Slovakia Versus Carbon Taxes: A Serious Substitute for Existing Taxation or a New Tax Load?

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Taxation of carbon is one of the key instruments of the European Union's agenda focused on decreasing emissions of CO_2. A recently introduced European green agreement (European Green Deal) perceives new carbon tax introduction into the tax mix through the lens of all possible benefits: *"Well-designed tax reforms can boost economic growth and resilience to climate shocks and help contribute to a fairer society and to a just transition"*[1].

Many economists[2] consider the instrument of the Pigovian tax, which penalizes unwanted behavior (polluting) as an optimal tool, which encompasses the following characteristics:

- punishes undesirable actions (the polluter pays);
- encourages investment to reduce emissions – supporting technological progress, including the development of renewable sources;
- it is nationwide and therefore fair; the same rate applies to all - the government does not choose technology winners by nationwide tax.

These economists support the introduction of such a tax with the claim that with growing income and wealth, consumers do not decrease their energy consumption, rather on the contrary (the so-called "Jevons paradox"). Higher efficiency of new technologies leads not only to lower unit prices, but also to increased consumption[3]. Only increasing costs of consumption, which can be secured by continuously raising the price of carbon, can reduce demand, thus leading to an absolute decline in consumption.

> WITH GROWING INCOME AND WEALTH, CONSUMERS DO NOT DECREASE THEIR ENERGY CONSUMPTION, RATHER ON THE CONTRARY (THE SO-CALLED "JEVONS PARADOX")

EVERY TAX HAS NEGATIVE EXTERNALITIES

The final effect of the carbon tax is determined by the way in which additional resources are handled. Every tax results in reallocation of scarce resources for purposes less desired by consumers. Not only do taxes diminish the utility of a consumer, but they also have a negative impact on economic growth. These effects are also consequential for the carbon tax.

The most integral part of the market economy is the price mechanism, which provides signals to individual economic agents about the scarcity of resources and their

[1] https://ec.europa.eu/info/sites/info/files/european-green-deal-communication_en.pdf

[2] https://www.ft.com/content/137b9da8-99c4-11e9-8cfb-30c211dcd229. EU economists call for carbon taxes to hit the net zero goal earlier.

[3] For example, declining air transport costs can be mentioned. Higher transport efficiency, new investments in more efficient aircraft have allowed significant price reductions and relatively strong growth in both mileage and passenger numbers.

utility. The generated profit, on the other hand, is a sign of efficacy of given production. The carbon tax disrupts these signals, subsequently reallocating investments from the most desired resources and needs to less effective production.

Electric cars can serve as an example. Nowadays, their manufacturing and operation are still more expensive, even after taking costs of pollution at current prices into account. Another example would be the rise in prices of basic inputs in construction (worsened availability of housing) due to higher prices (e.g. cement and steel).

To eliminate the additional loss of productivity, deadweight loss of new tax, economists suggest the carbon tax introduction to be revenue neutral. This means that the total amount of collected taxes will decrease by the amount of the carbon tax. Due to a negative impact on economic growth, this tax shift should lead to a decline in direct taxes. There is a kind of a consensus in economic literature that direct taxes are more harmful from the perspective of economic growth. They involve the income tax or taxes on company revenues, the labor tax, or social and health contributions.

> ECONOMISTS SUGGEST THE CARBON TAX INTRODUCTION TO BE REVENUE NEUTRAL

McKitrick (2016) argues that "[t]he logic of carbon pricing is that it induces the market to identify and implement the cheapest abatement options, and reject the rest. Using the revenues to subsidize the rejected ones would defeat the purpose of the policy"[4]. Also McKenzie (2016) argues that initiatives like infrastructure spending should be evaluated and financed independently of carbon tax revenues and new revenues should be used to reduce existing distortionary taxes[5].

> THE FINAL EFFECT OF THE CARBON TAX IS DETERMINED BY THE WAY IN WHICH ADDITIONAL RESOURCES ARE HANDLED

Accordingly, supranational institutions, such as the World Bank or the International Monetary Fund, recommend reducing the direct tax burden. As is apparent from the

[4] McKitrick, R. (2016) *A Practical Guide to the Economics of Carbon Pricing*, SPP Research Papers, University of Calgary, School of Public Policy. Available [online]: http://www.policyschool.ca/wp-content/uploads/2016/09/Carbon-Pricing-McKitrickFINAL.pdf

[5] McKenzie, K. J. (2016) *Make the Alberta Carbon Levy Revenue Neutral*. SPP Briefing Paper 9, 15 (April), University of Calgary, School of Public Policy. Availabe [online]: http://www.policyschool.ca/wp-content/uploads/2016/05/carbon-levy-revenue-neutral-mckenzie.pdf

Table 1: Opinion poll on the willingness to pay more for climate change

Question: How much more would you be willing to pay on your monthly bill for energy consumption to tackle climate change?					
EUR 0 (nothing more	EUR 2 (+5%)	EUR 5 (+12,5%)	EUR 10 (+25%)	More than EUR 10 (more than 25%)	Don't know / not considered
49.2%	25.1%	11.0%	4.8%	3.5%	6.4%

Source: https://blog.etrend.sk/eugen-jurzyca/slovaci-o-planoch-ursuly-von-den-leyen-prieskum.html [in Slovak]

text of the Green Deal, the EU is likely to aim to reduce the tax burden on labor.

This plan has its own logic, since environmental taxes are certainly not popular among general public. Representative opinion polls commissioned by MEP Eugen Jurzyca[6] show that Slovak citizens are generally unwilling to pay higher taxes on the consumption of energy produced from fossil fuels, respectively, only to a limited extent [See: Table 1].

Therefore, it is understandable that a disagreement within the public opinion provides support for the requirement that penalization of polluting behavior should be compensated for through cuts on different taxes.

However, the question is how much a reduction in labor taxes such a tax will bring. Carbon taxes are intended to cover, at an early stage, sectors that are not part of the emission-trading scheme today. On the other hand, land transport, which is not a part of the allowance permits market, is already heavily burdened by excise duties. Therefore, let us consider how much the Slovak state is already levying on carbon taxes. In the third part, we analyze the remaining emission production and estimate the potential of the carbon tax yield. In the last part, we analyze considerable risks and mitigation of keeping the promise of fiscal neutrality.

HOW MUCH DO SLOVAKS PAY FOR CARBON NOWADAYS?

To begin with, it is important to understand what a carbon tax is. It is generally defined as an indirect (excise) tax tied to the amount of carbon emissions, mostly due to burning fossil fuels[7].

The definition presupposes that the higher the content of carbon, the higher the rate, and, thus, less polluting fuels should be burdened by a lower tax rate. Since the term carbon tax itself is quite new, the taxes that are labelled as "carbon taxes" or "environmental taxes" are usually taxes on electricity (electricity produced from renewable sources is exempt), a coal tax, and a gas tax. These taxes were implemented into the Slovak tax system in accordance with the requirements of European Directives.

[6] https://blog.etrend.sk/eugen-jurzyca/slovaci-o-planoch-ursuly-von-den-leyen-prieskum.html

[7] A carbon tax is a tax levied on the carbon content of fuels (transport and energy sector). The term carbon tax is also used to refer to a carbon dioxide equivalent tax, the latter of which is quite similar, but can be placed on any type of greenhouse gas or combination of greenhouse gases, emitted by any economic sector.

> THE EU IS LIKELY TO AIM TO REDUCE THE TAX BURDEN ON LABOR

Nonetheless, in the Slovak tax system, there are also other taxes that exclusively burden fuels containing carbon. These represent, de facto, the key carbon taxes, although they are not labelled in that manner in legislation.

EXCISE DUTIES ON ELECTRICITY, COAL, AND GAS

Carbon or green taxes were introduced into the Slovak tax system in 2008 as a consequence of a transposition of directive 2008/118/ES[8]. At the time of the introduction of these taxes, the European Commission already advocated that reducing the tax burden on labor could offset them. However, as the Directive allowed member states to adopt different exemptions, lowering the rates, the Slovak government did not proceed with any related rate cuts.

The electricity tax rate is set at EUR 1.32 / MWh.[9]; coal is set at EUR 10.62 / t. The natural gas tax rate shall be set if: a) it is used as a fuel for the production of heat; or b) is supplied for the production of compressed natural gas to be used as the fuel for the production of EUR 9.36 / MWh. The rate of taxation on compressed natural gas supplied or used as propellant shall be EUR 0.141 / kg; if it is used as a fuel for heat production, the rate of tax shall be EUR 0.01989 / kg. As stated by the Ministry of Finance in Tax Report 2018:

> *"There are 27 exemptions for energy taxes, whether facultative or obligatory. Their share in the total delivered quantity of individual energies varies. While for coal it is close to 100%, for electricity the share of the exempt amount increases (65% in 2017), and for natural gas the share is stable at 68%[10]".*

Although coal is almost completely tax-exempt in Slovakia, the rate is also low. Assuming that one tonne of burned coal emits 1.5-1.9 tons of CO_2, at the current price allowance permits EUR 23/tonne, the coal tax should be set between EUR 34.5 and 43.7 per tonne of coal. Low prices are in line with values of government officials of over the last twelve years that did not want to pass on the tax burden to households (whether in direct consumption or through heating plants). The result is very low revenue on the following taxes, representing 0.1% of the total tax mix [See: Table 2]. According to available estimates, elimination of all exemptions would yield EUR 65 million[11].

CHARGES FOR ELECTRICITY PRODUCED FROM RENEWABLE RESOURCES

In fact, households and businesses contribute more to deal with climate change by subsidizing the production of renewable resources (RES). At present, their

[8] https://eur-lex.europa.eu/legal-content/sk/TXT/?uri=CELEX%3A32008L0118

[9] For comparison, a consumer pays for annual consumption of electricity of 1 MWh approximately 150-170 euros.

[10] Tax Report 2018. Available [online]:https://www.mfsr.sk/sk/financie/institut-financnej-politiky/publikacie-ifp/ekonomickeanalyzy/50-danovy-report-slovenskej-republiky-2018-oktober-2018-2.html

[11] Revision of environmental expenditures (2017) Final report.

[12] Public Sector Budget Proposal 2020-2022. Available [online]: https://www.mfsr.sk/sk/financie/verejne-financie/rozpocet-verejnej-spravy/#collapse-325601582823933291

Table 2: Revenues of energy/carbon taxes

Tax revenues (thousands, EUR)	2017	2018	2019	2020	2021	2022
Tax on electric energy	11,175	10,949	11,842	12,052	12,316	12,533
Tax on natural gas	25,638	24,053	23,691	24,178	24,774	25,280
Tax on coal	105	347	369	287	256	224

Source: Public Sector Budget Proposal 2020-2022[12]

production in Slovakia is financed by a subsidized feed-in tariff, which is significantly higher than the market price. The cost of the higher price of RES is transferred to the price of electricity of the final consumer, together with surcharges for subsidizing the production of cogeneration of electricity and heat and subsidies for coal mining [See: Box 1]. In 2018, these premiums in the final price of households represented a 22.5% share. The last known amount of renewable energy surcharges dates to 2018 in the value of EUR 16.6 per MWh of electricity (compared with EUR 1.32/ MWh of the electricity tax).

With this quasi-indirect tax, final consumers paid EUR 380 million for production of RES[13]. This is a much higher amount than consumers paid through the above-mentioned carbon (energy) excise duties. As 2,3994 GWh of energy was produced from RES, the current energy mix of 257 ths. tons of CO_2 were saved, approximately 0.6% of the total annual GHG production in Slovakia[14]. If we used the same amount of money to purchase emission permits for EUR 23 per tonne, we would save EUR 16 million tons of CO_2 emissions, almost 40% of the total Slovak production. This number indicates the current inefficiency of RES subsidies.

> CARBON TAXES ARE INTENDED TO COVER, AT AN EARLY STAGE, SECTORS THAT ARE NOT PART OF THE EMISSION-TRADING SCHEME TODAY

[13] https://ekonomika.sme.sk/c/22247669/za-8-rokov-sa-na-vyrobu-zelenej-elektriny-dalo-tri-miliardy.html

[14] Calculations based on data from European Environmental Agency. Available [online]: https://www.eea.europa.eu/data-and-maps/data/co2-intensity-of-electricity-generation

BOX 1: SUBSIDY FOR CARBON EMISSION IN SLOVAKIA

What is peculiar about the final price of electricity in Slovakia is the fact that the support of electricity production from RES is not a direct budget expenditure, but it is conducted in a hidden form. At the same time, the support of lignite mining is also a part of the same surcharge (the so-called "tariff for system operation").This additional charge pays for the purchase of electricity from the lignite power plant in Nováky at higher than market prices, so that the power plant with regulated profit continues to operate and buys lignite mined in the adjacent mines. The amount of the surcharge is EUR 118 million for 1.2 GWh of electricity produced.

Thus, the regulator will "support" CO_2 emission savings in the same surcharge in which it subsequently eliminates them more than twice (1.9 million tonnes of CO_2) by promoting unprofitable lignite mining.

This paradox is an illustration of the attitude of the last governments in Slovakia towards environmental pollution. The government has long preferred the "social" goal, preserving 1,800 miners' jobs (plus another 1,700 above the ground employees) over eliminating the health and environmental impact of the mining. Seven years ago, the closure of a large plant in the region would be a major problem, currently there is very low unemployment in the region and a total of tens of thousands of vacant jobs in Slovakia. Finally, the government adopted a plan to end subsidized lignite energy purchase by the end of 2023. Closing the extraction or stopping the burning of lignite would mean that GHG emissions from energy production in Slovakia would decrease by 7%.

TAXES ON MOTOR OILS

The tax on petrol had already been introduced in 1905 in the United Kingdom. It is apparent that, historically, this tax emerged neither as a carbon, nor a green tax. Despite that, it may be considered a green tax, or a carbon tax, as it does precisely what is expected of such taxes. It decreases the demand for fuels or motivates producers to produce more economic motors/vehicles. The question is to what extent this tax finance investments related to land transport, and how much of a carbon tax it is.

In 2019, the expected budget expenditure on investments and operation costs connected to land transport and infrastructure

> THE TAXES THAT ARE LABELLED AS "CARBON TAXES" OR "ENVIRONMENTAL TAXES" ARE USUALLY TAXES ON ELECTRICITY, A COAL TAX, AND A GAS TAX

Table 3: Fees and other payments paid by drivers

Type of fee/tax	The amount collected in 2018, in million EUR
Road toll[16]	124.0
Vignette	76.3
Vehicle tax	167.6
Total	367.9

Source: Annual report NDS 2018[17], Public Sector Budget Proposal 2020-2022[18]

> THE GOVERNMENT HAS LONG PREFERRED THE "SOCIAL" GOAL, PRESERVING 1,800 MINERS' JOBS (PLUS ANOTHER 1,700 ABOVE THE GROUND EMPLOYEES) OVER ELIMINATING THE HEALTH AND ENVIRON-MENTAL IMPACT OF THE MINING

(EU funds excluded) were EUR 368 million[15]. At the same time, motorists were charged for fees connected to the use of road infrastructure: [See: Table 3].

Although it may appear that the Slovak government plans its expenditure on road infrastructure based on income, it is just a coincidence. The revenue report does not yet include revenue from vehicle registration fees, which the government does not disclose. These are graded based on engine power and thus, represent another form of an environmental tax.

Since motorists will cover expenditures on infrastructure through different taxes and fees, it could be argued that the tax on motor oils as a whole has the character of a carbon tax.

[15] The infrastructure expenditures ofmunicipalities are financed from the personal income tax (PIT).

[16] Net revenues from the toll system.

[17] https://ww-w.ndsas.sk/uploads/media/18520d89b73d0664afe131df383a8f83e00458e5.pdf

[18] Public Sector Budget Proposal 2020-2022. Available [online]: https://www.mfsr.sk/sk/financie/verejne-financie/rozpocet-verejnej-spravy/#collapse-325601582823933291

Table 4: Calculation of the mineral oil tax per CO_2 tonne

	Kg CO_2 per liter	Levied tax in EUR	The amount of fuel consumption in litres	The volume of CO_2 emitted in tonnes	Calculated payment per tonne of CO_2 in EUR
Diesel	2.685	873,823,500	2,374,520, 380	6,375,587	137.1
Petrol	2.338	370,903,500	720,900,875	1,685,466	220.1

Source: Tax report (2018), own calculations

In 2018, the Slovak state collected EUR 1.27 billion from the mineral oil tax. Approximately 70% represents a tax on diesel[19], 30% is a tax on petrol, and less than 1% is a kerosene tax on LPG and CNG[20]. Diesel is subject to the rate of EUR 0.386 per litre, whereas petrol is taxed at the rate of EUR 0.5145 per litre.

The recalculated rate is significantly higher than the current price of emissions permit of tonne of CO_2[21], which is EUR 23. It is significantly higher than the modelled price, which is considered by Nordhaus in his DICE model, according to whom the value of USD 31 should be enough for maximum of 3.5C warming in 2100[22].

An objection to this recalculation could be the claim that resources from European funds, which replace domestic financing, are the cause of the low national investment in infrastructure. Let us ignore the fact that the point that EU funds should not be used to replace the member states' own expenditure, but rather to promote investments that would not otherwise have occurred. Even the assumption that half of the excise tax on mineral oils collected will be used for road construction and maintenance, or to compensate for the impact on health from transport emissions, an effective carbon tax will be EUR 68 per tonne of CO_2 for diesel, or EUR 110 per tonne of CO_2 for petrol.

The idea that the mineral oil tax finances environmental projects does not influence the fact that the tax already significantly reduces fuel consumption. This is only relevant from the point of view of fiscal neutrality.

EMISSION TRADING SYSTEM

Emission Trading System (ETS) is based on the principle of a gradual (1.74% per year) decrease in total emissions of subjects, which are obligatory parts of the market with emissions. The cap is given on the whole EU level. Each subject either receives a specific number of permits for free (free allocation covers approximately 43% of emissions) or it may acquire them in auctions. In the case a given subject emits less carbon in a given year, it may store its permits for the allowed volume for the future,

[19] 88% of diesel is used in road transport, 7,3% on Railway, and 2% in water transport. See: http://www.svetdopravy.sk/moznost-podpory-refundacie-spotrebnej-dane-z-mineralnych-olejov-na-uzemi-slovenskej-republiky/ [in Slovak]

[20] Tax Report (2018). Available [online]: https://www.mfsr.sk/sk/financie/institut-financnej-politiky/publikacie-ifp/ekonomicke-analyzy/50-danovy-report-slovenskej-republiky-2018-oktober-2018-2.html [in Slovak]

[21] The price of permits is determined by available quantity and limited number of sectors which must use them.

[22] Nordhaus, W. D. (2017) *Projections and Uncertainties about Climate Change in an Era of Minimal Climate Policies*, Working Paper No. 22933. Available [online]: http://www.nber.org/papers/w22933

or sell the remaining allowances to someone who wants to emit more than they were assigned.[23]

The system thus includes a market incentive factor – investments into lower emissions are rewarded by income. Therefore, the emissions with the lowest cost of reduction are reduced first (most effective). The revenues from primary auctions are the income of the member states, which should use them for green projects. The third phase of trading is currently underway, with more than 11,000 trading entities responsible for 45% of greenhouse gas (GHG) emissions of the EU + Norway, Iceland[24].

This system should reduce emissions of selected sectors by 21% by 2020, as compared to fifteen years ago. The following issues from specified sectors are included in trading:

- **carbon dioxide (CO_2)** from power and heat generation:
  - energy-intensive industry sectors including oil refineries, steel works, and production of iron, aluminum, metals, cement, lime, glass, ceramics, pulp, paper, cardboard, acids, and bulk organic chemicals;
  - commercial aviation (until December 31, 2023, the EU ETS will apply only to flights between airports located in the European Economic Area (EEA));
- **nitrous oxide (N2O)** from production of nitric, adipic and glyoxylic acids, and glyoxal;
- **perfluorocarbons (PFCs)** from aluminum production.

> THE IDEA THAT THE MINERAL OIL TAX FINANCES ENVIRONMENTAL PROJECTS DOES NOT INFLUENCE THE FACT THAT THE TAX ALREADY SIGNIFICANTLY REDUCES FUEL CONSUMPTION

Each allowance permit equals to one tonne of carbon dioxide (CO_2), or the equivalent amount of two more powerful greenhouse gases, nitrous oxide (N2O) and perfluorocarbons (PFCs). Small businesses are not included in trading procedures.

According to the European Commission (EC, 2019), the total number of allowances in circulation (TNAC) amounted to EUR 1.65 billion in 2018. Despite fewer EU emission allowances (EUAs) being auctioned in 2018 than in 2017, revenue from auctions increased from EUR 5.5 billion to EUR 14.1 billion. This hike reflects the increase in the average allowance price, from EUR 5.8 per tonne in 2017 to EUR 15.5 per tonne in 2018.

[23] Except for these two options, the polluter can purchase international credits from carbon sink projects (e.g. certified tree planting).

[24] https://ec.europa.eu/clima/policies/ets_en

To make sure that demand for allowance permits is always higher than the supply, Market Stability Reserve (MSR)[25] was established as of January 2019. The European Commission accumulates allowances (e.g. by reducing the amount to be auctioned), so that demand always exceeds supply. In May 2019, it reached a total of 397 million allowances (total of 1.65 billion of EUA were circulating in 2018), which will be placed in the MSR between September 1, 2019 and August 31, 2020[26].

This way, the regulator can gradually increase the price. Even in the fourth trading phase (2021-2030), member states will have the opportunity to acquire almost a half of allowance permits for free in order to achieve competitiveness of countries which could be severely hit by CO_2 reductions and, at the same time, to discourage businesses from reallocating production to countries (carbon leakage), where greenhouse gasses are not paid for/are not taxed. The volume of permits will decrease by 2.2% per year. However, sectors are not equal in access to free allowances – for example, the aviation sector will receive 82% of free allowances, others must be bought[27].

However, trading with allowance permits does not automatically mean that emissions are in decline in a given sector. The aviation sector can be used as an example, since in this sector, emissions have increased by almost 25% in four years, despite the limited volume of allowances. This is also due to the fact that airlines receive more than 80% of the allowances for free.

Electricity and heat production do not receive any allowances for free. The industrial sector started at 80% free acquisition, and by 2020, it will end at 30%. By 2030, when emissions are to decrease by 43% compared to 2005, there will be another 6 billion allowances allocated for free.

> TRADING WITH ALLOWANCE PERMITS DOES NOT AUTOMATICALLY MEAN THAT EMISSIONS ARE IN DECLINE IN A GIVEN SECTOR

The total volume of emissions of Slovak producers in ETS has reached 22 million tonnes (verified emissions) of CO_2 equivalent. At the same time, the government received freely allocated allowances equal to 13.6 million tons. The share of free permits reached 62% compared to verified emissions [See: Figure 1].

From the Slovak perspective, it is interesting that due to the high historical basis on which the amount of allowance permits is allocated, the government receives significantly more allowances than the verified emissions in a given year (28 versus 22.2 million tonnes of CO_2). In 2018,

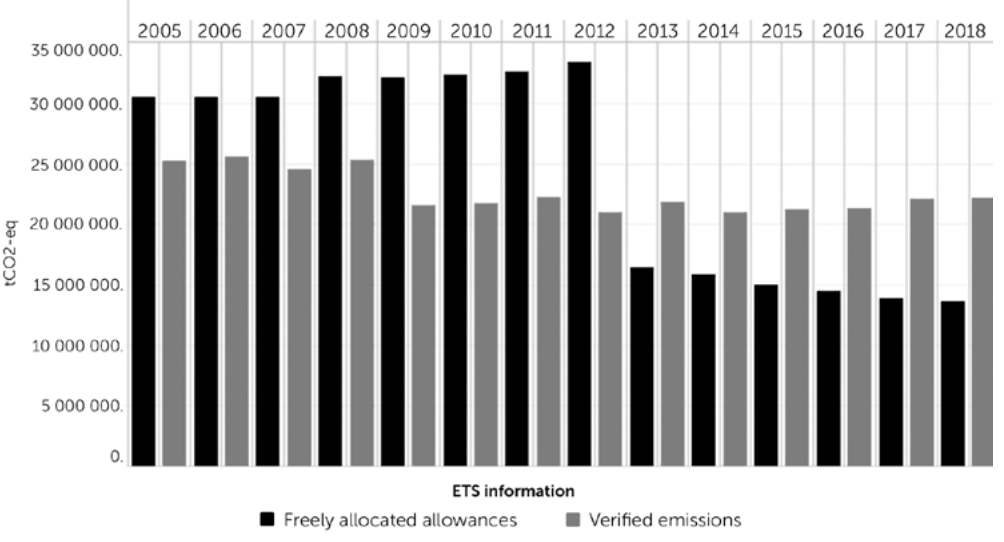
[25] https://ec.europa.eu/clima/policies/ets/reform_en

[26] Ibid.

[27] https://ec.europa.eu/clima/policies/ets/allowances/aviation_en

[28] EU Emissions Trading System (ETS) data viewer. Available [online]: https://www.eea.europa.eu/data-and-maps/dashboards/emissions-trading-viewer-1

Figure 1: Verified emissions in tons of CO_2 eq. and freely allocated allowances in Slovakia



Source: European Environmental Agency[28]

13.7 million tonnes were allocated for free. According to available data, the government sold allowance permits for EUR 230 million[29]. Current legislation prescribes that only 35% of the proceeds of auctions should be used to finance green or environmental projects[30].

HOW MUCH COULD WE PAY FOR CARBON? CARBON TAXES AROUND THE WORLD

Carbon taxes were introduced in dozens countries, but the significance of these taxes can be derived from the proportion of emissions that are taxed. A recent overview published by the International Monetary Fund (2019) shows that Scandinavian countries and Ireland are the leaders in Europe in this respect[31].

Carbon taxes cover 40 to 48% of all greenhouse gas emissions, up to 63% in Norway. In the EU, the ETS system covers another 45% of emissions, and thus countries such as Sweden and Ireland achieve together with emissions taxed by carbon tax 80-90% coverage. Meanwhile, Japan has the largest share of emissions included in taxation (68%), but the permit trading system does not work there. In Norway, emissions burdened by taxes are most probably also subject to the mandatory trading system. Sweden has a special position, because it receives more free permits from the scheme than the companies involved emit. The actual volume of emissions in the system has not declined since 2005.

[29] https://euractiv.sk/section/energetika/news/brusel-ziada-od-statov-cast-vynosov-z-predaja-emisii-slovensko-vaha/ [in Slovak] This would correspond with a price of EUR 15.4/ tCO_2 for all sold allowances, excluding those allocated for free..

[30] https://www.energie-portal.sk/Dokument/vynosy-z-predaja-kvot-co2-mozu-zadotovat-zelenu-energiu-a-domace-uhlie-navrhuje-ziga-105772.aspx [in Slovak]

[31] https://www.imf.org/en/Publications/FM/Issues/2019/09/12/fiscal-monitor-october-2019

Table 5: Structure of GHG emissions in Slovakia

Year 2018	Million tonnes CO_2 eq.
Total greenhouse gases emissions	43.2
Emissions included in the ETS	22.2
Emissions from mineral oil	8.1
Taxable emissions (1-2-3)	12.9

Source: Slovak Hydrometeorogical Institute; GHG Inventory 2018

The missing 10% from the total coverage may be the result easily caused by political reasons (various exemptions for households or entrepreneurs), or by the fact that it is administratively difficult to oversee and allocate emissions, which is mostly the case in the agricultural sector.

With respect to rates, there are huge differences between countries. The carbon tax per tonne of CO_2 ranged from USD 3 in Japan to USD 127 in Sweden. The IMF estimated the average world price at USD 2 per ton. To illustrate, 95% of the carbon tax revenue in Sweden comes from taxing motor fuels, which are also subject to an energy tax, in addition to a carbon tax[32].

THE VOLUME OF EMISSIONS IN SLOVAKIA

The latest complete data on emissions in Slovakia are from 2018. According to these, the atmosphere was "enriched" by Slovak 43.2 million tons of CO_2, while nature sequestrated 5.7 million tons of CO_2[33].

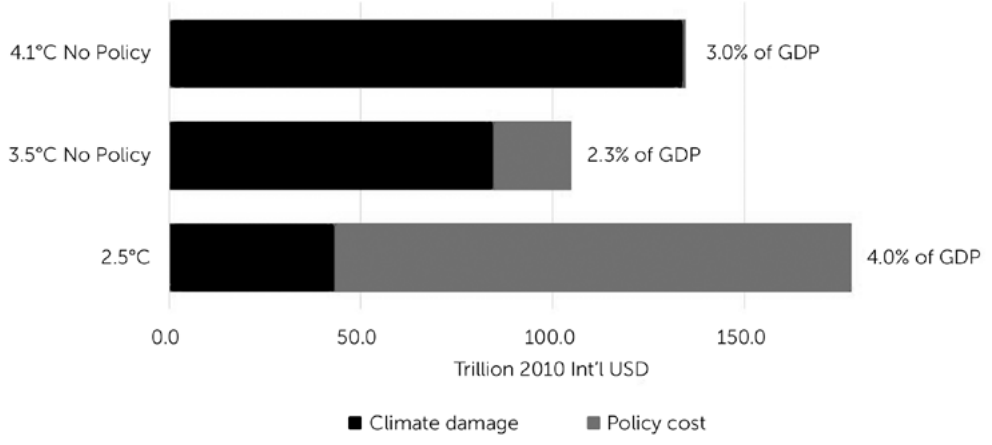
The carbon tax should primarily apply to emissions that are not part of the allowance-trading scheme (ETS), which amounted to 22.2 million tonnes. Also, emissions from transport, which are already burdened with a quasi-carbon tax, must also be deducted. The simplest conversion that may be made is based on the assumption that the Slovak state will be able to tax all residual emissions with a carbon tax. This recalculation represents something as a "ceiling" or the maximum revenue that a government can obtain by imposing a carbon tax [See: Table 5].

> CARBON TAXES COVER 40 TO 48% OF ALL GREENHOUSE GAS EMISSIONS, UP TO 63% IN NORWAY

[32] https://www.government.se/48e9fb/contentassets/18ed243e60ca4b7fa05b36804ec64beb/lessons-learned-from-25-years-of-carbon-taxation-in-sweden.pdf#mce_temp_url#

[33] https://ghg-inventory.shmu.sk/documents.php?download=757

Figure 2: Climate and Climate Policy Cost across 21st Century



Source: Bjorn Lomborg based on Nordhaus (2018) calculation[34]

The question remains whether we should include the volume of traded emission permits, which are provided free of charge. This is a fundamental question, as these permits would increase the tax base by more than 100%. However, as the EU envisages maintaining a free allocation until 2030, due to worries about carbon leakage impacting developing countries, these should not be included in the taxable base.

> THE CARBON TAX PER TONNE OF CO_2 RANGED FROM USD 3 IN JAPAN TO USD 127 IN SWEDEN

PRICE: THE DYNAMICS AND POTENTIAL TAX REVENUE

Determining the optimal tax rate is not an easy feat for many reasons. Let us just stay with the first issue, which is to determine the aim of the tax. Should the goal of a drop in emissions be only to lower global temperature rise, regardless of cost? Or should it be a decrease in emissions, but only with acceptable loss of wealth, or economic growth? A good illustration of this dilemma is the mentioned DICE model [See: Figure 2].

Of course, the more ambitious the target, the higher the carbon tax would have to be. Nordhaus himself talks about USD 31 to 50.

For the purposes of this analysis, we have decided to use the current price of the CO_2 emissions permit assuming no effect on amount of emissions. As this is a static assumption, we have also included prices of CO_2 for which the International Monetary Fund made impact calculations. This means that in line with the carbon tax assumptions, the rising prices will force consumers to reduce consumption or seek

Table 6: Carbon tax revenues at various prices

Year 2018	Million tonnes CO_2 eq.
Total greenhouse gases emissions	43.2
Emissions included in the ETS	22.2
Emissions from mineral oil	8.1
Taxable emissions (1-2-3)	12.9

Source: Own calculations

alternative options. In its analysis, the IMF worked with conversion values[34] of EUR 31 and EUR 62 (at the date of publication of the analysis). According to the study, emissions in 2030 would fall by 14% or 21% [See: Table 6].

However, the calculation featured in Table 6 assumes that all residual emissions would be subject to a carbon tax. As the current practice of several European countries shows, 10% are not taxed, so the expected return would decrease accordingly. Methodologically, it would be correct to deduct existing carbon taxes, but this would be more of a cosmetic treatment, given their volume of EUR 28 million.

To illustrate the impact of the tax, let us calculate the carbon tax for a household, which uses natural gas to heat, cook, and warm water. Emissions of electricity are calculated on the basis of the national average CO_2 load. When focusing on the carbon tax, VAT – which also applies to consumption taxes – was not included [See: Table 7].

If the household were using hard coal for heating instead of natural gas, the carbon tax load would be 1.7 times higher.

THEORETICAL DECREASE OF TAX REVENUES

The abovementioned calculations may now be used to determine the potential reduction in direct taxes. The key question is which taxes will reflect the proposed reductions. Some economists argue that the highest potential economic growth can be brought about by a reduction in corporate income taxes[36]. Given that the Emissions Trading Scheme already allocates free allowances to the most affected companies today, compensation in this case is not necessary.

[34] MF (2019) *Fiscal Policies for Implementing Paris Climate Strategies*. Available [online]: https://www.imf.org/en/Publications/Policy-Papers/Issues/2019/05/01/Fiscal-Policies-for-Paris-Climate-Strategies-from-Principle-to-Practice-46826

[35] https://twitter.com/BjornLomborg/status/1102627948962697221

[36] A concept economists use to estimate the excess burden of taxes is the Marginal Cost of Public Funds (MCF). Ferede and Dahlby (2016) describe the MCF as a "measure of the loss incurred by a society in raising an additional dollar of tax revenue" (p.1). In 2013, Ferede and Dahlby (2016) estimated that the MCF in BC for the corporate income tax (CIT) was 3.19 and for the personal income tax (PIT) it was 2.86. That means that if BC raised its statutory CIT rate to raise an additional dollar of revenue, holding all else equal, the additional cost over and above the government revenue raised would be USD2.19. These figures for BC also show that it is currently more costly to raise an incremental dollar of revenue in the province through a CIT increase than PIT increases. On tax efficiency, see also Clemens, Veldhuis, and Palacios (2007). QUated from: https://www.fraserinstitute.org/sites/default/files/examining-the-revenue-neutrality-of-bcs-carbon-tax.pdf

Table 7: Annual carbon tax paid by a regular household

Family house, annual consumption	kwh	tCO_2	
Natural gas	17.500	3.3	
Electricity	1.500	0.2	
Total		3.5	
Carbon tax rate	**EUR 23**	**EUR 31**	**EUR 62.2**
Carbon tax annually	80.5	108.7	217.3
Monthly in EUR	6.7	9.1	18.1

Source: Own calculations

The biggest increase in the burden will be on households, who will pay more for gas, electricity, or agricultural products. Given the transfer of total amount of personal income tax to the budget of the local government, a reduction of this tax is not an appropriate tool – it would have to be supplemented by other transfers. Therefore, a reduction of social security contributions shall be considered. Their collection and usage do not involve the private sector, as in the case of health care, and subsidizing the Social Insurance Agency from the budget has a long tradition in Slovak public administration [See: Table 8].

If this reduction in rates were reflected as an increase in the employee's net income with a salary of EUR 1,000 per month, there would be an increase in income of EUR 17. Such an increase could cover the additional cost of the modelled carbon tax for a household with a family home, at the highest rate of carbon tax it would be only one euro less.

However, the fact that a low-income household with an income of EUR 650 has relatively low contributions paid and thus net income will increase by only EUR 11 shall also be taken into account. While this would still be enough to cover the tax rates of EUR 23 and EUR 31, it raises the question of whether it is desirable to provide compensation of EUR 28 to a family with an income of EUR 2,000 per month, when both households have the same gas consumption. Reducing the rate will thus give a different advantage at the same level of pollution.

Equally, higher increases in energy will affect pensioners' households and households without regular income, which do

> IN LINE WITH THE CARBON TAX ASSUMPTIONS, THE RISING PRICES WILL FORCE CONSUMERS TO REDUCE CONSUMPTION OR SEEK ALTERNATIVE OPTIONS

not pay any social security contributions. An alternative in this case could be the introduction of a reduced VAT rate, but this means failing to decrease direct taxation [See: Table 9].

A lower VAT rate of 18.4% would generate monthly savings of around EUR 5 with the average pension benefit of EUR 460. Even in this case, however, the rate cut does not guarantee an even distribution of benefits, so it is quite likely that the government might make direct grant transfers. This consideration also points to the fact that the effective achievement of the fiscal neutrality is not at all easy.

FISCAL NEUTRALITY

Sweden currently has the highest carbon tax rate – EUR 114 per tonne of CO_2. This rate has been gradually increased since 1991, while taking compensatory measures to reduce the impact of raising the tax – specifically, for low-income groups. The introduction of a carbon tax was accompanied by a reduction in energy taxes, as well as direct taxes, on labor and capital. Higher transfers to low-income individuals should have reduced energy poverty. The most affected industry faced slower tax growth, but the rates have already been equalized. The rate was also widely discussed with all involved parties.

The next case of a country that has introduced a "textbook" carbon tax is the British Columbia Province of Canada. Unlike Sweden, here the government has openly declared the goal of fiscal neutrality. Other taxes were reduced by an increase in carbon tax revenues. The tax was introduced in 2008 at USD 10 per tonne and it reached USD 40 per tonne in 2019. In 2021, Canada is to pay a federal carbon tax of USD 50 per tonne. The tax was imposed on 70% of the country's emissions. As in Sweden, a carbon tax was introduced in addition to the motor fuel tax. Currently, the total tax rate in the majority of the country is 24 cents per litre of petrol, and 25 cents per litre of diesel. In Vancouver, these rates are at 36 and 38, which means 26 eurocents. A half, compared to the excise duty in Slovakia. According to the available estimates, the tax did not reduce total emissions, but due to a rising population, the emissions of

> SWEDEN CURRENTLY HAS THE HIGHEST CARBON TAX RATE – EUR 114 PER TONNE OF CO_2

Table 8: Potential impact of carbon tax revenues on payroll taxes

Rate of the carbon tax in EUR/tCO_2	23	31	62
Decrease in revenues of social contributions in %	5.9%	7%	12.6%
New contributions rate paid by an employee in % (nowadays 9.4%	7.3	7.0	5.0

Source: Own calculations based on the expected revenues from the social insurance for 2019 in Slovakia

Table 9: Revenue neutral decrease of VAT rate

Rate of carbon tax in EUR/tCO_2	23	31.045	62.09
New basis for the GDP rate (nowadays 20%)	18.4	18.1	16.6

Source: Own calculations based on public VAT revenues 2019

CO_2 per capita decreased from 15,000 to 13,000 tonnes (8,000 in Slovakia)[37].

In order to prevent energy poverty, the British Columbia government lowered the lower two brackets of the personal income tax rate and introduced the so-called Low Income Climate Action Tax Credit. The companies received abolished sales tax on the purchase of electricity.

However, the government has recently abandoned the idea of a revenue-neutral tax, and uses part of the carbon tax revenue to finance green technologies.

This is probably the most fatal problem of this promise. Carbon tax revenues may be unstable. Consumption elasticity may be lower than economists estimate, and meeting the emission reduction target may require a rate increase, as we see in Sweden and British Columbia. Increasing carbon tax revenues will require an increase in the amount of other tax revenues to offset the effects of a carbon tax. The government may not like this, of course, as it will reduce its room for maneuvering to meet its priorities.

However, the systemic carbon tax problem needs to be mentioned. Without a multinational application of this tax, especially in G20 countries (including the United States, India, and China), Slovakia's emission target can be met, but the strategic objective of slowing warming remains unfulfilled. For this reason, any carbon tax proposal should also be accompanied with alternative approaches that take into account the international factor. Adaptation can be cheaper than blowing against the wind.

CONCLUSIONS

From the calculations of carbon tax offsets and the evolution of carbon tax in several countries, the following characteristics of the fiscal neutrality promise of carbon tax may be identified:

1) If the carbon tax will not be applied across the board, covering all emissions, it will fail to meet the goal of making the most efficient technologies winners of the competition for optimal technology. This is true both in Slovakia and throughout the world.

2) The commitment to fiscal neutrality can be easily changed, which will have a negative effect on the country's slower economic growth and reduce competitiveness. The result will be a higher tax burden.

> CARBON TAX REVENUES MAY BE UNSTABLE

[37] http://www.env.gov.bc.ca/soe/indicators/sustainability/ghg-emissions.html

> ADAPTATION CAN BE CHEAPER THAN BLOWING AGAINST THE WIND

3) Carbon tax revenues in Slovakia are limited due to the already existing high taxation of fuels and relatively low amount of emissions.

4) The expected tax revenue is relatively low at the carbon tax rate set at the current level of the permits price. If the compensation were secured by reducing the tax burden on labor, this would have fallen from 42.9% to 41.7% at a wage of EUR 1,000. The decrease would be more pronounced at the highest rate of the carbon tax, with the tax burden falling to 40.3%.

These risks and negative impacts of the carbon tax could be mitigated by the following measures:

a) fiscal neutrality to be monitored by an independent body – for instance, the United Kingdom has respected UK Budget Board Green Fiscal Commission;

b) carbon tax should be set as a floor – coordination with EU ETS permits pricing is needed;

c) the needs of vulnerable economic sectors and households must be addressed; the Slovak government has large revenues from the sale of emission allowances which it should use to offset the effects of the carbon tax. Any other direct subsidies for green technologies distort the key advantage of a carbon tax, not the government, but market competition should select the winning technologies.

Carbon tax is often presented as an easy win-win solution for controlling the growth of GHG emissions. Nevertheless, once we start to deal with the barriers of practical implementation of this tax, we realize that the tax is not such a clear win.

Just like any other tax, it generates negative impacts whilst sufficient decline in emissions occurs only when set at high rates, and globally. Application of the rule of a fiscally neutral implementation of this tax may eliminate the resistance generated by the general public. Nevertheless, this rule opens the question of wealth redistribution and risk for taxpayers that politicians will not stick to their promise and increase the overall tax burden.

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