Development of Roadmap for the Introduction of a National Carbon Tax in North Macedonia

Project implemented by the Center for Clean Air Policy

Carbon Tax Roadmap

FINAL

2021

This document is prepared within the project “Macedonian enhanced Nationally Determined Contributions on Climate Change” implemented with financial support from the United Nations Development Programme, within the Climate Promise Initiative.

Acknowledgments

This Carbon Tax Roadmap was produced by the Center for Clean Air Policy within the project "Macedonian enhanced Nationally Determined Contributions on Climate Change" implemented with financial support from the United Nations Development Programme, within the Climate Promise Initiative. The Roadmap was authored by Stacey Davis, Aleksandar Dedinec and Stan Kolar, and offers recommendations for how the country could advance a carbon tax to meet its climate and EU accession policy goals. An accompanying Carbon Tax Assessment Report presents the results of modeling scenarios to inform the design of a carbon tax in North Macedonia.

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Executive Summary

A CO_2 tax offers a way for the Macedonian government to take advantage of market forces to encourage a broad set of low-cost emissions reductions from across the energy sector. A CO_2 tax would enable the government to set the desired market signals right away and allow for a gradual increase in the tax in support of Macedonian goals related to the Paris Agreement, Energy Community and EU accession. Implementing a tax would build experience in the country with carbon pricing and afford time to set up systems and build capacity needed to join the EU ETS at a later date.

What sources and emissions should be covered by a carbon tax?

Because of the dominant role of the energy-related GHG emissions in overall emissions and the ability to measure emissions with a relatively high level of accuracy, it is recommended to first introduce a carbon tax in the energy sector-more specifically, in the *electricity* and *heat production industry* and *transportation sectors*. The tax should cover all sub-sectors of the energy sector at the same CO_2 tax rate in order to avoid market distortions and capture more mitigation opportunities. Further, as over 96% of greenhouse gas emissions in the energy sector are CO_2 emissions, it is recommended that *taxation should only address CO_2 emissions* in order to simplify the process.

What legal authority should be used to establish a CO2 tax?

It is recommended to establish a CO_2 tax *via the existing excise tax authority*. It is preferable to make use of the excise tax as it already applies to all fuels, so the main change required would be a change in the level of the tax according to the relative CO_2 emission factors of the different energy sources. The second-best option would be to *make use of the existing environmental tax*. However, this would require changing the tax authorization to add excluded fuels in addition to changing the level of the tax to be consistent with CO_2 emissions factors. Under either authority, the tax would be applied upstream, to fuel producers and importers. This is a straightforward way to introduce the tax in a way that covers all fossil fuels. In this way, the value of the tax would be passed through to energy consumers, encouraging efficiency improvements and shifts to lower-carbon energy sources.

How should Macedonia set the carbon price?

According to the analysis, it is recommended to introduce a carbon tax that will *start at around 8 EUR/tCO_2 and reach 28 EUR/tCO2 in 2030*. This tax level would make substantial progress towards reaching the overall national climate goal set under the Paris Agreement for the energy sector. To prevent an increase in power imports from power plants outside of the country, Macedonia should be proactive in working with neighboring Energy Community countries to adopt a comparable carbon price. It is suggested that a clear carbon price trajectory be set up front. This would provide certainty to industry on the level of the carbon tax and avoid an ad hoc approach that could be subject to political pressures.

What should Macedonia do with the revenues generated from a carbon price?

It is estimated that the CO_2 tax will generate *revenues* on the order of *60 million EUR in 2025 and 137 million EUR in 2030*. The choice of how to use CO_2 tax revenues is a political decision. There will be a number of competing claims for these funds, so the alternatives should be weighed carefully. A few *priority uses of funds*, based on this assessment, Include: 1) rebating energy costs to protect vulnerable, low-income consumers least able to afford the cost increase; 2) devoting a portion of the funds in the early years of the program to help workers in the coal sectors transition to jobs in other industries; and 3) ensuring a level playing field for competitive industry sectors by offering funds to sources covered by the carbon tax on a comparable basis to those deemed to be at-risk for emissions leakage by the EU. Funds could also be used to increase the mitigation impact of the CO_2 tax and/or to lower the overall cost of the program.

What are the key steps needed to implement a carbon tax?

Macedonia should *first* design the carbon tax, including factors such as which entities should be taxed, the level of the tax, the use of revenues, and which legal authority should be used. If more information is needed to inform the design decision, depending on the questions, the lead ministries should decide whether additional modeling could be informative. The country should also initiate *engagement and communication* procedures to ensure, to the extent possible, that stakeholders are informed of the options and bought in to the solutions. Various *capacity needs* have been identified where additional support could be helpful to implement a carbon price.

1. Introduction

Over the last decade, a growing number of countries around the world have introduced systems that will put a price on carbon emissions as a way to meet climate goals at the lowest cost. There are two main approaches for introducing a carbon price: 1) charging a fee for every ton of emissions (CO2 tax), and 2) establishing an absolute limit (cap) on emissions by issuing a limited number of allowances and allowing affected sources to trade with each other (an emissions trading system, or ETS).

Each program offers advantages and disadvantages. In the case of a *CO2 tax*, a *main advantage* is that it can offer certainty on the level of the carbon price over time, providing a strong signal to investors and also ensuring there won't be unexpected price increases or price volatility. A CO2 tax is also more straightforward to implement and can often build on existing legal authorities.

In contrast, a *cap-and-trade system* offers certainty on the level of emissions to be achieved, but the CO2 price can fluctuate up or down based on supply and demand. Depending on the design and existing government capacity and infrastructure, cap-and-trade programs may require new monitoring and reporting systems, registries and trading platforms, auction systems, and government capacity to oversee these new systems and monitor compliance. Government staff and affected participants typically require special training to understand how the system works. Moreover, ETS programs often begin with a pilot phase that may not yield a meaningful carbon price.

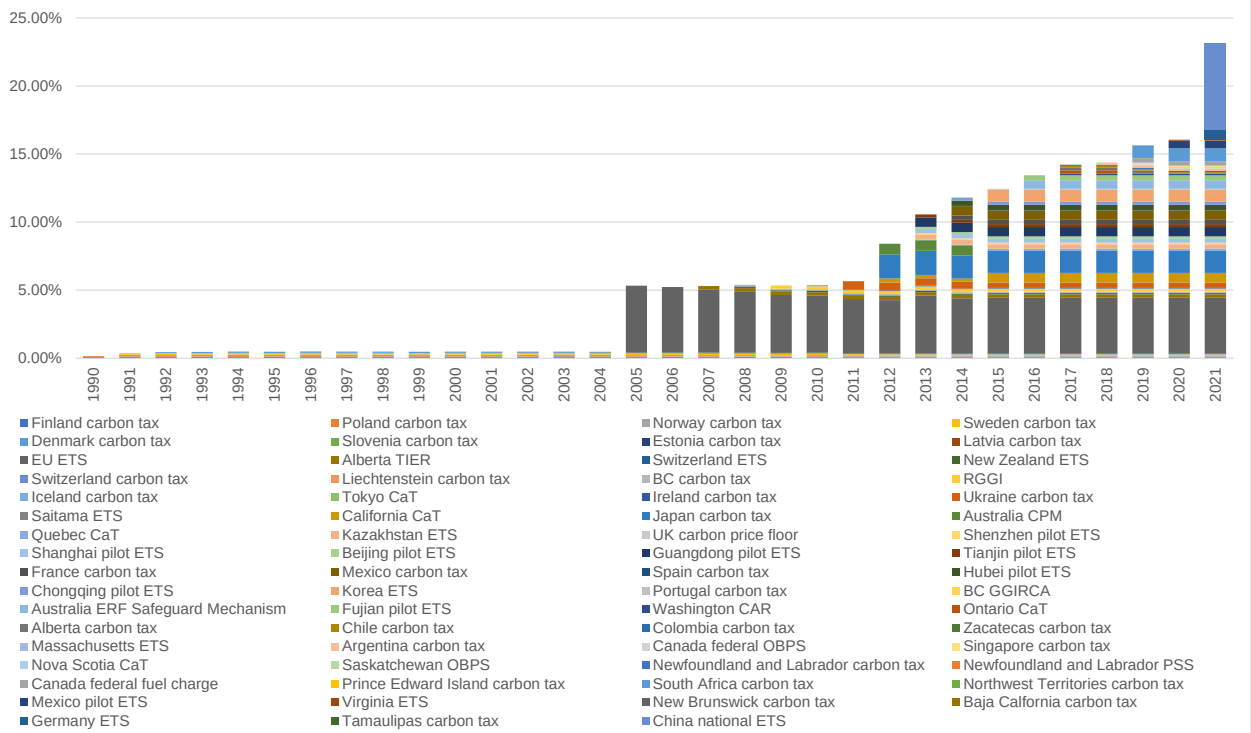
In either case, carbon pricing options rely on accurate measurements of fuels and/or emissions so that the charges are applied correctly. Most carbon pricing programs price carbon in the energy sector where such measurements are most straightforward. In many cases, carbon taxes build on existing fuel excise duties, based on the carbon content of the fuels themselves. Cap-and-trade programs often start with caps on emissions from the electricity and industry sectors.

On balance, it could make sense to start with a CO_2 tax, which could set the desired market signals right away and allow for a gradual increase in the tax in support of goals related to the Paris Agreement and EU accession. Implementing a tax would build experience in the country with carbon pricing and afford time to set up systems and build capacity needed to join the EU ETS at a later date.

1.1 International experience with carbon pricing

In 2021, 21% of global greenhouse gas emissions are covered by carbon pricing mechanisms (Figure 1). The first countries to introduce a CO2 tax were Finland and Poland in 1990. In 2005, the EU ETS system was introduced, which significantly increases the coverage of GHG emissions with carbon pricing, but is also an example for other countries in the world such as South Korea and China. Many countries have implemented both carbon pricing mechanisms -- CO2 tax and ETS. It is interesting for Europe to note that 16 countries, in addition to participating in the EU ETS system, have introduced a CO2 tax mainly for emissions and installations that are not covered by the EU ETS. Also, starting in 2021, Germany, in parallel with ongoing participation in the EU ETS, has introduced a national ETS system for emissions from heating and transport.

Figure 1: Carbon pricing at global level

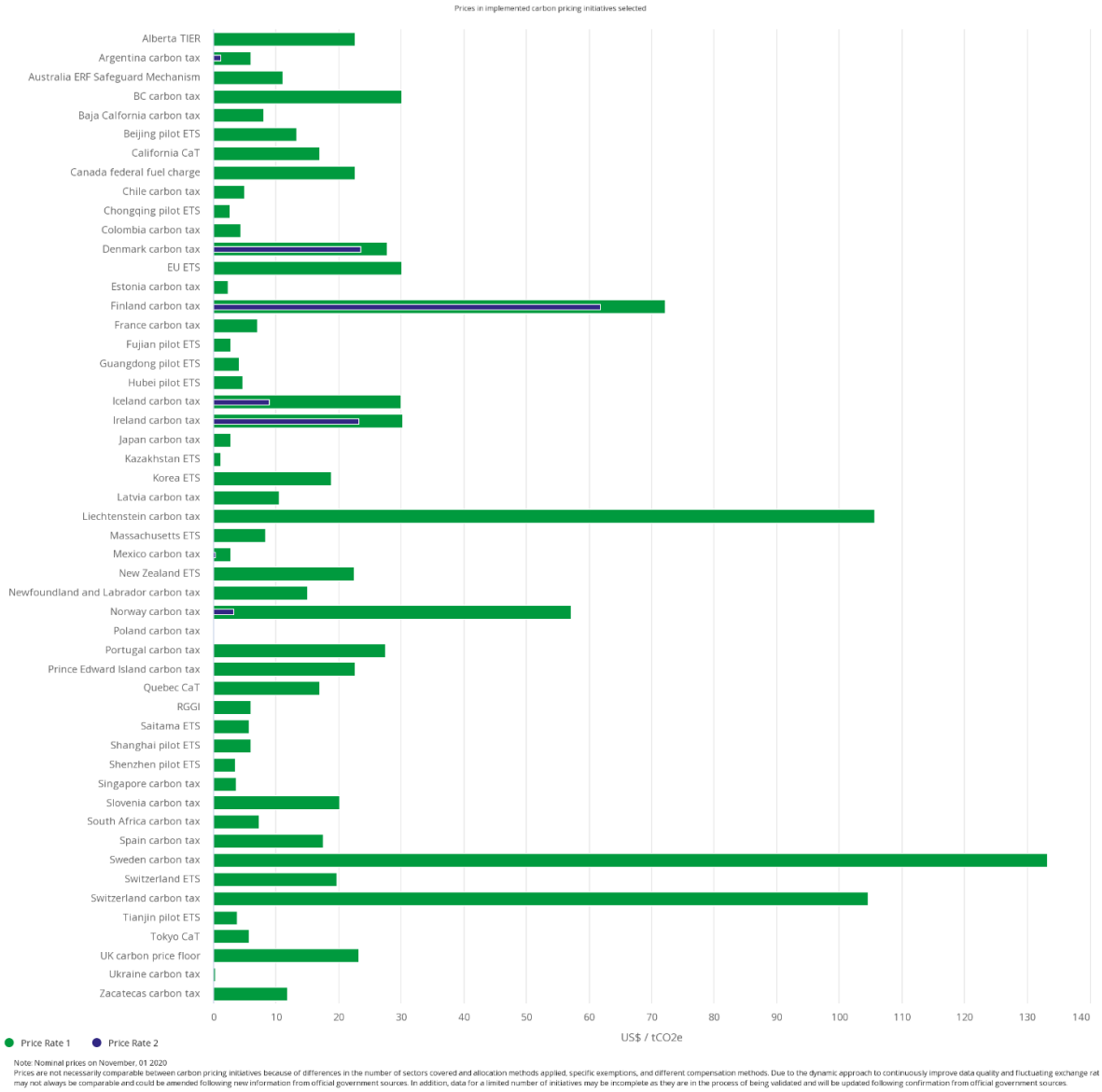


Source: World Bank - Carbon Pricing Dashboard

There are big differences in the price charged for carbon emissions across the different programs. Poland, Ukraine and Kazakhstan have the lowest carbon prices globally while Sweden, Switzerland, and Lichtenstein have the highest (Figure 2). Interestingly, although each EU member state participates in the EU ETS system, which has a single price for carbon (around 30 EUR/tCO2 in 2020, and recently reaching 45 EUR/tCO2[1]) for the power, industry and domestic aviation sectors, carbon tax rates vary substantially from one country to another. The highest carbon tax rates are in Sweden (around 110 EUR/tCO2), while the lowest are in Poland (0.09 EUR/tCO2) (Figure 3). In Germany, the Fuel Emissions Trading Act, which addresses heating and transportation fuels not covered by the EU ETS, stipulates that the price of CO2 in the national ETS starts at 25 EUR/tCO2 (2021), and in 2025 the minimum price will be 55 EUR/tCO2. The EU country that is closest to Macedonia and has introduced a CO2 tax is Slovenia, where it is around 17 EUR/tCO2. There are still EU member states that have not introduced a carbon tax. Montenegro is the first Energy Community country to introduce a carbon price in the form of a cap-and-trade system. Montenegro's program covers industrial and energy plants and includes a minimum auction price of 24 Euros per ton.

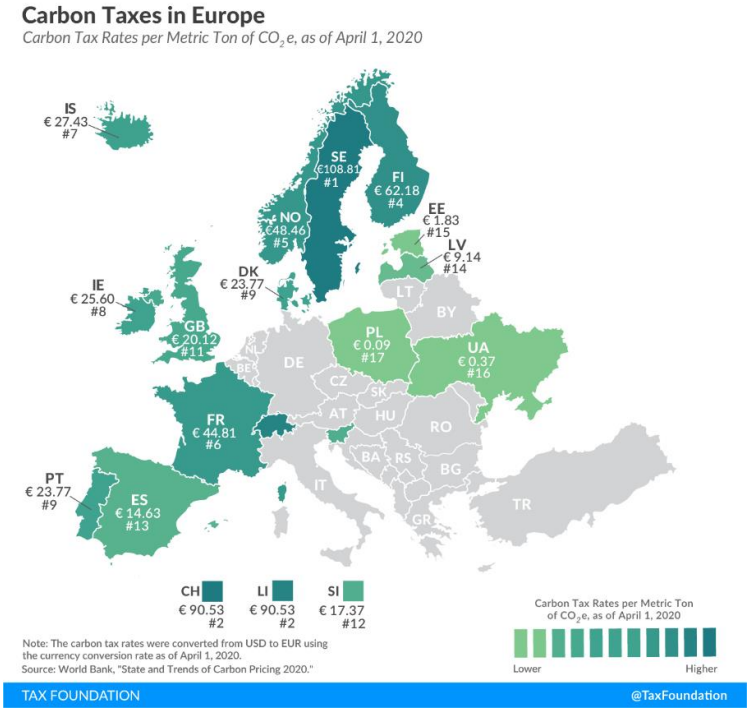
[1] Chestney, Nina. EU carbon price hits record high above 45 euros a tonne. Reuters. April 20, 2021. https://www.reuters.com/business/energy/eu-carbon-price-hits-record-high-above-45-euros-tonne-2021-04-20/

Figure 2: Carbon prices at a global level



Source: World Bank - Carbon Pricing Dashboard

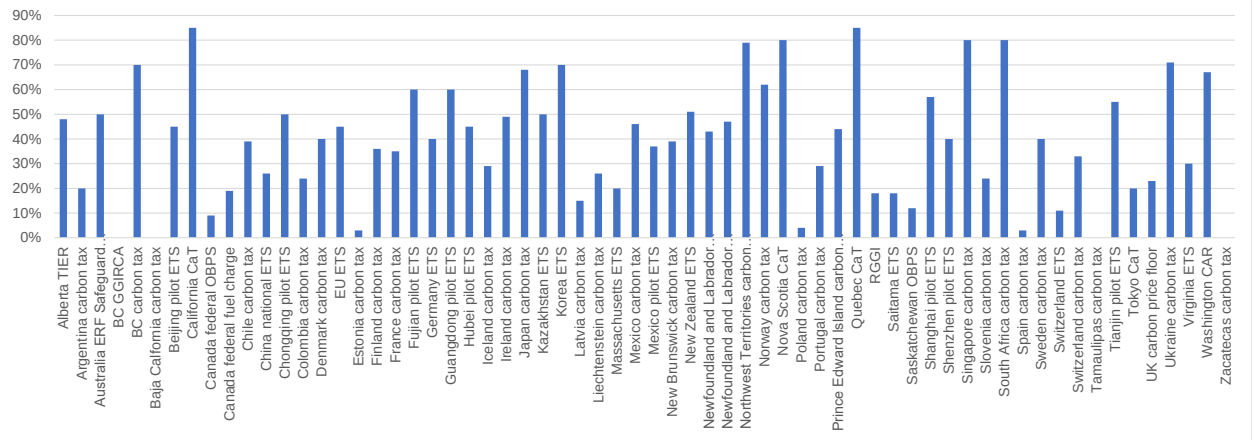
Figure 3: Carbon taxes in Europe



Source: Tax foundation, https://taxfoundation.org/carbon-taxes-in-europe-2020/

The scope of emissions covered by carbon pricing mechanisms also varies from one country to another. The EU ETS, for example, accounts for around 45% of emissions in the EU (Figure 4). In addition, national carbon pricing mechanisms help expand the coverage. For example, the national ETS in Germany covers 40% of emissions, and the national carbon taxes in Norway, Sweden and Slovenia cover 62%, 40% and 24% of emissions, respectively.

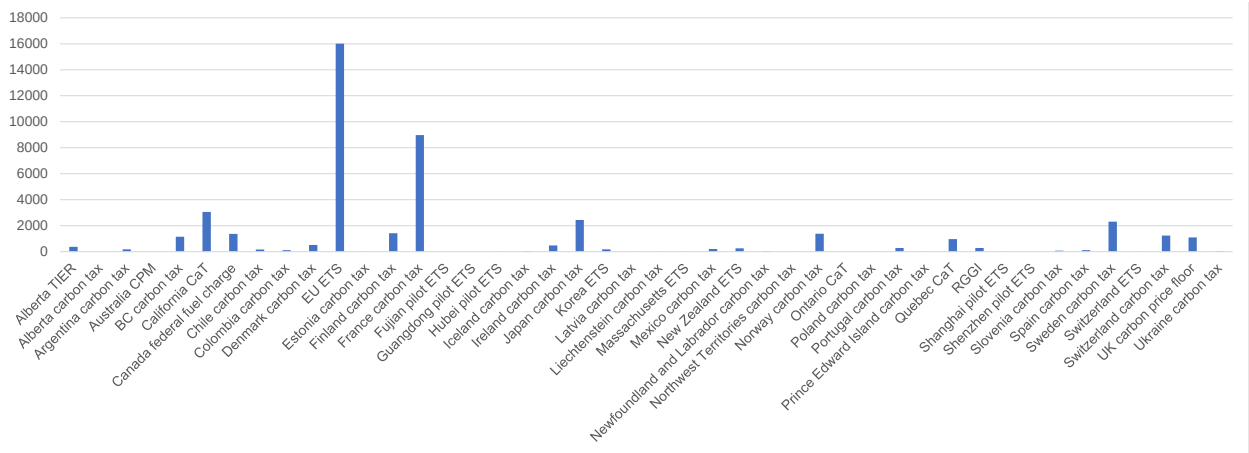
Figure 4: Share of jurisdiction's GHG emissions covered



Source: World Bank - Carbon Pricing Dashboard

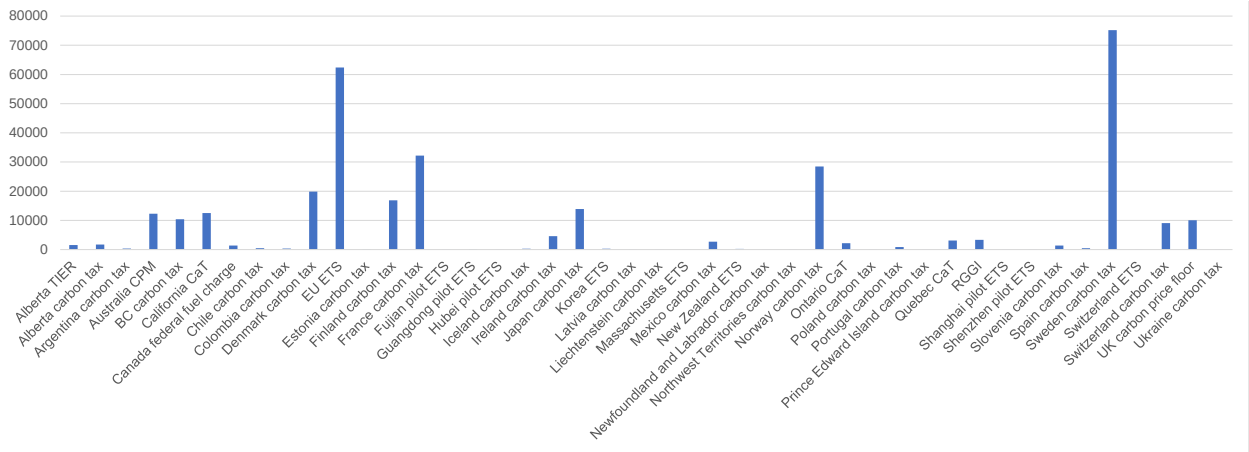
A carbon price imposes a cost on users of energy, but also raises revenues that can be used to advance national policy objectives, including national efforts to realize climate goals. In 2019, the highest revenue is from the EU ETS system (16 billion USD) and carbon tax in France (9 billion USD) (Figure 5), and cumulatively the highest revenue is from the Swedish carbon tax (75 billion USD) (Figure 6). In general, as greenhouse gas emissions decrease, if the carbon price does not increase, the annual revenue decreases.

Figure 5: Revenue from carbon tax in 2019



Source: World Bank - Carbon Pricing Dashboard

Figure 6: Cumulative revenue from carbon tax in (1990-2019)



Source: World Bank - Carbon Pricing Dashboard

2. Steps to Create and Design a Carbon Tax

As Macedonia considers its own approach to applying a carbon tax, its leaders should consider several steps to define a viable design that will fit the domestic context. It is recommended that these steps be advanced in an iterative fashion, so that outcomes from one step inform the next, and to ensure feedback from stakeholders is considered in a meaningful way in the final assessments and tax design. The basic steps include:

- Modeling to inform the level of the tax and understand the possible impacts;
- A process to review and decide on the different design elements; and
- A process to gather input from a range of affected stakeholders.

These steps are elaborated below, along with some additional actions that are likely to be needed to bring the design to the point of implementation.

2.1 Model the likely impacts of carbon tax scenarios

A key early step should include one or more types of modeling to understand the likely implications of a carbon tax on the affected sectors and consumers and the wider economy. Two widely-used approaches include energy system modeling and economy-wide modeling, described below.

2.1.1 Energy system modeling

Due to the complexity of the energy sector, detailed energy sector modeling is recommended to inform the policy design decisions described in Section 3. Energy system models will typically include detailed assumptions about the types of energy that already exist in the country, characteristics of electricity and other energy imports, along with assumptions about population and economic growth, the impacts of existing energy policies, how these metrics fuel future energy demand, and options for new energy supply. Considering these different assumptions, it is possible to run a business-as-usual scenario that captures expected fuel use, expenditures and emissions under expected future conditions, as well as policy scenarios that capture (in this case) how different carbon tax trajectories might affect the energy system as compared to the business-as-usual scenario.

The results of this modeling should show how the introduction of one or more carbon tax designs (e.g., considering assumptions on the tax level, program coverage, regional participation, use of offsets) will affect the entire energy system, especially the level of greenhouse gas emissions, price changes at final consumers, collection of tax revenue, technology and fuel switch, etc.

This project has already evaluated several carbon tax scenarios using a detailed model of the energy system of Macedonia (MARKAL-Macedonia). See Annex 1 for a brief explanation of the model and key assumptions. With the help of this model, four main scenarios have been created, along with one sensitivity scenario. The results of these scenarios, their input data and assumptions are detailed in the accompanying Carbon Tax Assessment Report. Many of the recommendations elaborated in section 2.2 were directly informed by these modeling results.

2.1.2 Economy-wide modeling

Economy-wide modeling can also be helpful to understand how energy price increases stemming from the carbon tax might affect the broader economy, including GDP. This could be done by linking the MARKAL-Macedonia model with a computable general equilibrium (CGE) model that captures supply and demand for goods and services in the economy at large. For each carbon tax scenario modeled, energy sector outputs from MARKAL (for example, energy prices) could be input to the CGE model, and CGE model outputs (e.g., demand) would be input to MARKAL, until equilibrium is reached. Linking energy and CGE models would take advantage of the richness of the MARKAL-Macedonia platform while garnering additional policy-relevant outputs.

This is similar in some respects to the modeling that was done as part of the Macedonian Third Biennial Update Report on Climate Change (BUR) and the Macedonian enhanced Nationally Determined Contributions on Climate Change. All sectors that are part of the IPCC are involved in emission modeling until 2040. The MARKAL model is used for the energy sector, IPCC software is used for Waste and AFOLU, while a simple regression model is used for the IPPU sector. The connection of the models is done by using the same input data and the output from one model is input to another. For example, forest growth is an entry into the MARKAL model. Additionally, the growth of the industry sector from the MARKAL model is an input to the IPCC regression model.

These earlier scenarios missed key macroeconomic implications of the proposed BUR and NDC measures, and only the energy sector modeling included a financial component of any sort. Therefore, it is recommended to create or employ a model that will enable assessment of a CO2 tax and other the sector-specific policies on the broader economy. In that way, the broader economic impacts of a CO2 tax (and other sectoral policies and measures) can be evaluated. This project does not include economy-wide modeling, but development of a linked model could be considered to take the MARKAL-Macedonia carbon tax modeling one step further. Having a linked modeling platform available could also be helpful in producing the next BUR.

2.2 Assess design issues and options

The carbon tax design choices should consider that the policy aims to make substantial progress towards achievement of the national mitigation goals, facilitate future alignment with the EU ETS and minimize adverse effects on vulnerable populations and industries. *Key design issues include: tax base, point of regulation, application of the tax, tax rate, use of revenues, use of offsets, emissions quantification and reporting and penalties for non-compliance*. These design considerations are elaborated in this chapter, with special emphasis on the national context and recommendations on the manner of implementation.

Considering the authorities that could be used to implement the carbon tax, it is anticipated that *the Ministry of Environment and Physical Planning and the Ministry of Finance would coordinate in leading a design process* that includes stakeholder engagement. This could take the form of government or consultant presentations and straw proposals on the different design issues to a multi-stakeholder forum to gather stakeholder input in the development of a carbon tax package that would be implemented through the existing tax authorities.

2.2.1 Tax base (affected sources)

One of the first steps in designing a carbon tax is deciding which fuels and sectors will be covered by taxation. It is common to cover all fossil fuels used in a country by the carbon tax. If one fuel type is tax-exempt, consumers may switch to using this fuel, which may not reduce emissions and may reduce revenue. It is therefore best to introduce a tax on all fossil fuels. For example, Colombia's existing carbon tax (Law 1819) is levied based on the relative carbon emissions factors of the different fossil fuels, but has excluded coal, the most carbon intensive fossil fuel. A bill was recently introduced to change the tax to include coal. At the moment in Macedonia the excise tax for certain fuels (natural gas, coal, coke and lignite) is zero denars, which puts them in a preferential position compared to other fuels (Table 1).

The existing carbon excise tax is not in line with GHG emission reduction policies, as it does not consider the relative carbon content of the fuels.

Table 1: Excise duties in North Macedonia

Fuel	Price	Unit
Leaded petrol	0.397	EUR/l
Unleaded petrol	0.353	EUR/l
Diesel oil -Transport - Heating	 0.295 0.102	 EUR/l EUR/l
LPG and CNG	0.080	EUR/kg
Kerosene - Transport - Heating	 0.179 0.036	 EUR/l EUR/l
HFO	0.002	EUR/kg
Petroleum coke	1.376	EUR/GJ
Natural gas	0.000	EUR/nm3
Coal, coke and lignite	0.000	EUR/GJ
Electricity	0.000	EUR/MWh
Biofuels	0.000	EUR/kg
Lubricating oils	0.114	EUR/kg
Lubricants (synthetic)	0.358	EUR/kg

Source: Customs administration https://customs.gov.mk/index.php/en/biznis-zaednica-mk-2/akcizi

Unlike Macedonia, at the European level there are different excise taxes for fuels in different sectors. These excise taxes are regulated by Energy Tax Directive 2003/96/. With the help of this Directive, the minimum values of excise taxes for the fuels were set for certain sectors (Table 2). It leaves the possibility for each country to set higher values for excise duties on fuels. (An example is given in Figure 7 for unleaded petrol, where it can be seen that in Bulgaria, Croatia and Romania the excise tax is set at the minimum value prescribed by the Directive, while in Netherlands the excise is almost two times higher than the minimum.)

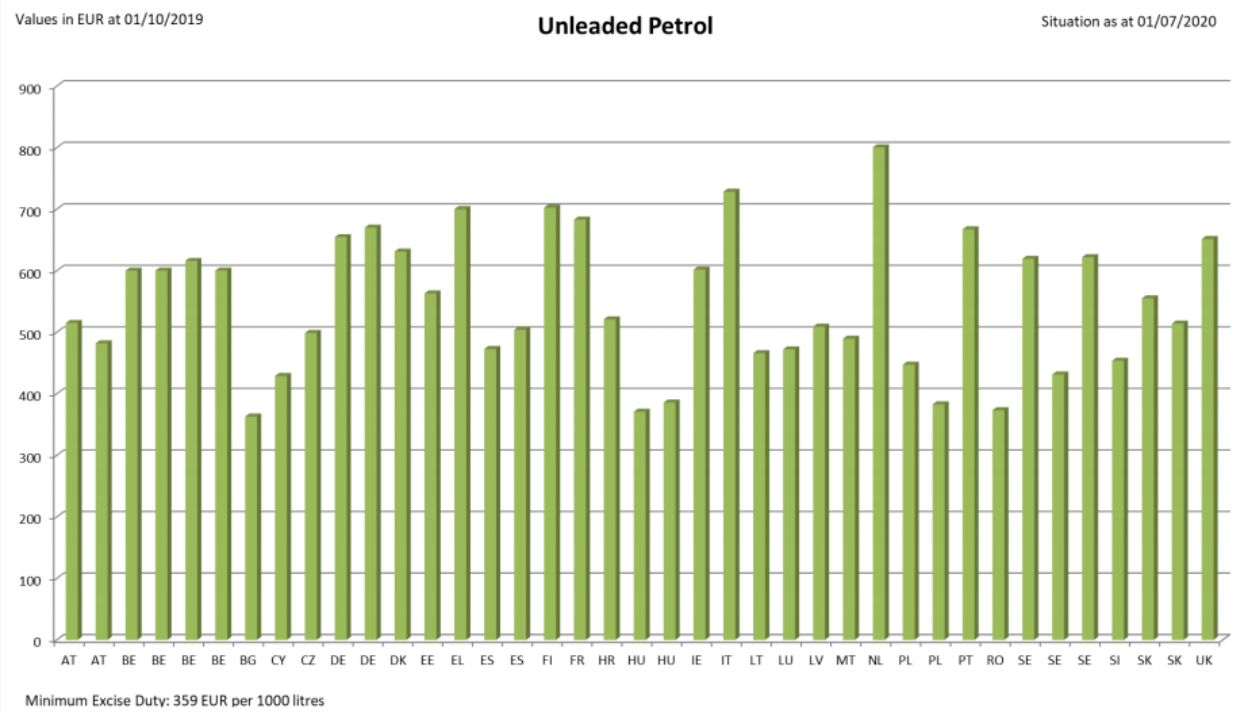
If excise taxes in Macedonia are compared with the minimum values prescribed in the Directive, it can be concluded that the price for unleaded petrol and diesel oil in Macedonia fall about 2 to 11 percent below the minimum level prescribed in the Directive.

Table 2: Minimum level of excise duties at EU level

Fuel	Minimum rates for motor fuels	Minimum rates for motor fuels used for commercial and industrial use	Minimum rates for heating and electricity		Unit
			Rate for business	Rate for non-business	
Leaded petrol	0.421				EUR/l
Unleaded petrol	0.359				EUR/l
Gas Oil	0.330	0.021	0.021	0.021	EUR/l
Kerosene	0.330	0.021	0.000	0.000	EUR/l
LPG	0.125	0.041	0.000	0.000	EUR/kg
Natural Gas	2.600	0.300	0.150	0.300	EUR/GJ
Heavy fuel oil			0.015	0.015	EUR/kg
Coal and Coke			0.1500	0.3000	EUR/GJ
Electricity			0.500	1.000	EUR/MWh

Source: COUNCIL DIRECTIVE 2003/96/EC

Figure 7: Excise duties at EU level – unleaded petrol in 2020 (Euro per 1000 liters)



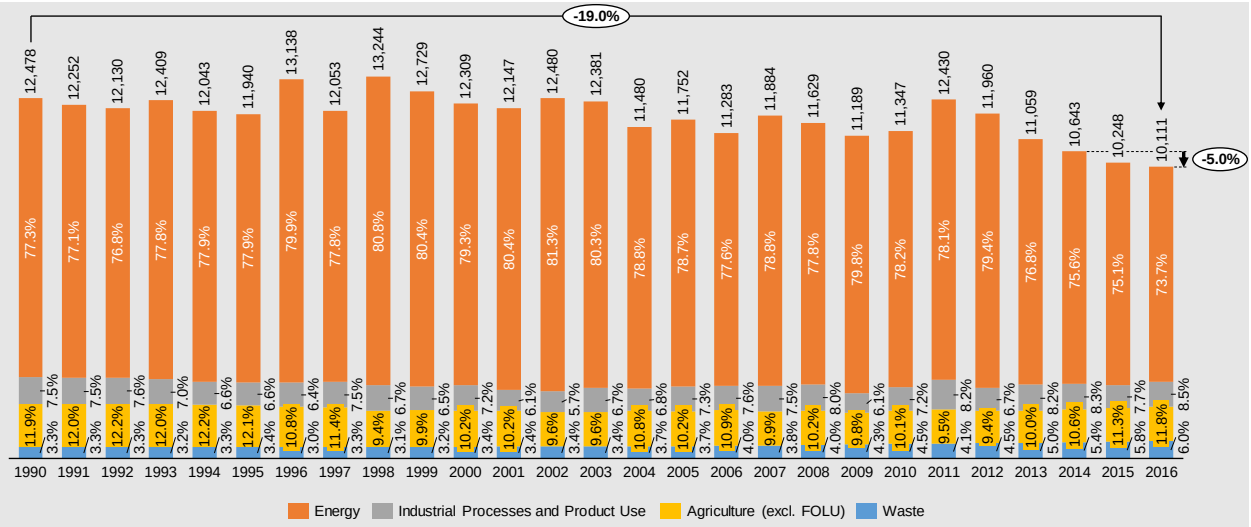
Source: EUROPEAN COMMISSION, EXCISE DUTY TABLES Part II Energy products and Electricity

Another important aspect of carbon tax design is which sectors should be covered. Most of the emissions in the world and in Macedonia come from the energy sector (Figure 8). That is the main reason why carbon tax is usually introduced initially in this sector. Another reason is that energy sector

emissions can be quantified with a high level of accuracy. According to the greenhouse gas inventory in Macedonia, the energy sector was responsible for over 73% of the total greenhouse gas emissions in the period from 1990 to 2016.

Because of the dominant role of the energy-related GHG emissions in overall emissions and the ability to measure emissions with a relatively high level of accuracy, it is recommended to first introduce a carbon tax in the energy sector.

Figure 8: Total GHG emissions by sector, excluding FOLU sector (in Gg CO2-eq)



If the sub-sectors in the energy sector are analyzed, it can be concluded that *energy industries (i.e., electricity and heat production), transport and industry (manufacturing industries and construction)* have the largest share of GHG emissions. However, the composition of the energy sector emissions has changed. As shown in Figure 9 both the share and absolute value of GHG emissions from energy industries have come down over the period (i.e., from 70% in 2000 to 51% in 2016). Over the same timeframe, emissions from the transport sector have increased. Looking ahead, the reference and business-as-usual scenarios for the Carbon Tax Assessment Report and the Energy Strategy show that these three sectors will continue to dominate emissions in the period through 2040. Forecasts suggest that energy consumption and emissions from the transportation and industry sectors will continue to grow over the study period.

The Energy Community Study for introduction of carbon pricing was limited to the electricity and heat production sectors, which comprise nearly 60% of energy sector emissions in Macedonia, but just 39 percent of total emissions. Limiting the carbon tax to these sectors misses opportunities to reduce emissions in the transport and manufacturing industries and construction sectors, which contribute about 20 and 14 percent of energy sector emissions, respectively.

While there can be political or practical reasons for taxing only some sectors of the economy, it should be noted that doing so can create distortions and inefficiencies. For example, regulating just the electricity and heat production sector would make it relatively more costly to operate electric cars as

compared to diesel- or gasoline-fueled cars. Likewise, taxing just power and heat production could lead more industries to shift from power and heat purchases to self-generation.

In order to avoid market distortions and achieve a reduction of greenhouse gas emissions, it is recommended to introduce a carbon tax on all sub-sectors of the energy sector at the same tax rate. As over 96% of greenhouse gas emissions in the energy sector are CO_2 emissions (Figure 10), it is recommended that taxation should only address CO_2 emissions in order to simplify the process.

Figure 9: GHG emissions in Energy sector, by category (in Gg CO2-eq)

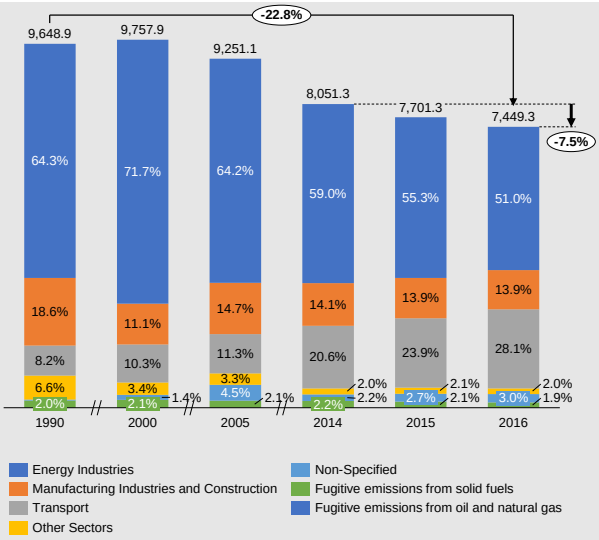
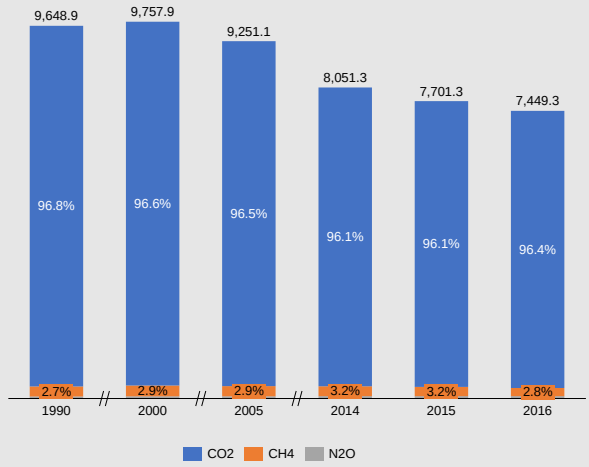


Figure 10: GHG emissions in Energy sector, by gas (in Gg of CO2-eq)



2.2.2 Point of regulation

Once the decision is made on the tax base (the sources to be affected by the carbon tax), the next step is to decide the point of regulation—where the tax should be applied. There are three primary options (Figure 11):

- Upstream: Upstream carbon taxes are applied to fuels at the point where the product associated with the emissions enters the economy.
- Midstream: A midstream carbon tax refers to a tax that is applied somewhere between the point where the product enters the economy and the point of consumption.
- Downstream: A downstream carbon tax is applied at the point of consumption, whether by consumers, businesses, or industry.

Introducing the tax on an upstream basis means that tax is paid before greenhouse gases are emitted and flows through the economy as part of the fuel price. In Macedonia, the introduction of the tax on an upstream basis would mean that it would be paid by coal producers and importers of oil products, coal and natural gas. On the other hand, the introduction of a downstream tax would be based on a source-by-source accounting of greenhouse gas emissions or fuel and electricity use by the final consumers.

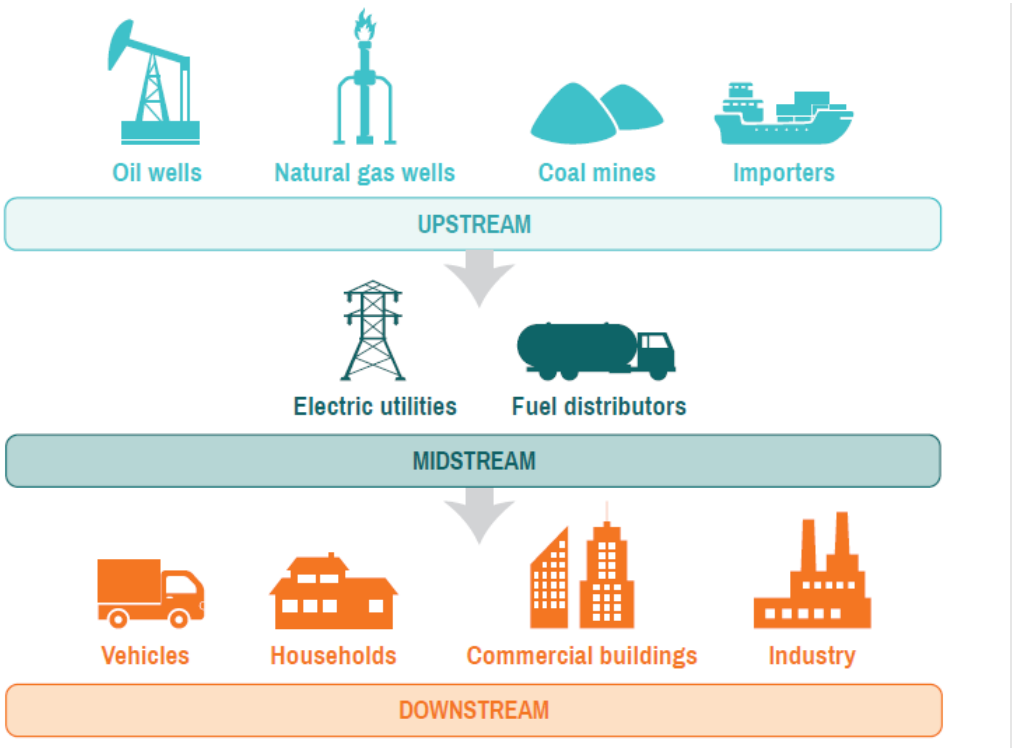
In Macedonia, an upstream tax has an important advantage in that it could build on already-established tax mechanisms, either the existing excise tax system described earlier or the existing environmental fee under the Law on Environment.

The implementation of a downstream tax is much more complex because it requires a detailed MRV system to track fuels or emissions for each consumer, and in some cases also requires the government to establish a new levy system if these activities are not already taxed. Further, as there is very limited fossil fuel production in Macedonia, there are far more downstream sources than upstream ones.

On the other hand, even though the carbon price would be the same under different points of regulation, some consumers may react differently to a tax that is charged directly and more easily visualized as opposed to one that is embedded in upstream fuel prices. It should also be noted that an upstream tax focused on fuels would miss certain non-fuel-based downstream CO2 emissions (e.g., cement, lime). Also, complexity can't be avoided entirely under an upstream tax as some downstream sectors that use petroleum as a feedstock would need to be exempted.

In Macedonia's case, considering: 1) the importance of fossil fuels in its GHG inventory, 2) that the effect of introducing a tax at different points of regulation is largely the same as an upstream tax, and 3) that an upstream tax is much simpler to implement, it is recommended to introduce an upstream carbon tax applicable to all energy sources.

Figure 11: General Categorization of Potential Points of Regulation for Fossil Fuels



Source: Carbon Tax Guide A Handbook for Policy Makers, World Bank, 2017

2.2.3 Application of the tax

Related to the point of regulation, policy makers will also need to consider the authority (or authorities) that could be used to introduce the carbon tax. In some cases, it may be possible to build on existing tax infrastructure, and in others, it will be necessary to establish a new legal authority. In Macedonia's case, there are three separate laws that are applicable to a carbon tax (Table 3). The Law on Climate authorizes a carbon tax, and the Law on Excise and Law on Environment already tax fuels and/or sources of CO2 emissions.

As noted in Table 1 in accordance with the Law on Excise, a taxation system has already been established that taxes fuels at the point of production or import. However, the tax rates for the different fuel types were entered directly into the Law on Excises and there is no documentation laying out the methodology that was used to set the tax rates or to specify how the rates should change over time. If the Law on Excises will be used as a foundation for the carbon tax, it will be necessary to change the tax rates based on the emission factor of each of the fuels.

Additionally, the Law on Environment charges environmental fees for the import of certain fuels. For example, for diesel, the price is 0.03 den/l, for gasoline 0.08 den/l, and for heating oil, the price is 0.04 den/l. There is also an environmental tax for electricity produced from fossil fuels, which is set at 0.007 den/kWh (0.1 EUR/MWh). As in the case of the Law on Excise, there is no set methodology for determining the level of the fees. For example, there is no relationship between the level of the fees and the type of fossil fuel that produces the electricity, or the carbon intensity of the fuels. Additionally, the production of heat from fossil fuels is not taxed under this Law, and the industry sector is left out of both the Law on Environment and the Law on Excises. In other words, the manufacturing and construction industries do not pay taxes for the use of coal or natural gas.

So while legal authorities exist upon which to establish a carbon tax, in both cases it is necessary to define a methodology to align the tax levels with the relative carbon impact. This can be done by taking into account the emission factor for each of the fuels and relevant applications (and to ensure that those using petroleum in products will still be excluded). In all three cases, further analysis is needed to identify the existing authorities and limitations on the use of revenues collected, and the most promising next steps to implement the desired revenue recycling approach.

Table 3. Legal options to implement a carbon tax in Macedonia

	Excise Tax	Environmental Tax	Climate Law
Application/Authorization	Applies upstream to all fuels and electricity; however, some tax rates are set to 0 (coal, natural gas, electricity)	Applies upstream to some fuels (diesel, gasoline, heating oil) and midstream for electricity	Carbon taxes are included as an example of authorized policies and measures to reduce CO2. No details provided.
Exclusions (if applicable)		Coal, natural gas and industry are not covered	
Lead agency	Ministry of Finance	Ministry of Environment	Ministry of Environment
Changes needed to adopt a carbon tax	Set values based on CO2 emissions expected per unit of fuel, considering the fuel carbon content and CO2 price; ensure tax applies to all energy users	Add excluded fuels and sources; set values based on CO2 emissions expected per unit of fuel, considering the fuel carbon content and CO2 price	Would need to establish a new mechanism
Assessment	Fastest option to enact a CO2 tax, if there is political will.	Second-best choice.	Would take the longest to develop; likely duplicative with existing tax laws.

It is recommended to establish a CO2 tax via the existing excise tax authority. It is preferable to make use of the excise tax as it already applies to all fuels, so the main change required would be a change in the level of the tax according to the relative CO2 emission factors of the different energy sources.

The second-best option would be to make use of the existing environmental tax. However, this would require changing the tax authorization to add excluded fuels in addition to changing the level of the tax to be consistent with CO2 emissions factors.

2.2.4 Tax rate

One of the last but most important steps is to determine the value of the carbon tax. The Carbon Tax Guide: A Handbook for Policy Makers[2] defines four basic principles for setting a carbon tax:

- Social Cost of Carbon (SCC) - is an assessment of the total economic damage that can be done by releasing 1 t of CO2 into the atmosphere.
- Abatement target - in this approach the amount of carbon tax is set at as high level as needed to achieve a reduction of GHG emissions to a predetermined or desired level

[2] Partnership for Market Readiness. Carbon Tax Guide: A Handbook for Policymakers. World Bank. Washington, DC. 2017. https://openknowledge.worldbank.org/bitstream/handle/10986/26300/Carbon%20Tax%20Guide%20-%20Main%20Report%20web%20FINAL.pdf?sequence=1&isAllowed=y

- Revenue target - with this approach the amount of carbon tax is set as high as necessary to achieve a predefined revenue level.
- Benchmarking - with this approach the amount of carbon tax is set at the same level as in another country or region that has some similar specifics as the country in which the introduction of CO2 is proposed.

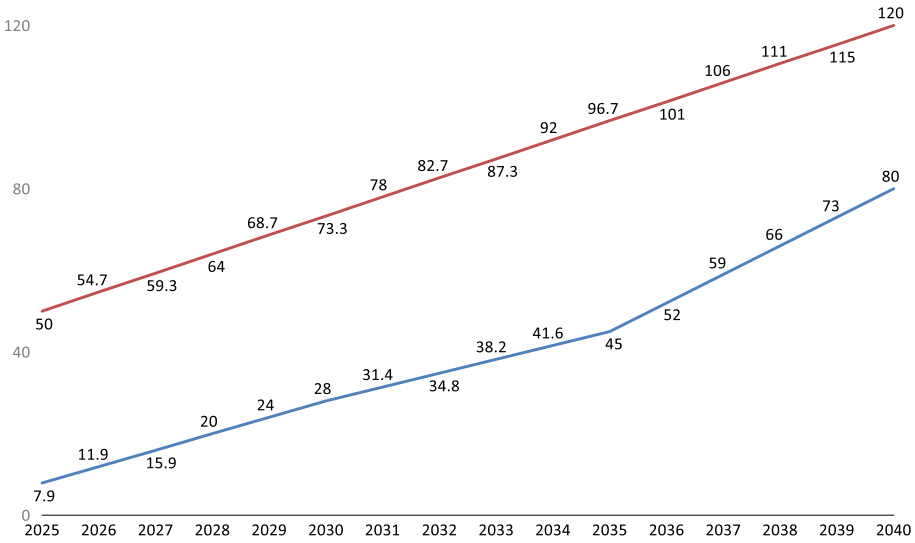
In addition to these four principles when determining carbon tax, it is necessary to determine how the carbon tax will change in the future. Here, too, several ways can be identified, and these are:

1. Static carbon tax rate - remains at the same level throughout the review period
2. Gradually increasing carbon tax rate - changes over time
3. Adjustment formula - the design of carbon tax leaves room for it to change over time and that change depends on certain conditions
4. Periodic review - various stakeholders (this could be policymakers and/or experts) could be charged with making periodic assessments of how well the carbon tax is meeting the defined goals, and recommending or effecting adjustments in the tax level based on their findings
5. Ad hoc political approach - periodic change in the amount of carbon tax by policy makers

As part of this assignment (see the accompanying Carbon Tax Assessment Report), several scenarios were created in which two basic principles were considered. In the three EnC scenarios (EnC, EnC_all, and EnC_all_ind, the benchmarking principle is used because the price of CO2 is taken from the Energy Community study in which it is planned to introduce a carbon price at the regional level, which initially differs across the EnC countries but later converges to the same level expected to be consistent with the EU ETS. On the other hand, in the NDC scenario, the abatement target principle is implemented because the carbon tax is increased until a target level of GHG emissions in 2030 is reached, considering the energy sector's share of the country's Paris Agreement goal, called the Nationally Determined Contribution, or NDC. Finally, the EnC scenarios evaluated consider a relatively gradual increase in the CO2 tax, while the NDC scenario requires a higher tax level even from the beginning to realize the energy sector's share of the NDC goal.

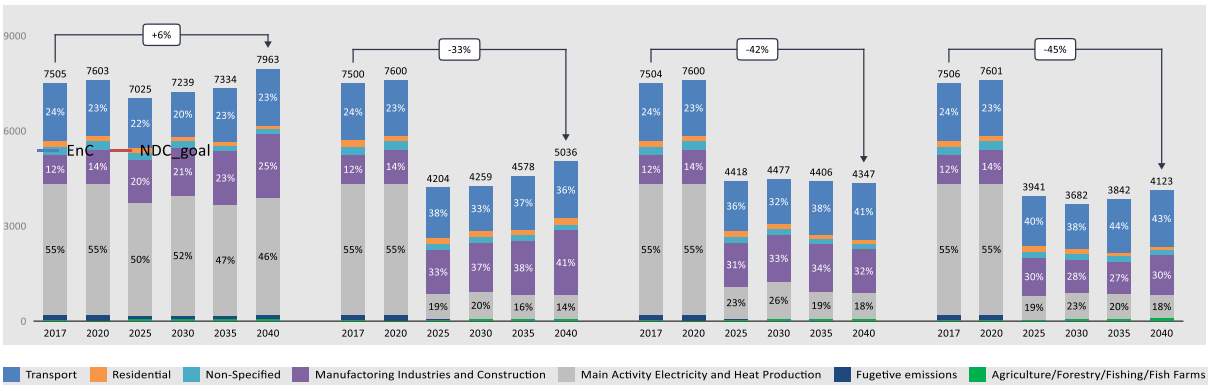
Considering the results of the Carbon Tax Assessment Report, benchmarking should be a high priority. This is particularly the case as there is the potential for leakage in the event that Macedonia adopts a €28/ton carbon price independently, without similar action by its neighbors. As Macedonia is a small country surrounded by member states of the European Union and the Energy Community, the level of the carbon tax in Macedonia should roughly correspond to the prices in the region to avoid reduced economic competitiveness. That being said, the study also found that a smaller carbon tax (€8/ton) could be implemented unilaterally without resulting in incremental leakage in the electricity sector relative to a scenario that assumes regional effort. It should also be noted that the Carbon Tax Assessment Report found that the abatement target approach, where the level of the tax was set to approximate the NDC goal, was found to be too costly. An additional 3% of mitigation towards the NDC goal would require a substantial increase in the level of the CO2 tax (as illustrated in Figure 12).

Figure 12: CO2 tax used in the MARKAL-Macedonia model



*It is recommended to implement benchmarking in carbon pricing, which could mean taking proactive efforts within the region to encourage adoption of a comparable carbon price, whether through a tax or an ETS. According to the analysis, it is recommended to introduce a carbon tax that will start at around 8 EUR/tCO2 and will reach 28 EUR/tCO2 in 2030 (Figure 12). This level would come close to reaching the overall nationally determined contribution (NDC) goal under the Paris Agreement for the energy sector (*Figure 13*). It is suggested that a clear trajectory be set up front. This would provide* ***certainty to industry on the level of the carbon tax and avoid an ad hoc approach that could be subject to political pressures.***

Figure 13: GHG emissions by sectors (without MEMO) for the BAU, EnC, EnC_all and NDC_goal scenarios (kt C2-eq)



Finally, as explained in the accompanying Carbon Tax Assessment Report, the last increment of emissions reductions to meet the energy sector's share of the NDC could likely be achieved at a more manageable cost through policies and measures in other sectors.

2.2.5 Use of revenues

A critical policy decision to be made in establishing a carbon tax involves determining how to use the revenues generated from the tax. The chosen approach(es) to revenue recycling can be instrumental in building support for the carbon tax among stakeholders who might otherwise oppose the policy. These funds also provide a critical tool to mitigate impacts to vulnerable populations and businesses that may be disproportionately impacted by the carbon tax policy specifically and low-carbon transformations in the energy sector more generally. It is important to note that while the revenues that can be generated are substantial, the demand for these tax revenues could still greatly exceed the total funds available. Therefore, the government will need to be strategic in defining priority uses.

As stated above, according to the Law on Environment, there is a tax on the production of electricity from fossil fuels. Every year with a special Decision, the Government allocates funds from the environmental tax revenues to the municipalities where electricity production facilities are located, according to the methodology defined in a special Government Decree (Decree on the methodology for distribution of funds realized as income from the fee for electricity generation from fossil fuels). In 2018, about 400,000 EUR were collected, which were distributed to 9 municipalities, as shown in Table 4. This is an example of how funds generated from tax proceeds can be redistributed. However, it also suggests that changes in how revenues are deployed could create resistance among the municipalities as they may rely on some minimum funding level to deliver basic services. In the case it is decided to use the Law on Environment to implement the CO2 tax, it could be possible to devote a set amount of revenues to these municipalities at historic levels while the additional revenues could be allocated as deemed most important to ensure the strongest possible design for a carbon tax.

Table 4: Distribution of revenue by municipalities of the electricity production tax

Municipality	EUR
Bitola	233,487
Mogila	50,843
Novaci	106,771
Kicevo	4,303
Gazi Baba	1,923
Aerodrom	586
Kisela Voda	296
Centar	1,084
Cair	3,339
Total	402,631

The sections below discuss the total amount of revenues expected to be generated from the EnC_all scenario and consider various options for making use of these resources. However, it could be considered that some amount should be taken “off the top" for the municipalities.

Total funds collected under the different scenarios (modeling output)

A key output of the MARKAL model is a projection of the total funds that would be collected under the different carbon tax scenarios (Table 5). In the case of the EnC_all scenario, the model considers how

the electricity, heat, industry and transportation sectors will respond to the assumed carbon tax. The model would seek the lowest cost solution: all mitigation actions that cost less than the tax would be utilized. For example, if the carbon tax rate in a given year is 15 EUR per ton, any measures to reduce emissions that cost up to 14.99 EUR would be used.

The model also forecasts the expected emissions remaining that would be subject to the applicable carbon tax. These carbon tax payments, in total, define the revenue that would be collected by the government. The amount of the payments will differ from one year to the next considering factors such as the assumed increase in the level of the carbon tax, the projected growth in energy demand, and changes in cost or availability of mitigation measures.

Given the EnC_all scenario assumptions, the model forecasts the carbon tax will result in total revenues collected of 137 and 345 million EUR, respectively, in 2030 and 2040. This result suggests a substantial increase in revenues over time. Growing revenues could be helpful in mitigating adverse impacts to disproportionately impacted stakeholders as the tax rates increase. However, lower revenues available in the early years of the tax could impact the government's ability to fully mitigate near-term effects, such as job losses in the energy sector.

Table 5: Revenues generated under the EnC_all scenario

Year	2025	2030	2035	2040
Revenues (million EUR)	**60.4**	**137**	**196**	**345**

Other factors that have not been modeled could also affect these revenue projections. This includes decisions on whether or not to use flexibility and/or cost containment measures, which could increase the supply of lower cost mitigation alternatives and therefore reduce the total emissions subject to the tax, or limit the increase in the carbon price, reducing revenues collected per ton of emissions.

Because the total projected revenues consider a number of underlying assumptions, the projected revenue figures should be viewed with a degree of caution. The government may wish to take a conservative view of the total revenues that will be generated to avoid the possibility that resource commitments will exceed the collected revenues.

Revenue recycling options to evaluate

While the options for recycling revenue are limitless, some of the main options (not mutually exclusive) used in other systems include the following:

- Using revenues to reduce the adverse impact of the carbon tax to vulnerable and disproportionately impacted groups (e.g., low-income consumers, affected workers, carbon-intensive and trade-exposed manufacturing industries);
- Using revenues to achieve additional emissions reductions; and
- Using revenues to replace other taxes.

These options are considered below.

Rebating low-income consumers

As a result of the carbon tax, energy consumers will see an increase in the price of their electricity and heat payments and transportation costs, commensurate with the carbon content of the fuels used to generate the energy. These energy price increases provide a signal to consumers intended to encourage changes in behavior. Initially, price increases may spur increased energy conservation, purchase of more efficient consumer products and/or transportation mode shifting where such choices readily exist. In the longer term, the expectation of higher energy prices could lead, for example, to enhanced insulation/weatherization and shifts to lower-carbon fuels and technologies.

In the case of Macedonia, it is important to note that these energy price increases (Table 6) are additional to price increases that are already expected as residential electricity subsidies are phased out over the coming decade. Business-as-usual residential sector electricity prices are expected to increase by about 40 percent, from 90.02 in 2017 to a high of 127.51 EUR/MWh in 2030 before coming down with the transition to low-marginal cost renewable energy sources.

Table 6: Estimated average annual household energy price increases under EnC_all (relative to BAU) (total projected households in 2030=584,481; total projected households in 2040=606,337)

	1a Increased cost Euros/ MWh or Euros/liter (2030)	1b Increased cost Euros/ MWh or Euros/ liter (2040)	2a Total MWhs residential (2030)	2b Total MWhs residential (2040)	3a Increased total cost (Euros) (2030)(1a* 2a)	3b Increased total cost (Euros) (2040) (1b*2b)	4a Increased cost/ household, Euros (2030)	4b Increased cost/ household, Euros (2040)
Electricity	12.9 EUR/MWh	42.4 EUR/MWh	2,743,700 MWh	2,898,300 MWh	35,393,730 EUR	122,887,920 EUR	60.56 EUR	202.67 EUR
Natural gas	5.6 EUR/MWh	15.9 EUR/MWh	871,500 MWh	860,800 MWh	4,837,484 EUR	13,651,643 EUR	8.28 EUR	22.51 EUR
			Liters/km (2030 + 2040)	km/car	cars/household			
Diesel (70%)/gasoline (30%)	0.06 EUR/l (diesel); 0.06 EUR/l (gasoline)	0.19 EUR/l (diesel); 0.16 EUR/l (gasoline)	1/25.3 (diesel); 1/24.59 (gasoline)	12,333 (2030); 12,951 (2040)	0.81 (2030); 0.88 (2040)		24.66 EUR	83.14 EUR
Total							93.50 EUR	308.32 EUR

While the price increase passed through to consumers is a key driver of the emissions reductions that would result from the carbon tax policy, there also must be recognition that not all consumers are equally able to afford the increase, just as the underlying energy prices affect consumers differently depending on income levels. In particular, vulnerable households with low incomes may be least able to afford higher energy costs stemming from a carbon tax.

For the lowest-earning households (the lowest fifth of the population, or quintile) (Q1 in Table 7), the projected 2030 and 2040 total energy cost increases stemming from a carbon price represent 1.4 and 3.4 percent of estimated 2030 and 2040 income levels, respectively. In contrast, the price increases represent 0.3 and 0.7 percent of estimated 2030 and 2040 income levels for the highest earning quintile. These values illustrate the differential impact of the carbon tax on low vs. high income consumers.

Table 7: Estimated disposable income by income quintile3 and impact of total energy price increases (from EnC_all) in 2030 and 2040

	Q1	Q2	Q3	Q4	Q5
a. Total estimated 2030 disposable income per household, all sources (EUR)	6,684	11,434	15,856	21,533	31,703
b. 2030 total energy price increase/total salaries (% of projected 2030 disposable income)	1.4%	0.8%	0.6%	0.4%	0.3%
c. Total estimated 2040 disposable income per household, all sources (EUR)	9,038	15,460	21,438	29,114	42,865
d. 2040 total energy price increase/total salaries (% of projected 2040 disposable income)	3.4%	2.0%	1.4%	1.1%	0.7%

Based on this assessment, it is recommended to rebate energy costs to protect consumers least able to afford the cost increase. At a minimum, this could be consumers in the Q1 and Q2 income categories.

Such rebates could be particularly important in the years leading up to EU accession. It should be noted that there are many policies and programs in the EU that address energy poverty, and that these types of programs could be anticipated with EU accession.

Incentives should be delivered on a lump sum basis, for example, as a separate line item on consumer electric bills. Delivering rebates on a lump sum basis ensures that all consumers will still face the marginal carbon price incentives from higher electricity prices for electricity consumed and be motivated to shift demand or fuel sources.

The estimated cost of rebating Q1 and Q2 households for the increase in carbon prices is 21.9 million EUR in 2030 and 74.8 million EUR in 2040 based on average household energy consumption. Rebating all households would cost 54.6 million EUR in 2030 and 186.9 million EUR in 2040.

Rebating workers and communities

Revenues from the carbon tax could also be used to support a just transition for workers and communities that might face significant job losses that are at least partly attributable to the tax. This could include payments for job training, income support, social services, mobility assistance and other measures.

[3] Rows a and c show forecasted estimates of disposable income by quintile. Each quintile represents a fifth of the household population, broken down by disposable income. For example, quintile 5 (Q5) represents the average of the top 20% of households based on forecasted estimates of GDP per capita. Assumptions used to develop these estimates are that (1) disposable income remains at 70% of GDP per capita, consistent with recent levels, (2) all households (Q1-Q5) have the same number of people, on average and (3) the relation between the different quintiles in the future is the same as it was in 2019. Rows b and d show the estimated energy price increase from the carbon tax as a share of the disposable income, by quintile, in 2030 and 2040.

Most notably, all of the carbon tax scenarios evaluated show a substantial decline in emissions from the electricity and heat sectors starting in 2025 relative to business-as-usual. It appears that a carbon tax could offer the last financial incentive needed to replace the 800 MW of coal-fired (lignite) power generation that currently fulfills 71 percent of the country's electricity needs with cleaner sources of electricity generation, including natural gas and renewable energy. Depending on the replacement technology, jobs could be at risk at both the Bitola and Oslomej coal-fired power plants and at the lignite mines serving these facilities. This follows already-significant declines in the mining sector: coal production in Macedonia has recently declined from 9,049 short tons in 2011 to 5,506 in 2018.[4] The loss of demand from two coal-fired thermal power plants, with 3,588 employees, would be expected to intensify these losses.

Already, Unit 1 of the Bitola facility announced plans in October 2020 to replace coal with natural gas within the next five years. The other Bitola units are being modernized to enable operation for up to ten years.[5] Oslomej now operates only a few months a year and the power company (ESM) is actively seeking a private partner to pay for construction costs of 100 MW of solar PV capacity under a PPP arrangement. A key contractual term is the hiring of 100 employees from the Oslomej power plant and mining operations.[6, 7]

In Macedonia, the success of ESM in shifting coal jobs to other energy production sources in its portfolio, including through new contracts, could reduce the amount of carbon revenue funding that might be needed to support a just transition. That being said, the costs could still be quite substantial. Considerations that could affect the funds needed for a just transition include, among others, fossil fuel income levels, proximity to job centers and existing social services. Experiences in other countries can offer a proxy, for example:

- In Poland, the Miners Social Package, seen as successful in facilitating a reduction in coal mining jobs, cost over 2 billion USD for about 80,000 workers, or roughly 25,000 USD per worker.[8]
- In the Netherlands, the cost of facilitating 17,100 lasting jobs cost between 450,000 and 600,000 USD per job.[9]

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[4] World Data Atlas. North Macedonia. https://knoema.com/atlas/North-Macedonia/topics/Energy/Coal/Production-of-lignite-coal

[5] Todorovic, Igor. North Macedonia to shut REK Bitola coal plant unit, turn to gas. Balkan Green Energy News. October 20, 2020. https://balkangreenenergynews.com/north-macedonia-to-shut-rek-bitola-coal-plant-unit-turn-to-gas/

[6] Todorovic, Igor. North Macedonia to use coal pit Oslomej for 100 MW photovoltaic project. Balkan Green Energy News. February 13, 2020. https://balkangreenenergynews.com/north-macedonia-to-use-coal-pit-oslomej-for-100-mw-photovoltaic-project/

[7] Tanev, Mario. N. Macedonia seeks private partner for 100 MW solar park project. Renewables Now. February 12, 2020. https://renewablesnow.com/news/n-macedonia-seeks-private-partner-for-100-mw-solar-park-project-687051/

[8] World Bank Group. Managing Coal Mine Closure: Achieving a Just Transition for All. November 2018. http://documents1.worldbank.org/curated/en/484541544643269894/pdf/130659-REVISED-PUBLIC-Managing-Coal-Mine-Closure-Achieving-a-Just-Transition-for-All-November-2018-final.pdf p.32

Key elements of Poland's Miners Social Package[10]

Miners' leave: Provided 75% salary for miners within 5 years of retirement who retire early, providing a bridge to the retirement pension benefits. Workers were permitted to take another job, but the Miners' leave payment would be cut in half.

Redundancy payment: Workers that leave the job and are not within 5 years of retirement were eligible for a single, unconditional payment equal to 24 months of salary. This payment could not be combined with the welfare allowance.

Welfare allowance: This is an allowance equal to 65% of monthly salary that was paid monthly during the period of retraining and job seeking, for up to two years. Upon taking employment outside the mining sector within two years of leaving the mining job, the worker received a single payment equal to 14.4 months average salary.

Retraining course: All former mineworkers were eligible for a single retraining course to improve their employability outside the mining sector.

These programs, closely negotiated with the labor unions, were jointly funded by the government (70%) and the private sector (30%). The programs were successful in encouraging workers to sever ties with the mining sector. However, based on the experience, a more attractive welfare allowance that allows additional time to find new employment coupled with additional support to secure alternative jobs could lead more employees to select this option and potentially result in higher levels of employment and improved long-term outcomes among former mineworkers.

Scaling these values based on relative per capita GDP[11], this could mean total just transition expenditures ranging from 95.5 to 651.6 million USD, assuming benefits are delivered to the 9,094 estimated total workers at coal mines and coal-fired thermal power plants. The timing of the just transition expenditures would need to align with the expected timing of the job losses. For example, support for coal sector workers could be delivered in the 2024-2027 timeframe. Early outreach is recommended to identify the specific training and mobility needs of the affected workers and to support early planning and implementation of compensation programs. Early, proactive efforts could help mitigate concerns from impacted communities and could also reduce resistance to the carbon tax program.

Accordingly, it is recommended that worker compensation be a priority measure for use of revenues, likely totaling around 96 million USD, potentially delivered over a period of 4 or more years (e.g., amounting to 24 million USD per year) depending on the nature of the compensation plan.

Rebating sectors exposed to leakage

Industrial sectors

Industries that are both carbon-intensive and trade-exposed could also be vulnerable to economic losses and emissions leakage from a carbon tax in cases where their competitors are not subject to comparable carbon pricing. In such cases, and absent protective measures, the added cost of a carbon tax has the

[9] Ibid.

[10] International Institute for Sustainable Development. The Transformation of the Polish Coal Sector. GSI Report. January 2018. https://www.iisd.org/system/files/publications/transformation-polish-coal-sector.pdf

[11] Using 2021 values from the International Monetary Fund, IMF Datamapper. https://www.imf.org/external/datamapper/NGDPDPC@WEO/OEMDC/ADVEC/WEOWORLD/SMQ

potential to reduce economic competitiveness, leading to reduced sales for Macedonian industries and a reduction in jobs. At the same time, demand could be met with increased carbon intensive imports from countries that lack an equivalent carbon price, potentially reducing the overall reductions in CO2 expected from the tax. To mitigate these impacts, jurisdictions that adopt a carbon price will typically assess which industries could be at risk for leakage and define solutions.

At-risk sectors can be identified considering data on carbon intensity, trade exposure, and available information on trade partners. A sector that is carbon intensive but not exposed to international trade, or exposed to international trade but not carbon intensive would be at lower risk for leakage effects of a carbon tax. It is also important to consider the carbon pricing and leakage mitigation context within each industry's main trading partners. For example, 88 percent of Macedonia's chemical sector exports and 58 percent of imports is with Germany, which is subject to the EU ETS cap-and-trade program and the associated leakage remedies. In contrast, trade in manufactured food products tends to occur with Macedonia's more immediate neighbors, many of which are not subject to a carbon price.[12]

Considering that the EU is an important trading partner and that Macedonia would eventually join the EU ETS with EU accession, it would make sense to focus on the EU ETS approaches to define at-risk sectors and mitigate the effects of leakage.

The EU ETS uses a quantitative test that multiplies emissions intensity by trade exposure to determine which sectors are at risk for leakage, considering both emissions intensity and trade exposure. Emissions intensity is calculated by dividing (direct + indirect CO2e emissions) (in kg) by gross value added (in Euros) for each sector or subsector, disaggregated at the NACE-4 level. Trade exposure is calculated by dividing (total exports + imports) by (total production value + imports), also at the NACE-4 level of disaggregation. Sectors or subsectors that exceed 0.2 are considered to be at risk, and those with outcomes between 1.5 and 2 could be evaluated further, upon request, using a qualitative assessment or at a further level of disaggregation. The result was a list of at-risk sectors for the 2021-2030 period of the EU ETS.[13]

Impacts to disproportionately affected sectors can be remedied by allocating a portion of the carbon tax revenues to compensate shareholder losses stemming from the lost sales. The EU ETS compensates at-risk industries using a benchmarking approach whereby sectors receive compensation based on production output that considers the carbon intensity of the top-performing facilities within the applicable sector or sub-sector. Alternatively, the issue could be addressed by imposing border taxes on imports of products from countries that lack an equivalent carbon price. This is also being considered

[12]Observatory of Economic Complexity (OEC). North Macedonia. https://oec.world/en/profile/country/mkd?depthSelector1=HS2Depth&depthSelector2=HS4Depth&yearSelector1=exportGrowthYear23&yearSelector2=importGrowthYear24

[13] The EU ETS process for defining at risk sectors and subsectors, along with the final list of at risk sectors and subsectors, can be found in the following Commission Decision. See especially paragraphs 8-12. https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32019D0708&from=EN

within the EU. It is anticipated that the need for these remedies would decline over time as more of Macedonia's trading partners adopt a carbon price or equivalent mandates.

While data are not available in Macedonia to calculate carbon intensity and trade exposure using the EU ETS methodology as described, a first approach that could be taken would be to match the sectors determined to be at-risk for leakage within the EU ETS, perhaps with modifications to reflect that certain non-energy emissions would not be covered by the carbon tax as proposed (e.g., from the cement and lime sectors). Macedonia could likewise adopt the EU ETS benchmark values or develop its own in cases where carbon intensity of top performers may differ. Alternatively, Macedonia could consider more simplistic eligibility procedures and compensation methods. There could also be discussion of other measures (e.g., border tax adjustments, cost containment measures) that could be used and/or triggered under certain circumstances.

Alignment with the EU ETS approach could support a level playing field with EU industries, particularly for sectors where the EU is a major trading partner. Such an approach could also be relatively straightforward to implement. In time, as data become available and as the carbon price increases and thus any impacts from leakage become more important, this approach could be refined with Macedonia-specific assessments of leakage risks and benchmarks.

One further note is that many carbon pricing programs also include compensation for industry sectors that are not at high risk, particularly in the early years of the program. The EU ETS, for example, has been implemented in four phases (Table 8), with each new phase including reduced levels of compensation. By 2030, the rough timeframe for Macedonia's accession to the EU, only installations most at risk of leakage would still be receiving compensation. In considering whether (and by how much) to compensate industry sectors that may not be at risk for leakage, the country should again consider compensation provided to such industries by the EU as well as tradeoffs with other possible uses of revenues.

At a minimum, it could be recommended to roughly match the EU ETS compensation levels for Macedonian industries judged to be "at-risk" and "not-at-risk" to ensure a level playing field.

Table 8: EU ETS Allowance Allocation Framework[14, 15]

EU ETS Phase	Industrial compensation (via free allowances)
Phase 1 (2005-2007)	Allocation methods were determined by each member state and included a combination of (mostly) free allocations based on historic emissions, with some allowances distributed via auctions or benchmarking approaches.
Phase 2 (2008-2012)	Allocation methods are similar to Phase 1; ~90% of allowances were allocated for free.

[14] European Commission. Allocation to Industrial Installations. Website. https://ec.europa.eu/clima/policies/ets/allowances/industrial_en

[15] International Carbon Action Partnership. EU Emissions Trading System (ETS). Updated May 5, 2021. https://icapcarbonaction.com/en/?option=com_etsmap&task=export&format=pdf&layout=list&systems%5B%5D=43

Phase 3 (2013-2020)	The electricity sector no longer received free allocations. Allocations to industrial sectors were based on 54 product-specific benchmarks set at the average of the 10% best performing installations producing the product. At-risk sectors received 100% of the benchmark for free; others receive a declining fraction of the benchmark over the period (80% to 30%).[16] A correction factor was applied in cases where total requested allocations exceeded the budget set aside for manufacturing industry allocations.
Phase 4 (2021-2030)	At-risk sectors continue to receive 100% of the benchmark for free[17]; others receive a declining fraction of the benchmark over the period (30% to 0%).

Electricity and heat production sectors

In the case of the electricity and heat production sector, the modeling study findings indicate that Macedonia could adopt a carbon price on the order of 8 EUR/ton without a meaningful increase in electricity imports to meet domestic power and heat needs. However, it appears that electricity and heat imports to Macedonia—and the associated emissions--could increase at higher carbon prices. This could mean a loss of market share for Macedonian energy companies.

The best approach to address this emissions leakage in the electricity and heat sectors would be to encourage neighboring Energy Community countries to adopt a common (or comparable) carbon price path. However, if this isn't possible, other potential remedies include: 1) providing compensation from carbon tax revenues to protect shareholders from losses stemming from reduced market share; and/or 2) instituting a border tax on electricity and heat imports.

For both the industrial sectors and electricity and heat production sectors, the country should undertake outreach on potential competitiveness and leakage impacts and potential remedies. Consultations will be needed to share the assessments of vulnerable sectors and sub-sectors (including those that may be conducted by the industries), gather feedback on the analyses and assumptions used, and review remedies used in other jurisdictions, particularly among key trading partners. The final strategies aimed at supporting Macedonian companies from possible adverse effects of a carbon tax should be clearly communicated as part of the stakeholder communications plan.

Using revenues to pay for mitigation

Macedonia could consider using a portion of revenues to pay for additional mitigation measures from the sectors affected by the carbon tax. The RGGI states[18] in the US and Montenegro are examples of governments using this approach. RGGI states have invested significant amounts of auction revenues in energy efficiency and renewable energy, supporting compliance with their cap-and-trade program and lowering the effective carbon price. Montenegro's cap-and-trade system similarly calls for proceeds to

[16] 2011/278/EU: Commission Decision of 27 April 2011 (no longer in force) https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32011D0278

[17] COMMISSION DELEGATED DECISION (EU) 2019/708. Official Journal of the EU. February 15, 2019. https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32019D0708&from=EN

[18] Regional Greenhouse Gas Initiative states include Connecticut, Delaware, Maine, Massachusetts, New Hampshire, New York, Rhode Island, Vermont, Virginia and the District of Columbia.

be used for environmental protection measures, support for production of energy from renewable sources and innovations.

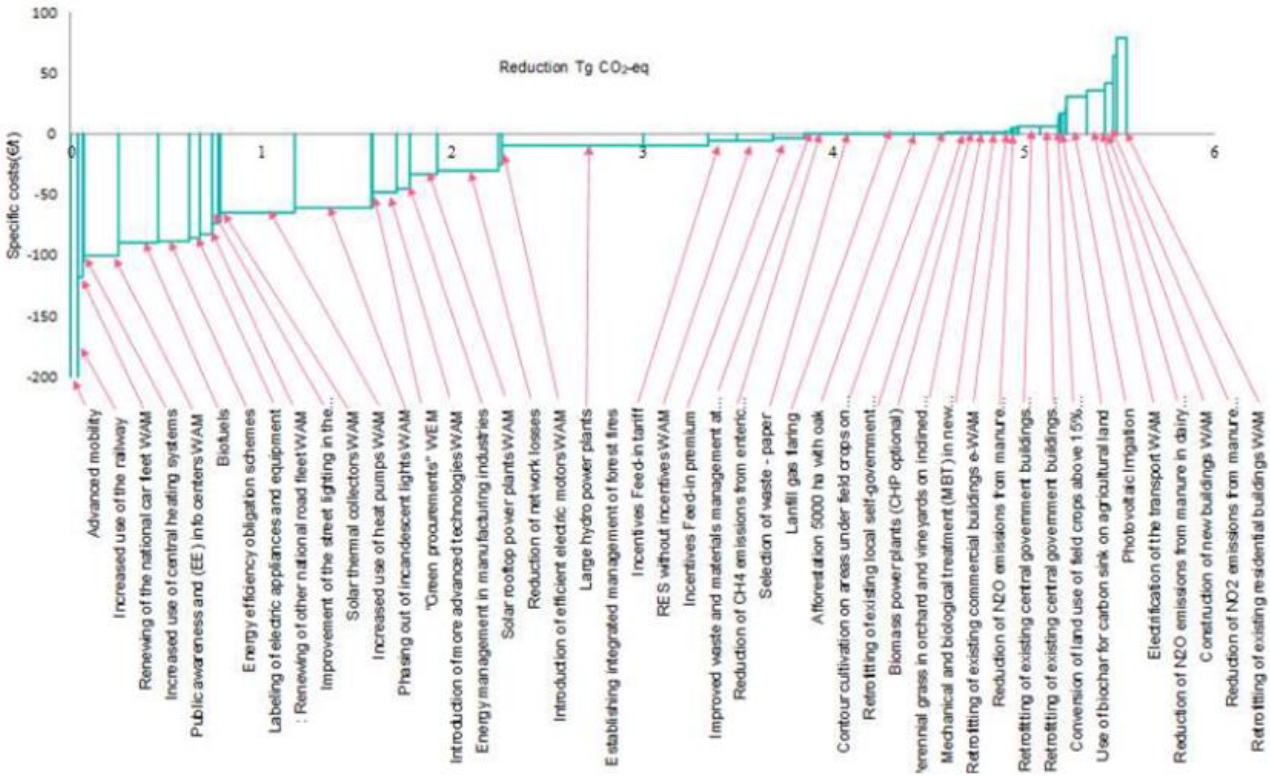
Using carbon tax revenues to invest in more emissions reductions can be helpful in making the tax more effective in reducing emissions, particularly if used to overcome barriers to private sector investment in the sectors affected by the carbon tax. One example could be tax rebates to help consumers overcome the high upfront costs of low-carbon technologies such as heat pumps or other energy sector technologies that are relatively low on the cost curve (see

Figure 14). Such investments could lower the cost of compliance for sources affected by the carbon tax, but would also reduce the revenues generated from the tax.[19] Different from a cap-and-trade program, investments in measures that reduce emissions from covered sources would not have a direct impact on the level of the carbon tax.

Funds could also be used to support low-cost mitigation activities in sectors not covered by the tax. This could offer a way to ensure that low-cost measures from across the economy are used to meet the NDC, supplementing the mitigation expected from the carbon tax. If the chosen carbon tax level is not expected to encourage sufficient mitigation investments to meet the NDC, additional mitigation actions paid for by carbon tax revenues could help reach the NDC goal. (An alternative way to capture these emissions reductions would be to establish an offset program, as discussed below. An offset program has the advantage of allowing market forces rather than government decisions to pick the low-cost investments. It also facilitates a broader set of such investments. However, an offset program may also entail higher transaction costs to establish and implement the needed MRV methodologies. It could also reduce the revenues generated from the carbon tax.)

[19] As affected sources lower their emissions (the desired outcome), there are fewer emissions subject to the tax.

Figure 14. The marginal abatement cost curve for 2030 in Macedonia



Using revenues to rebate existing taxes

A final potential use of revenues, used in Argentina, British Colombia, Sweden and the UK, is to rebate existing taxes. Under this scenario, the carbon tax revenues replace a portion of revenues that would otherwise be raised by other taxes (e.g., income, corporate income, value added tax). Accordingly, in this case, the revenues generated by the carbon tax would be used to support the overall government budget.

This approach works by lowering the marginal tax rates for activities the government wishes to encourage (e.g., income) and increasing taxes on activities it seeks to discourage (carbon pollution). By replacing taxes on "goods" with taxes on "bads," carbon tax revenues can reduce the overall cost of the carbon tax to the economy by increasing incentives for productivity. In some cases, a carbon tax has been shown to modestly increase GDP.[20]

If the government is interested in exploring the option to use carbon tax revenues to rebate existing taxes, we would suggest additional economy-wide modeling using a computable general equilibrium

[20] Metcalf, Gilbert E. On the Economics of a Carbon Tax for the United States. Brookings Papers on Economic Activity. Spring 2019. https://www.brookings.edu/wp-content/uploads/2019/03/Metcalf_web.pdf

(CGE) model to understand how a change in tax structure and rates might impact Macedonia's economy (see Section 2.1.2). However, CGE modeling is beyond the scope of the current project.

2.2.6 Use of offsets

The government could allow affected companies to purchase offsets—quantified emissions reductions from another source not subject to the tax--in lieu of paying a portion of the carbon tax owed. This would provide compliance flexibility, particularly for companies with significant emissions and few low-cost mitigation options. Macedonia could allow just domestic offsets and/or international offsets.

Considering the cost curve (

Figure 14, above), we note that most of the lowest cost mitigation options are electricity, industry and transportation measures that would already be available to those subject to and affected by an energy sector carbon tax. However, there are still a number of mitigation opportunities from the waste, forestry and agriculture sectors that could be attractive to companies subject to the carbon price, as they still fall well below the assumed carbon tax levels. Offsets could offer a lifeline to companies with sizeable emissions (e.g., iron and steel) in the case that they lack low-cost mitigation options of their own. Allowing for offsets could also encourage innovation in sectors not covered by the carbon tax.

It should also be considered that Macedonia may not have experience with offset programs, which would necessitate more education and setup costs. For example, there are no registered projects with the Clean Development Mechanism. Setting up a domestic offset system would require standards and methodologies, MRV and approval systems, and creation of a registry. The costs of setting up and operating a domestic offset system should be weighed against the potential benefits, including how the system is likely to be used.

Finally, we note that access to offsets could have some adverse effects on the overall success of the carbon tax program. First, if offsets are used, the carbon tax will generate fewer revenues, reducing the government's ability to mitigate adverse impacts and create buy-in to the program. Also, offsets make it possible for industries to put off investments in their own facilities, counteracting the incentives generated by the tax. As a result, offsets could be allowed on a limited or temporary basis to ensure the desired incentives towards transformation are retained.

Colombia's Offset Program

On June 1, 2017, Colombia established an offset program that allows fossil fuel producers and importers subject to the national 5 USD per ton CO2e carbon tax to offset up to 100% of their tax liability by purchasing high quality domestic emissions reductions (or removals). Eligible offsets must meet the following criteria:

The main criteria require that emission reductions or removals must, as summarized by VERRA[21]:

- Have taken place in Colombia;
- Have been generated on or after 1 January 2010;
- Be *ex post*, meaning that the eligible emissions reductions must already have taken place;
- Meet regulatory surplus requirements;
- Rely on methodologies that have either been approved by the UNFCCC, or have undergone a public stakeholder consultation and can be audited by properly accredited auditors;
- Have been verified by auditors accredited by either the UNFCCC, Colombia's National Accreditation Body (Organismo Nacional de Acreditación de Colombia, or ONAC), or a member of the International Accreditation Forum (IAF) that has accreditation services for greenhouse gases under ISO 14065;
- Have been issued by GHG certification programs that have a publicly available registry;

[21] Colombia Drives Innovation and Carbon Markets: Updated. September 2017. https://verra.org/colombia-drives-innovation-and-carbon-markets/

- Be certified by the accepted GHG certification program; and
- Be retired in the originating GHG certification program before being issued in the National Registry of Emission Reductions, noting that the rules also set out procedures for complying with the law prior to the operation of the National Registry.

A key advantage of Colombia's offset program is that it is able to get started without full development of the needed government infrastructure (e.g., methodologies, approval systems and even a registry) by relying on existing third-party verification systems. Also, by using just offsets from Colombia, all actions taken will support progress towards long-term transformation, and the country is able to avoid complexities with international transfers of mitigation outcomes.

The expected impact of adding an offset program to the Macedonia carbon tax could be evaluated using the MARKAL model. This would involve adding a linked offset curve (derived from the marginal abatement cost curve) that excludes energy sector mitigation options. Other key assumptions would include an adder to reflect the expected transaction costs, and restrictions on offset utilization. For example, there could be an assumption that companies may only use offsets to cover up to a particular percentage of their total CO2 emissions covered by the carbon tax. We would expect the model would show that companies would purchase offsets that cost less than the carbon price[22] up to the assumed limit. This additional modeling run would demonstrate the impact of allowing offsets on key outputs such as energy prices and carbon tax revenues.

2.2.7 Quantification and reporting

Carbon taxes need to be accompanied by MRV systems that provide the basis for accurate calculation of tax liabilities. As proposed, the carbon tax would be applied upstream, at the point where fuels enter the economy.

In the case of an upstream carbon tax, measurements and reporting seek to ensure that fuel production and imports are properly recorded. In most cases, this is done by revenue authorities, who will typically already have systems in place for measuring the amount of fuel sold for excise tax purposes. In these cases, there is no need for the establishment of an independent framework to quantify emissions; the data on fuel use is simply multiplied by the carbon tax level appropriate for the fuel type. If certain fuels are being taxed for the first time, the government will need to identify/notify affected entities of the new regulations and develop government procedures to review recorded fuel transactions and specify quantification/measurement methods and verification requirements. For tax verification purposes, supplementary information may be required, such as on details of major sales or on the largest purchasers.

In the case of lignite use for production of electricity, the data will be taken from AD ESM, directly from the lignite mine. As an added check, the quantity of produced electricity can be used to estimate lignite sold for power using assumptions on power plant efficiency. This data can be provided by the transmission system operator (MEPSO). The import of oil derivatives as well as coal can be monitored on

[22] Including the cost of the transaction cost adder

the basis of customs data. Data on the amount and types of fuel entering the country are already tracked to support compliance with the excise tax.

Using only a few pieces of data (Table 9), it is possible to calculate the level at which the excise tax should be increased to conform to the chosen carbon tax level. The emission factors for the various fuels are the first set of required data. Having in mind that Macedonia is an import-dependent country, IPCC default emission factors can be used, except for lignite used for electricity production, which has a specific emission factor. In this case, the emission factors used for the preparation of the greenhouse gas inventory at the country level should be used. Additionally, the caloric values for all energy sources are required, (calculated from the energy balance data prepared by the State Statistical Office). For some fuels that are expressed in liters, conversions of l/t are required. That is the case with gasoline and diesel. Key input data are shown in the table below.

Table 9. Key input data for determination of the CO2 tax[23]

Fuel	**Emission Factor (ktCO2/PJ)**	**Calorific value (TJ/kt)**	**Conversion factor from liters to tons of fuel (as needed)**
Leaded petrol	69.3	44.3	1350
Unleaded petrol	69.3	44.3	1350
Diesel	74.1	42.9	1195
Kerosene	71.5	43.4	TBD
LPG	63.1	46.8	1850
Natural gas	55.1	0.034*	
Heavy fuel oil	78.1	40.1	
Coal (domestic lignite) for electricity production	107.9	6.6	
Coal for other purposes	96.1	21.9	
Petroleum Coke	97.5	39.6	

* Unit TJ/'000nm3

The level of the tax for each type of fuel would be calculated by applying the defined CO2 tax rate to each fuel's emission factor. As described above, IPCC emission factor values would be used with the exception of lignite. Table 10, below, shows the results of these calculations for suggested CO2 prices of 8 and 28 EUR per ton in 2025 and 2030, respectively, making use of the emission factor values calculated in Table 9. As shown, the effective carbon tax value in 2025 would be 1.1 MKD/l of gasoline and 1.3 MKD/l of diesel above the existing excise duty. The largest cost increase would be for the lignite

[23] For each fuel, each column in this table is multiplied (along with appropriate unit conversions) to generate an estimated emissions factor, as shown in Table 10.

used for electricity generation: 53 MKD/GJ. *In 2030, it is expected that gasoline prices would increase by about 4 MKD/l, diesel would increase by about 4.6 MKD/l and coal costs would increase by 186 MKD/GJ*.

Table 10. Estimated carbon tax levels, applying emission factors and assumed carbon prices

Fuel	Unit	Emission factor (kgCO2/ corresponding unit)	Suggested 2025 tax rate (in Euros) (Emission Factor x €8/ton), addition to existing excise duty	Suggested 2025 tax rate (€8/ton) in Denars, addition to existing excise duty	Suggested 2030 tax rate (in Euros) (Emission Factor x €28/ton), addition to existing excise duty	Suggested 2030 tax rate (€28/ton) in Denars, addition to existing excise duty
Leaded petrol	liter	2.27	0.02	1.12	0.06	3.92
Unleaded petrol	liter	2.27	0.02	1.12	0.06	3.92
Diesel	liter	2.66	0.02	1.31	0.08	4.58
Kerosene	liter	TBD	0.00	0.00	0.000	0.00
LPG	Kg	2.95	0.02	1.45	0.08	5.08
Natural gas	nm3	1.87	0.01	0.92	0.05	3.22
Heavy fuel oil	Kg	3.13	0.03	1.54	0.09	5.39
Coal (domestic lignite) for electricity production	GJ	107.88	0.86	53.08	3.02	185.77
Coal for other purposes	GJ	96.07	0.77	47.26	2.69	165.43
Petroleum Coke	GJ	97.53	0.78	47.99	2.73	167.95

2.2.8 Penalties for non-compliance

In general, there is no need to establish special penalties for non-compliance with the carbon tax. Rather, countries that adopt a carbon tax will generally apply their standard tax non-compliance mechanisms to the carbon tax. Typically, the government's Treasury (Ministry of Finance) already has effective non-compliance regimes in place to collect taxes. These are often more effective than, for example, collection of non-compliance penalties under an ETS regime, which normally has to go through more layers of findings and rulings, and the state has to wait much longer to ultimately collect its money. With respect to taxation, the Treasury typically acts as court-sanctioned collector, capable of enforcing tax non payments through court-sanctioned payment orders issued directly to the non-complying entity's bank account. The prospect of a frozen bank account is generally more than enough to ensure tax payment and avoid willful non-compliance.

2.3 Engage stakeholders and communicate the message

Due to the fact that any new tax can be unpopular, even one that aims to meet national climate commitments and EU accession goals, a concerted effort will be needed to build political support for a CO2 tax. This starts will early consultations on the modeling and policy design, and continues after the recommended strategy is developed to ensure that the main audiences understand the purposes, the

approach, the various benefits (e.g., jobs in new industries, air quality improvements) and how impacts will be remedied. Accordingly, we recommend the development of a stakeholder engagement plan that encompasses engagements and communication materials aimed at each of several key audiences.

2.3.1 Communication and stakeholder engagements

A good communications strategy will allow the government to incorporate feedback received from stakeholder groups into how the policy is designed. Communications and policy creation are not separate processes. When implemented well, government communications can also counter public misinformation about the policy. Polling results to date suggest the public has a very limited understanding of the mechanics of carbon pricing.[24] Communicators need to be careful in their messaging: carbon pricing can be complex and poor attempts at explaining a complex policy design can prompt further misunderstanding and confusion. Moreover, successful tax schemes feature regular updates on the use of proceeds and the environmental, social and economic impacts of the tax.

The communications and stakeholder engagement program should consider the following steps:

- Involvement in early stages of policy design: The choice of carbon tax as the selected policy instrument, the name the government gives it, the instrument design, and how revenue is used all affect how the policy will be perceived.
- Audience research: Audience research is a vital tool both for identifying audiences who are likely to support and oppose the policy, and for creating language and narratives to use in communications. Supportive audiences can be segmented into “base”, who are supportive of the principle of carbon pricing, and “swing” audiences, who have intermediate views and are often open to well-communicated arguments. The most effective communication strategies often concentrate resources on building support with “swing” audiences, while encouraging support from “base” audiences.
- Stakeholder engagement: Stakeholder engagement is a two-way process: it informs stakeholders about the policy while enabling policymakers to refine its design and the narratives that can be used to promote it. It means governments can identify which actors are likely to support and which are likely to oppose the carbon price, as well as some of the key messages that may be used by opponents.
- Design of frames and narratives: It is important to create language and narratives that work for supportive audiences but do not polarize opinions or fuel opposition elsewhere. Narratives are structured stories containing distinct actors with clear motivations. Narratives contain frame-words that operate as codes and signal established meanings.

The specific communication and stakeholder engagement plan for Macedonia should include at the least the following types of stakeholders:

[24] Partnership for Market Readiness, Communicating Carbon Pricing for Governments and Policymakers, Briefing Note, December 2018.

- Domestic stakeholders. The needed consultations are described above. Stakeholders should include ministries and other government agencies, industries and their associations, consumer groups, academia, and civil society organizations (CSOs). Determine what guidance materials or training might be needed for affected sources.
- EU policymakers. Macedonia's leaders involved in the accession negotiations will want to consult on the timeline to approach EU ETS carbon prices.
- Regional stakeholders. Proactive engagement is needed to support regional alignment of carbon prices.

2.3.2 General messages

Good communication requires good policy—and in order to be successful, governments need to engage communicators early in the policy development process. The key messages that the government of Macedonia should convey to all stakeholders include:

- This carbon pricing policy is fair, coherent, simple, and effective. Such perceptions are more likely to attract support.
- The expected co-benefits of the policy, such as reductions in air pollution or increased energy security. Such messaging alongside climate change messaging may engage wider audiences.
- Visibility on the use of carbon price revenues. The public is more likely to accept carbon pricing if revenues are used in easy-to-understand ways that support the green economy or address major issues of social concern.
- The policy is necessary in order to develop closer economic and political relations with the European Union and eventually enter the EU.

Other important considerations include the messenger and language used to engage audiences. Trust is vital and governments should seek out trusted messengers that speak to different audiences. Moreover, use of simple and accessible language is more effective for public audiences than economic and technical terms. A lack of trust in financial systems means that focusing on carbon pricing as a market-based system may reduce its support.

2.3.3 Communication materials

Various communication materials may be needed to support the communication goals at different stages of the process to design and socialize the tax and support its implementation. Important among these will include a short policy brief.

Policy brief

A short policy brief (4 pages maximum) should be one of the most important communication tools used by the government that synthesizes the main findings and recommendations. Such a high-level policy paper would explain the rationale, the role in reaching policy goals, and the recommended policy design, backed by analyses and record of stakeholder consultations. A policy brief could serve as an entrée to discussions with other agencies and other key stakeholders (e.g., industry associations, NGOs).

The policy brief should explain that the tax rate will start low and rise gradually over time and the possible or recommended approaches for redistributing the revenues. As described earlier, tax revenues can be used to further enhance public acceptability, for example, by cushioning socioeconomic side-effects via carbon dividends (direct payments to affected households), lowering other taxes or investing in additional ways to reduce emissions. It is essential for public acceptability that the use of proceeds is carefully explained, alongside information on the overall environmental, social and economic impacts of the tax package.

The policy brief should provide the rationale for the carbon tax, both the main reasons for instituting the tax and why this approach to carbon pricing is being considered or selected. The brief could highlight that compared with other policy interventions such as technology subsidies, carbon taxes have been shown to be more efficient and fair. It should clearly explain how key stakeholders (low-income consumers, workers, industry sectors and municipal governments) are expected to be impacted by the policy, and the measures used to mitigate effects to low-income populations and others that could be disproportionately impacted to ensure emissions are reduced without harming the most vulnerable and economic output.

Other materials

Supplemental information and publicity materials can be developed to present the carbon tax policy in more abbreviated form for select audiences, or to present certain partial outcomes of the tax, for example, use of revenues in order to build support among different stakeholders.

2.3.4 Communication lessons from other countries

Existing tax schemes implemented in Europe and North America provide important lessons for the design of a carbon tax in Macedonia.

Lesson 1: Carbon taxes reduce emissions. Evaluation of other existing carbon taxes, particularly of the long-established schemes in the Nordic countries, shows that they have been successful in reducing greenhouse gas emissions. However, the emissions cuts have not been as steep as what will be required under a trajectory to reach net-zero emissions. In part, this has to do with relatively low tax levels and/or widespread tax exemptions.

Lesson 2: Taxing carbon is more difficult politically than other climate policies such as subsidies and regulation. This has been most visible in the backlash to the French carbon tax by the Gilets Jaunes movement, although it is worth noting that those protests were primarily due to bad tax design as it was coupled with tax rebates for high-income households. Carbon tax escalators are often aborted, or schemes later rescinded (as happened in Australia, for example), because of political difficulty. Making carbon taxes more politically acceptable is thus a key precondition for more effective climate action.

There are several reasons for public resistance to carbon taxes. Often, people suspect the government's main motivation to be fiscal – raising revenues – rather than environmental – reducing emissions. They may doubt that despite evidence to the contrary, carbon taxes are effective in reducing emissions. Consequently, they consider their personal burden too high, even if they agree with the environmental

objective. More broadly, people feel that carbon taxes fall disproportionately on low-income households.

Lesson 3: Public acceptability can be increased through a combination of smart design and clear communication. British Columbia is a good example of an innovative tax design that has sought to achieve this. However, conventional fiscal thinking – where all proceeds are treated as general tax – had to be abandoned to foster greater political acceptability and durability.

Aspects of smart design that can help with stakeholder communications include the following:

- Phasing in the tax over time. Together with good communication, phasing in a carbon tax can build familiarity with the scheme ahead of higher tax rates.
- Transparent use of carbon tax revenues. Transparent earmarking can help to overcome suspicions about the social, economic and environmental impacts of the tax.

What balance is appropriate among the different revenue recycling options depends on the political context. If the greatest obstacle is building a broad coalition of citizens, then direct transfer to citizens in the form of a dividend may be a good option. Where genuine competitiveness concerns present the largest barrier, compensating firms through tax rebates may be preferable, although border carbon adjustments could fulfill a similar function. Moreover, as the share of global greenhouse gases covered by a price increases, competitiveness concerns are reduced.

3. Steps to Bring the Design to Point of Implementation

Given the above recommendations, this section highlights the primary legal steps and capacity building that may be needed to bring the tax to the point that it can be implemented.

3.1 Identify the necessary legal steps

3.1.1 Amend the chosen legal authority for the carbon tax

According to the above recommendations, the regulation of carbon tax can be done through modifications to the Law on Excises for which the Ministry of Finance is responsible or the Law on Environment for which the Ministry of Environment and Physical Planning is responsible. To implement a carbon tax through the Law on Excises, the Ministry of Finance would need to adjust the values of the existing excise taxes to align with the chosen CO2 price path. In the case the Law on Environment is used, the Ministry of Environment and Physical Planning would need to propose an amendment to the tax rates and also add additional fuels and affected sources. The government should set out a clearly defined methodology to quantify the carbon tax levels for each fuel that considers the carbon content of the fuel and the corresponding emission factor. These methods would draw on data already used in reporting the national emissions inventory.

To adopt the new tax levels, and as applicable, the broader coverage of the tax, it would be necessary for the lead agency to formally propose the requisite amendments. In both cases, the lead agency would need to provide appropriate justification and conduct a public debate on the proposed changes. The recommended changes would then need to be approved during a meeting of the government (Vlada, or cabinet of ministers) and adopted by a majority of Parliament.

In addition to modifying the level of the tax, it would also be important to modify the approaches used to deploy the revenues, consistent with the government's priorities. It is recommended the modifications to the revenues for the increase in tax related to the carbon tax be made in a separate by-law (a decree or rule book), adopted by the government or ministerial level. The Parliament would not need to approve the decision. The decree or rulebook would need to contain the specific methodology for allocating revenues for different purposes, along with the intended uses of the revenues.

Strong political leadership and cooperation across the Ministry of Environment and Physical Planning and Ministry of Finance would be particularly important to foster use of the Law on Excise to implement a carbon tax. As described earlier, and in order to build the needed political consensus on the design and legal path, there should also be efforts to involve various other government agencies, such as the Ministry of Economy, and other stakeholders, including power plants of North Macedonia (ELEM), AD TETO Skopje, Makstil, FENI and other major consumers. Debate and involvement of technical and legal experts could also build confidence in the most appropriate solution.

3.1.2 Legal interactions with a carbon tax

The government should be aware of some small interactions between the carbon tax and existing tax and policy frameworks. The two main areas to consider include interactions with the VAT and interactions with other policies and measures in the energy sector.

Because the carbon tax would be applied upstream, the tax would be based on the value of the imported or produced fuels, before the VAT is applied. The VAT is paid last, after the excise and environmental taxes are charged. Therefore, the VAT paid on fuels would also increase, as it would now be charged on a higher base value. The impact of the higher tax on the VAT was not considered in the model. As a result, both the emissions and financial implications of the carbon tax could be a bit larger than estimated.

In terms of other policy interactions, Macedonia's plans to meet renewable energy standards in the electricity and transportation sectors were already included in the modeling baseline forecast. As a result, the emissions reductions reported in the Carbon Tax Assessment Report were additional to those measures and achieved in response to the carbon tax. Likewise, the estimated revenues generated as a result of the carbon tax already consider the expected investments in renewable energy and energy efficiency.

3.2 Capacity requirements

The key steps to develop a carbon tax program have already been discussed in the earlier sections of the Roadmap. In general, Macedonia has existing legal authorities that will make many aspects of the CO2 tax design and implementation relatively straightforward. The main elements where additional government capacity and/or international capacity support could be needed are listed in Table 11, below.

Table 11. Synthesis of Capacity Needs to Implement a Carbon Tax

Types of Capacity to Implement a Carbon Tax	Notes on Capacity and Capacity Needs in Macedonia
Further modeling capacity, as needed, to inform and further refine the CO2 tax design (optional)	• The modeling and analysis presented in this Roadmap and the accompanying Carbon Tax Assessment Report already point to a promising CO2 tax design. • Macedonia could decide to do additional modeling, including CGE modeling, to inform the choices on revenue recycling and/or use of offsets. If this is the case, CGE modeling capacity support would be a key near-term need. • Macedonia could also choose to evaluate different CO2 price path scenarios as it builds agreement around the most viable solution. For this, it could be possible to again make use of MARKAL-Macedonia.

Capacity to estimate competitiveness concerns for certain industry sectors and design solutions	• In case the government decides to use a portion of the tax revenues to compensate industry sectors most at-risk for losses due to economic competitiveness considerations, international capacity support could help align compensation levels with those applied under the EU ETS, considering the differences in program coverage.
Capacity to develop/refine systems for measurement, reporting and verification on production and imports from covered fuels	• In Macedonia's case, because the tax would be applied upstream, it would only be necessary to measure and report accurate data on fuels at the point of production (lignite) or import (all others). • Additional capacity could be helpful to elaborate a methodology to set the carbon prices considering fuel emissions factors and carbon content.
Capacity to develop a registry for offset projects and rules/systems to approve such projects (as applicable)	• Macedonia currently lacks rules/systems to approve and register offset projects. • It is important to note that these systems would only be needed if Macedonia takes the decision to allow for compliance via offsets. • This optional component could be added later if added compliance flexibility is deemed to be needed or to spark mitigation in additional sectors.
Capacity to undertake public engagement and communications	• As described in Section 2.3, public engagement and communications are critical to the success of a carbon tax. • The government should marshal the needed resources and/or consider whether international support could be helpful.

Annex 1. Summary of the MARKAL-Macedonia model and assumptions

About the model	The analysis employs the MARKAL-Macedonia model. This is a least-cost optimization model which incorporates the entire energy system of N. Macedonia. In the assumptions, the model captures a high level of detail about Macedonia's energy sectors.
How the model captures the energy system responses to a carbon price	A main feature of MARKAL-Macedonia is the electricity sector dispatch model. The model includes representation of all existing electric generating sources in Macedonia, and virtually dispatches those sources to meet energy demand at the lowest overall cost to the energy system. The model solves for different times of day and year (e.g., day/night/peak demand/summer/winter/ intermediate). The dispatch would also include any new capacity "built" by the model in response to the carbon tax, as well as imported power.
New build capacity options	MARKAL-Macedonia includes various new investment opportunities that can be selected by the model to minimize system costs in response to a carbon price.
Impacts of air quality regulations and other Macedonia-specific conditions	MARKAL-Macedonia considers compliance with regulatory directives requiring reductions in PM, SO2 and NOx. These directives would add new capital and operating costs for coal plants that continue to operate (e.g., installation of control technologies). In addition, assumptions recognize that mining capacity would need to expand to continue serving coal-fired power generation starting later this decade.
Energy demand	In the MARKAL-Macedonia model there are separate demand models for each sector. The main drivers in the demand model are GDP and population. These inputs are combined with other data on energy use in Macedonia to calculate energy demand levels for each sector. In solving to meet energy demand at the lowest cost, the model is able to select a combination of demand- and supply-side technologies. Based on the selected technologies, the final energy use is calculated.
Energy efficiency measures	MARKAL-Macedonia includes 20+ energy efficiency measures. Some are forced in considering Macedonia's plans. Additional efficiency measures are defined and can be "built" by the model to minimize system costs in response to a carbon price.
Treatment of power imports	The model assumes particular characteristics (cost, emissions factors) of imported power from neighboring countries[25]. Considering availability of excess transmission capacity, the model could choose to increase power imports in cases where importing more power from neighboring countries costs less than existing/new domestic electricity generation. The modeled scenarios include runs with and without a border tax applied to imports to inform understanding of how a border tax might impact power imports.

[25] This is based on data from the Power@sum model, which includes electricity generation data from EU and Energy Community countries.