge is imposed on more than 5000 firms and 120 air pollutants. However, 90% of the targeted polluters pay less than 500 euros annually (Figure 3.7) which provides weak incentives for investment in low-emission technologies. Therefore, regulatory measures (emission limits) rather than

pricing incentives (emission taxes and charges) are currently the main drivers of firms' emission reduction efforts (IEEP, 2016).

Figure 3.7. The majority of polluters in the Slovak Republic pay less than EUR 500 in air emission charges annually

Frequency distribution by revenue collected (EUR)



Note: * Exempt if the payable tax amounts to EUR 34 and less.

Source: Institute for Environmental Policy (2019) based on data from the Slovak Hydro-Meteorological Institute

The Slovak Republic has one of the lowest air pollution charges¹⁰ for the main pollutants, partly because the rates have not changed in nominal terms since 1998. In contrast, countries such as France, Poland and the Czech Republic have increased their charges during the last 10 years. The Czech Republic has begun to gradually increase its charges since 2012, and in 2020 they will reach the highest unit rates for SO₂ and TSP among the neighbouring countries (Table 3.1).

Table 3.1. The Slovak Republic has one of the lowest tax rates on air pollutants

Selected pollutants (EUR per tonne)

	NO _x	SO ₂	CO	TSP
Sweden	5 274	-	-	-
Norway	2 040	-	-	-
Denmark	640	1570-3130	-	-
Hungary	385.3	96.3	-	160
Italy	209	106	-	-
Lithuania	196	104	-	61
France	160.8	136	-	-
Czech Republic*	150.4	189	-	566.9
Poland	121.5	121.5	25.2	84-351
Estonia	111.2	111.9	7	112.4
Latvia	85.4	85.4	7.5	75

¹⁰ Note that in the Slovak Republic this levy is referred to as a charge while it is a tax according to the OECD definition: an "unrequited payment to general government" (OECD Glossary of Tax Terms, available at www.oecd.org/ctp/glossaryoftaxterms.htm). The same definition is used in the UN System of National Accounts (SNA).

Slovak Republic	49.8	66.4	33.2	166
Kazakhstan	59.1	59.1	-	-
Croatia	42.8	42.8	-	-
Romania	9	9	-	5

Note: *The tax rates listed above for the Czech Republic will be in place only starting in 2020.

Source: OECD (2019) *Policy Instruments for the Environment (PINE) database*

The optimal tax rates should reflect the marginal external damage costs caused by the discharged air pollutants. Sources located upwind or near densely populated areas cause higher damages. The current air pollution charges imposed on medium and large sources in the Slovak Republic correspond, on average, only to 0.91% of estimated damages (Table 3.2).

Table 3.2. The tax rates in the Slovak Republic do not reflect the external damage costs

	SO ₂	NO _x	PM _{2.5}	NH ₃
Marginal damage costs (MDC) (EUR per tonne, lower-bound estimate)	4,900	5,200	20,000	14,000
Tax rate (EUR per tonne)	66.4	49.8	166	66.38
Tax rate as a share of MDC (%)	1.36	0.96	0.83	0.47

Note: The damage costs include human exposure to PM_{2.5} and ozone in terms of VOLY valuation. Many other costs are not covered, such as the direct effects of SO₂ and NO_x, agricultural productivity losses, impacts on materials and ecosystems.

Source: AEA Technology Environment (2005).

The preferential fiscal treatment of coal should be abolished. Medium and large sources which combust in the fuel mix at least 30% of brown coal originating from domestic production benefit from reduced rates on emission of air pollutants. Yet, brown coal is a highly emission-intensive fuel generating the most of NO_x and SO₂ emissions per unit of energy produced. Therefore, there is no environmental reason to favour this harmful fuel.

Another possibility to control air pollutants is to introduce an emissions trading system. Trading schemes are in many ways similar to taxes: they create property rights and hence correct for a market failure, they achieve emission reduction in a cost-effective way and they may generate budget revenue, depending on how permits are allocated. The main difference between taxes and tradable permit schemes is in the transaction costs and uncertainty over achieving an environmental goal (PCGCC, 2009). In the past, the Slovak Republic introduced an SO₂ trading scheme but due to a high number of allowances on the market, the scheme did not generate any emission reductions and was later abolished. The considerations of re-introducing a trading system in the Slovak Republic for one or several air pollutants faces several risks and is not advised due to the rather limited market size: i) small countries may consider administrative costs to be too high (OECD, 2002), ii) a low number of participants in the trading system can negatively affect market liquidity (OECD, 2001). For instance, the Netherlands introduced a trading scheme for NO_x in 2005. As the companies had to apply BAT later on, the reduction of emissions resulted in the NO_x market price close to zero. The well-known example of air emissions trading scheme is the cap-and-trade for SO₂ and NO_x in the United States; however, these schemes have not been as successful as previously estimated (for more information, see Braathen 2019).

4. Conclusions

This paper examines the potential for tax policy reforms in the Slovak Republic directed at a more effective and efficient protection of its natural asset base, better environmental quality of life for its citizens, improving its environmental and resource productivity and nurturing the economic opportunities arising from a greener growth.

The implementation of environmental market-based instruments in the Slovak Republic remains limited. The share of environmentally related taxes on total tax revenue has been declining and is now the second lowest among neighbouring countries. While the use of such taxes is growing in some countries, the Slovak Republic has not introduced any modifications to its taxation system that would help better address environmentally harmful activities.

Automatic indexation is a minimal requirement for an effective implementation of environmentally related taxes in order to keep up with the rate of inflation. As the tax bases are usually defined in physical units, the effective tax rates and the revenue generated tend to fall over time in real terms. Automatic indexation also ensures that the policy signal is transparent and predictable over the longer run, which is important to help guide investment decisions of firms and households.

The new or existing policy instruments should explicitly reflect the pollution and external damages in order to convey abatement signals to firms, households and the markets more generally. In particular, Slovakia's carbon emissions from energy use face a low price signal. In 2015, only 30% of carbon emissions from energy use were priced above a low-end estimate of carbon costs (EUR 30 per tonne of CO₂). Moreover, almost 13% of Slovakia's carbon emissions from burning fossil fuels for energy were unpriced. Thus, polluters are not held accountable for the damages their emissions cause. Differentiation of excise tax rates by the carbon content of fuels would be an important step towards strengthening the policy signal.

Air pollution is one of the most costly environmental challenges at the local level with serious human health impacts. Almost 3200 premature deaths in the Slovak Republic were due to poor air quality in 2017. Most deaths and many illnesses are caused by exposure to ambient PM_{2.5}, followed by exposure to residential PM_{2.5} and ambient ozone. The associated welfare cost for the Slovak Republic amounts to approximately USD 9.7 billion, equivalent to 6% of GDP.

Polluters should bear the external costs of air pollution. Households, transport and to a lesser extent the industrial sector are the major sources of local air pollution. Taxes on heating fuels and transport-related taxation should better reflect the emission intensity. Taxes on air pollutant from medium and large sources should be considerably increased to reflect the marginal damage costs of air pollution.

The Slovak Republic should also exploit its potential in strengthening and extending its market-based instruments in other environmental domains, such as waste management, land degradation, biodiversity loss and other emerging environmental concerns. Almost three quarters of Slovakia's environmentally related tax revenue are generated by energy taxes, followed by transport taxes. Other tax bases, such as pollution and natural resources, have been growing steadily but remain limited in scope.

Raising the landfill tax would provide stronger incentives for diverting waste streams away from landfills. Incentives harmful to biodiversity need to be phased out to safeguard functioning ecosystems and the essential life-support services. Achieving a more effective and cost-efficient water resource management would help increase the country's resilience vis-à-vis looming climate-related risks. Therefore, water charge rates should reflect water scarcity and enforce the user-pays principle.

This paper identifies some opportunities for environmental policy reform. Future research might complement this broad overview with more in-depth analyses, e.g. focused at the environmental effectiveness and cost-efficiency of particular policy instruments and measures; an in-depth examination of biodiversity-harmful incentives would be another important follow-up.

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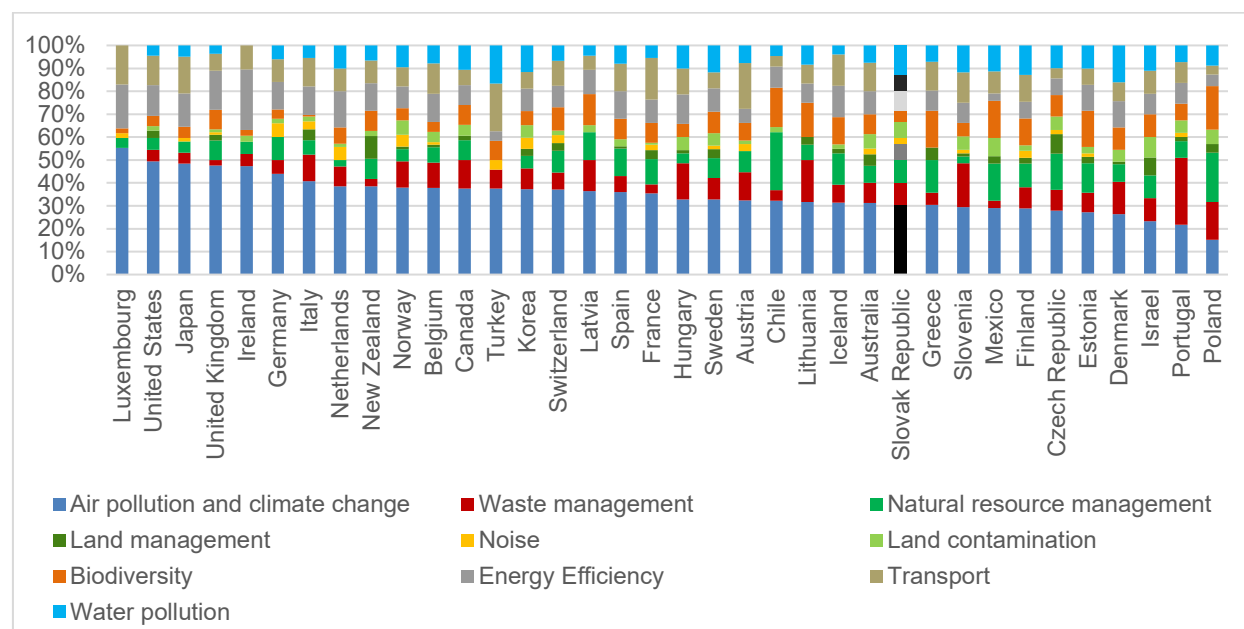
Annex A. Policy instruments in the Slovak Republic directed at negative environmental externalities

This annex presents an overview of environmental policy instruments in the Slovak Republic and provides selected examples from some other OECD countries. The review draws on the OECD *Policy Instruments for the Environment (PINE) database* (<http://oe.cd/pine>) and focuses on the market-based instruments in place, such as taxes, fees and charges, tradable permits, deposit refund schemes and environmentally motivated subsidies.

The majority of the reviewed policy instruments target air pollution and greenhouse gas (GHG) reduction (Figure A.1). In the Slovak Republic, they include the GHG emissions trading scheme (EU-ETS), taxes on air pollutant emissions from medium and large emission sources, excise taxes on fossil fuels, complemented with instruments with a more indirect incidence, such as subsidies for building energy efficiency investments and for renewable energy generation (e.g. feed-in tariffs and premiums). This is a rather limited range of instruments compared to those employed in other OECD countries. The second largest group consists of policy instruments directed at waste and natural resource management. Finally, there are very few instruments aimed at biodiversity conservation, noise reduction and prevention of land contamination; this is partly because primarily command-and-control instruments regulate these domains. However, there is no particular merit in having many instruments. *One* instrument, applied at an appropriate stringency level, could completely cover all relevant sources.

Figure A.1. The largest share of market-based policy instruments in the Slovak Republic target primarily air pollution and climate change mitigation

Share of the number of instruments reported in PINE database by environmental domains



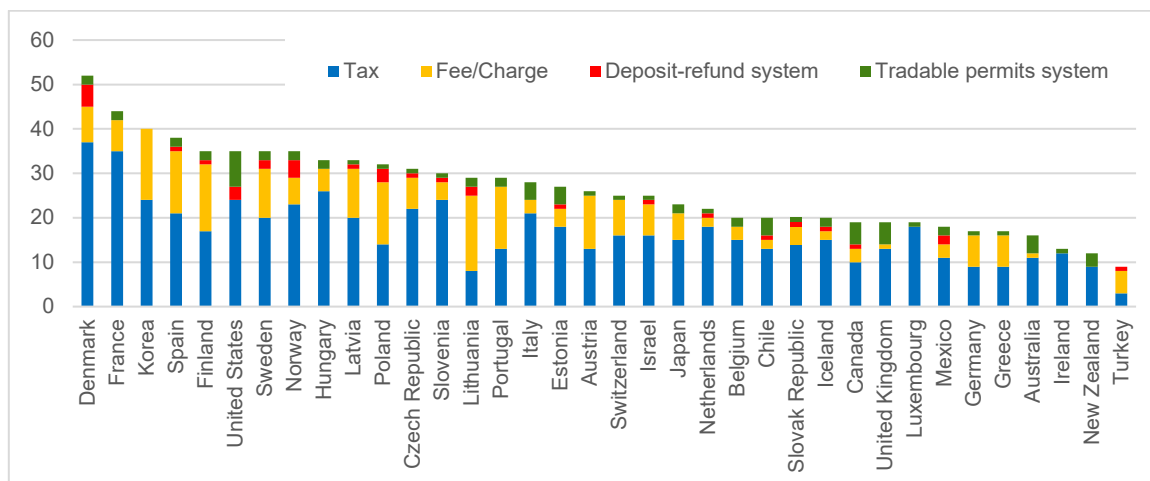
Note: Sub-national instruments have been normalised to enable comparison across OECD

Source: OECD (2018), *PINE database* (<http://oe.cd/pine>)

Among the 20 market-based instruments implemented in the Slovak Republic (and reported in PINE), taxes are the most widely used, followed by fees and charges directed mostly at air emissions, water effluents and water use (Figure A.2). They also include a system of tradable permits for GHG

emissions (the EU-ETS) and a deposit-refund system for motor vehicles. The number of instruments only indicate of the various approaches and does not fully characterise the quality of countries' policy framework.

Figure A.2. Taxes are the most common among market-based instruments used to correct environmental externalities in the Slovak Republic



Note: Sub-national instruments have been normalised to enable comparison across OECD

Source: OECD (2018), *PINE database* (<http://oe.cd/pine>)

Annex Table A.1 presents an overview of environmental policy instruments in the Slovak Republic and lists selected examples from some other OECD countries, focusing on the market-based instruments.

Table A.1. Policy instruments in the Slovak Republic and selected examples from other OECD countries

Externality	Policy instrument in SVK	Policy instruments in OECD
Air pollution and GHG mitigation		
Stationary sources (excluding households)	Excise taxes on fossil fuels	Excise taxes on fuels and taxes based on CO ₂ content in fossil fuels
	EU-ETS, Air pollution charges	CO ₂ trading (Canada), EU-ETS, NO _x charge (Sweden)
	Feed-in tariffs and premiums on electricity from renewable sources	Renewable energy feed-in tariffs and premiums
	Building energy efficiency subsidies	Renewable energy mandates/tradable certificates Building energy efficiency subsidies
Mobile sources	Excise tax on motor fuels	Congestion charging, highway tolls
	Car registration fee	Feebate (tax/subsidy) schemes differentiated by CO ₂ emissions (France)
	Distance-based toll for heavy good vehicles and buses	Differentiated car registration and ownership fees
	Low-emission zones	Consumer subsidies for purchase of electric or hybrid vehicles Removal of harmful consumer and producer subsidies (scrappage, road infrastructure) Congestion charges to enter cities (Sub-)urban mobility policies (e.g. street parking policies, cycling policies, building codes, urban planning, low-emission zones)
Residential combustion sources	Excises taxes on heating fuel (e.g. on natural gas,)	Inspection and maintenance of biomass appliance (Germany, Switzerland)
		Financial incentives

Water pollution		
Industrial processes	Wastewater effluent charge	Water effluent charges
Residential activities	Water tariffs	Water tariffs
Water transport		Tax on the use of rivers and waterways (France)
Resource management		
Material resources	Fee on extracted minerals	Tax schemes on various primary materials, e.g. mining charges
		Fee on extracted minerals
		Fee for on the withdrawal of forest land
Waste management	Landfill tax	Tax on the incineration of waste
		Tax plastic bags and plastic materials
		Pay-as-you-throw pricing models
Water scarcity		
Industrial processes, irrigation, water supply	Groundwater abstraction	Water resources charges
	Surface water abstraction charges	Water services charges
Biodiversity conservation and sustainable use		
Land use change and intensification	Financial compensation for limited management interventions	Payments for ecosystem services
	Levy on withdrawal of land from agriculture	Taxes on fertiliser and pesticides (Denmark, Norway, Sweden), tax on phosphorus in animal food
		Fee for excessive soil pollution (Bulgaria), Emission-related landing charge (Switzerland)
		Land value tax (Denmark, Estonia)
		Levy on withdrawal of land from agriculture
		Soil load charge
Timber production and harvesting		Reform of potential environmentally harmful support to agriculture
Hunting	Fee for hunting rights	Taxes on forest products, timber harvest
		Fee for hunting rights
		Tradable permits (sets a limit or cap on user access to a resources)
Urban sprawl		Biodiversity offsets/Bio banking
Tourism and recreation		Fees for the import and export of animals and plants (Austria)
		Entrance fees to protected areas
Noise		
Road transport	Tax on the entry and residing of motor vehicles in historical parts of towns	Noise pollution non-compliance fee
		Noise charge
		Congestion charges to enter cities
Airports		Aircraft noise charges

A few additional instruments (not yet recorded in the PINE database) provide incentives to reduce negative environmental impacts. For instance, the private sector benefits from income tax credits on expenditure on environmental protection activities, such as forest cultivation, restoration of land affected by mining, landfill closure and remediation, and disposal of electrical and electronic waste collected from households. The exemption from property tax could apply to buffer zones for water resources, protected areas, wetland, windbreaks and protected areas. In the past, a reduced VAT tax rate used to apply on firewood, LPG and natural gas use but the subsidy has been phased-out, which is well in-line with the proposals of this paper.

Towards a green fiscal reform in the Slovak Republic

This paper is an outcome of a joint project between the Institute for Environmental Policy (IEP) at the Slovak Ministry of the Environment and the OECD Environment Directorate. The paper has been authored by Marianna Bodáčzová (IEP), Ivan Haščíč (OECD) and Martin Haluš (IEP). An earlier version of this paper benefitted from helpful suggestions by Nils Axel Braathen, Katia Karousakis and Jean-François Lengellé of the OECD Environment Directorate, Jonas Teusch of the OECD Centre for Tax Policy and Administration, and Václav Vojtech and Dimitris Diakosavvas of the OECD Trade and Agriculture Directorate. The contribution of many other colleagues is also gratefully acknowledged, among them Ivana Ďuricová (Slovak Hydrometeorological Institute), Eva Viestová (Ministry of the Environment of the Slovak Republic), Veronika Antalová (Institute for Environmental Policy) and Miguel Cárdenas Rodríguez for help with the OECD PINE database.

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