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Environmental Taxes in Portugal: current framework and options for the future

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1. Introduction

Climate change is increasingly present on our daily life's. Over the past two decades greenhouse gas ("GHG") emissions have risen by more than 41% worldwide and are still showing an increasing tendency. As a consequence, the global average temperature has increased by 2-degree Celsius since the pre-industrial era, and the ten warmest years on record have occurred since 2005 (Lindsey, R., Dahlman, L. 2021).

These temperature increases gave rise extreme weather events such as floods caused by heavy rainfall, high temperatures in uncommon locations, which have become more frequent and are likely to happen even more often in the future (Ge, M. , Friedrich, J. and Vigna, L. 2020). Such events have a negative impact on the earth's biosphere and may give rise to mass extinctions and the destruction of habitats. Moreover, climate change is harmful for human societies and economies.

Human activities and consumption are the main cause for the substantial increase of GHG emissions over the years. Of those activities' energy and heating (for industrial and transport purposes), followed by transportation are the most relevant sources of pollution.

For the purpose of tackling the continuous increase of GHG as well as the negative climate change impacts caused by such rise, counties worldwide have signed several agreements such as the Kyoto Protocol and the Paris agreement.

The EU has recently put forward the Green Deal initiative, that has the objective of reducing carbon emissions by 55% in 2030 and to attain carbon neutrality in the continent by 2050. Although the EU's emissions have indeed registered a 24% decrease in 2019 when comparing with 1990 levels, the Union is still a long way from its objectives.

In this context the Commission has presented a package of legislative proposals – the so-called Fit for 55, that aim at adapting the EU's economies and societies, so that the 2030 objectives may be achieved (EC 2021a).

Environmental taxation plays a crucial role in making sure that the EU's climate objectives are reached. By acting directly on the environmentally harmful human activities, environmental taxes have the objective of changing human's behavior towards more greener activities and consumption.

Environmental taxes increase the price of environmental harmful products and activities to ensure that demand for those products and activities decreases. When combined with tax incentives on environmentally friendly products, green tax regulations have direct effect in shaping consumer behavior's towards greener practices.

Portugal has implemented its first environmentally related taxes in the early 90's. However, it was not until 2014 that an extensive Green Tax Reform was adopted by the country's government. In the context of such reform a carbon tax was introduced for the first time and several other measures were put forward.

However, there is still long path to follow with regards to green taxes in Portugal. Throughout this paper, an analysis of the main environmental taxes will be presented in order to provide an overview on the current status of environmental taxation in Portugal. For that purpose, comparative figures will be shown to demonstrate Portugal's position when comparing to its EU peers.

Before depicting the main features of the Portuguese environmental tax framework, a definition of environmental taxes will be presented for ease of comprehension, and a theoretical framework will be exposed. Such framework intends to show the main features to consider when designing an efficient and fair tax policy.

This paper intends to provide key recommendations to Portuguese policy makers on how to improve Portugal's current environmental tax policy and hopes to be a positive contribution for the increasingly important discussion on environmental taxes as a source of revenue and a toll of climate protection.

1.1. Types of environmental policy instruments

Before jumping into detail regarding environmental taxes it is relevant to understand the broader concept of environmental policy instruments ("EPI").

Environmental taxes are one in a broader scope of measures available for governments to address adverse environmental changes.

According to WIFO 2020, EPI's may be divided into two broad categories: market based and non-market-based policies. The former includes fiscal measures, whilst the latter is composed of "command and control" regulations aimed at creating awareness and which

usually do not have a direct impact on prices. Examples of non-market instruments can be the definition of standards on vehicle efficiency that limit the amount of emission per unit of output.

Fiscal instruments may be divided into (i) revenue-based instruments, which seek to make environmental harmful behavior more expensive; and (ii) subsidies which in turn promote environmentally friendly behavior and consumption.

Revenue based instruments include taxes, charges, and fees (i.e. price-based instruments) as well as emission trading schemes such as the European emission trading system (i.e. quality based instruments).

This policy paper will focus on providing an overview on the theoretical framework of environmental taxes in the EU, exposing some of its main features as well as discussing relevant aspects that should be considered when adopting an environmental tax policy. The study will then focus in the Portuguese case and provide relevant data on tax revenues, and environmental spending in that jurisdiction.

Although it may be referred to in some parts of this work, the paper will not cover in detail the European emission trading system ("EU ETS"). However, and for sake of completeness a short overview of the EU ETS will be provided.

1.1.1. European emission trading system ("EU ETS")

The EU ETS is an emission trading system which was launched in 2005 covering both EU and EEA-EFTA states. The EU ETS is based on "cap and trade" scheme according to which a cap or a limit is set on the amount of GHG that may be emitted by the facilities covered by the scheme (EC 2021b).

Every year, the facilities covered by the scheme, buy, or receive allowances issued by governments. These licenses are issued in a limited number to ensure that prices are not decreased by excessive offer (and lower demand).

By the end of each year, the entities must surrender enough allowances to cover for their emissions in that period. If by the end of the year the emission limit set by the allowances has been surpassed, these entities are required to pay fines. If otherwise, the

emission limit is not reached, each entity may sell the remaining allowances to another entity that is short of allowances to cover for its own emissions.

The EU ETS covers around 40% of the EU's GHG emissions and limits emissions of more than 11 000 power stations, industrial plants, and airplanes.

Although the ETS has been demonstrated to have positive effects on the reduction of GHG (the emissions of installations covered by the system were reduced by about 25% between 2005 and 2019), in the context of the European Green Deal, the European Commission has presented as a part of the 'Fit for 55' package, proposals to revise and extent the scope of the EU ETS, in order to ensure that a reduction of GHG of at least 55% is hit by 2030 (EC 2021a).

1.2. Defining environmental taxation

According to article 2 of the Regulation (EU) No 691/2011 of the European Parliament and of the Council [1], an environmental tax is defined as: *"A tax whose tax base is a physical unit (or a proxy of a physical unit) of something that has a proven, specific negative impact on the environment, and which is identified in ESA as a tax."*[2]

The definition puts emphasis in both the effects and the tax base of the environmental taxes.

On the one hand, environmental taxes are defined as per the impact they have on increasing the cost activities and the pricing of products that are damaging for the environment.

On the other hand, environmental taxes are levied on tax bases that are considered to produce negative impacts on the environment.

According to the framework presented in Eurostat (2013), other criteria such as the name of the tax, the objectives and the use of the revenues are considered less accurate than the tax bases, as they may lead to exclusion or inclusion of taxes that may have indirect environmental impact, however are not environmental taxes per se.

[1] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32011R0691&rid=1
[2] This definition is followed by other organization such as the OECD and the United Nations.

1.2.1. Tax bases

In order to support the above-mentioned definition, a list of relevant tax bases has been agreed by the Eurostat, the European Commission's Directorate General Environment and Directorate General Taxation and Customs Union, the OECD, and the International Energy Agency (IEA) in 1997. The list has been updated in 2011 and 2012.

The list is divided in four main categories, which include the following:

- Energy: Energy products (e.g. unleaded petrol); Energy products for stationary purposes; GHG including carbon content fuels.
- Transport: Motor vehicles import or sale; registration (e.g. yearly taxes).
- Pollution: Measured or estimated emissions to air (e.g. NOx emissions; SOx emissions; excluding CO2).
- Resources: Harvesting of biological resources (e.g. timber); Extraction of raw materials (e.g. minerals; oil and gas).

As mentioned above, these tax bases serve as a reference framework for international comparisons. The framework allows analysts and policy makers to identify and compare environmental taxes, since all taxes levied based on the above will be considered as environmental taxes.

1.2.2. Excluded categories

Throughout this work we will not consider property or land taxes, VAT, charges, or other levies that are not considered environmental taxes

1.3. Main categories of environmental taxes

According to Eurostat’s guidelines on environmental taxation, environmental taxes may be classified into four different categories which correspond to the four tax bases identified above.

1.3.1. Energy taxes

Energy taxes are the most relevant form of environmental taxation in the EU. According to data from the Eurostat (2020), revenues from energy taxation account for almost 78% of the total environmental taxes in the EU.

The energy tax definition provided by the Eurostat includes all taxes on energy products used for transport or stationary purposes. The most relevant products for transport purposes are petrol and diesel, whilst for stationary purposes the most relevant sources are fuel oils, natural gas, coal, and electricity.

It is relevant to point out that the framework provided by Eurostat includes carbon taxes under energy taxes instead of pollution taxes. This is due to the following:

- It is not possible to differentiate CO2 rates in statistics because these are integrated in energy taxes e.g. tax rates on fuel are based on the carbon content of such fuel.
- They are partially introduced as a substitute to other energy taxes and the revenue from these taxes can be much higher than pollution taxes. Including CO2 taxes within pollution taxes would lead to distortions in time series at both international and national level.

According to the data presented in EC (2020), more than two thirds of energy tax revenues come from transport fuel. Ranging from over 85% of the total energy tax revenue in countries such as Lithuania to 37% in countries such as Denmark.

However, the Eurostat (2013) guidelines recommend that when CO2 taxes are identifiable as a separate category, these should be identified as such in the total energy taxes.

This approach has been recently followed by the European Commission (EC 2020) in its wide assessment of the existing practices to reduce GHG in the EU. In the context of this assessment the Commission used a different framework than the Eurostat's by separating CO2 taxes from the energy taxes and has identified 16 EU jurisdictions out of the 33 jurisdictions considered as having a carbon tax. The increasing existence of separate CO2 taxes in the EU may be an indicator for the Eurostat to update its theoretical framework, to formally include a separate CO2 tax category.

Considering the growing importance of carbon taxes in the EU, we will dedicate the next paragraphs to explore the nature of these taxes

Carbon taxes

Of the 33 countries analyzed by the Commission in its assessment on existing tax practices, 16 had adopted a carbon tax until 2020, 13 of which are EU member states.

Carbon taxes in the EU present very divergent tax rates, ranging from 108.81 per ton of carbon emissions in Sweden to 0.09 in Poland (World Bank 2020). Moreover, tax bases are also very divergent resulting in different shares of the total GHG emissions covered by the tax (3% in Spain and 62% in Norway).

In most countries carbon taxes are calculated based on the same criteria as fuel excise taxes i.e. by reference to kilograms of fuels. More rarely, as in the case of Poland, carbon taxes are levied directly on emissions.

As it will be developed in the chapters below, carbon taxes may have regressive economic effects. Those negative effects may decrease public acceptability regarding this kind of measures. Therefore, revenue earmarking or providing compensation measures is extremely relevant to counter negative regressive effects these taxes may have in low-income families.

With respect to carbon taxes, studies have demonstrated that these are only effective over a certain threshold. Aydin and Essen (2018) have demonstrated that below certain thresholds carbon taxes increase prices with no particular environmental effects (EC 2020).

Energy tax directive

The energy tax directive 2003/96/EC ("ETD")[3], lays down the rules for the taxation of energy products used as motor fuel, heating fuel and electricity.

The ETD establishes minimum excise duty rates, above which each member state may set higher rates according to the specific needs of each jurisdiction. The directive also identifies the energy products subject to the harmonized rules and sets the regulations for applying tax exemptions and reductions.

[3] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32003L0096&from=en

The ETD was adopted in 2003 in a time where the regulatory framework and the policy and climate objectives of the union were substantially different. To assess whether the directive has attained its objectives, as well as if in its current form it is fit to address the new challenges that arose since its implementation, in 2019 the Commission launched an assessment of the ETD.

The work of the Commission resulted in a report (EC 2019) that has depicted the following conclusions:

- The directive does not reflect the current mix of energy products in the market.
- The directive's long list of exemptions favors fossil fuel consumption (harmful tax incentives).
- There is no link between the minimum tax rates of fuels and their energy content or CO2 emissions.
- The ETD fails to adequately promote GHG reduction, energy efficiency or alternative fuels.
- It no longer achieves its objectives and its added value has eroded significatively over time .

As a result of the assessment performed in 2019, and in the context of the EU Green Deal the Commission undertook a revision of the ETD in order to make sure that it is in line with the EU's climate ambitions as well as to encourage European individuals and entities to be part of the path to climate neutrality, by changing their behavior towards the environment.

On July 2021, the Commission has put forward a proposal for the revision of the ETD, that follows the conclusions reached from the impact assessment, as well as from the opinions issued by the key stakeholders. The proposal is a part of the broader 'Fit for 55' package and updates the directive in order ensure that it is line with the Commission's carbon reduction objectives for 2050.

1.3.2. Transport taxes

Transport taxes are the second most relevant component of environmental taxes, accounting for an average 19% of the total environmental taxes in the EU. These taxes include taxes related to the use and ownership of motor vehicles, as well as taxes on other

means of transports (e.g. airplanes, ships) or transport services if they correspond to the definition of environmental taxes. Transport taxes may be charged on an annual basis (e.g. annual road tax) or on one-off basis (e.g. registration tax).

Taxes on environmentally friendly means of transport, such as public transport, electric cars or others should also be considered under this definition. As pointed out above, taxes on petrol and other transport fuels should be allocated to the energy tax category.

It is relevant to note that some countries levy one-off registration or annual vehicle taxes based on the specific emissions of the acquired vehicle. Such countries use CO2 emissions as the tax base (e.g. average CO2 emissions per 100 km), or combined CO2 emissions with other features such as vehicle wight and engine power. These taxes should also be considered under the transport tax category.

1.3.3. Pollution and resource taxes

Pollution taxes include taxes on estimated emissions (GHG except CO2) to air, water, management of solid waste and noise.

Resource taxes intend to tax activities that may have a negative impact on natural resources. Taxes are levied on the extraction and use of natural resources including water, forests, wild flora, and fauna. Taxes that seek to charge rents from natural resources extraction, should not be considered as resource taxes. These should be considered rents on property income, as they are charged because the resources being extracted belong to the state.

1.4. Theoretical framework: Pigou, Ramsey, and the double dividend hypothesis

The key objective of environmental taxes is to reduce the negative implications that human activities and consumption may have on the environment, namely by applying the "polluter pays-principle" defined by the OECD and included in the Treaty on the Functioning of the EU ("TFEU").[4]

[4] Article 191 of the TFU states that: *"(…) It shall be based on the precautionary principle and on the principles that preventive action should be taken, that environmental damage should as a priority be rectified at source and that the polluter should pay."*

Environmental taxes have been recognized has essential instruments for environmental policy for decades, and for that reason vast and relevant literature exists on the topic.

The notion of environmental taxes is often associated to the name of Arthur Cecil Pigou, a British economist who put forward the idea to use taxes as a form of coping with negative externalities generated by a particular activity, which are not included in the price of such activity.

In those cases where the negative externality or 'social cost' is not covered by the private price of the activity, the market outcome is not efficient, and overconsumption of the product may occur. *Pigouvian taxes*[5] are taxes levied on production associated with a negative externality at a rate which is set at the marginal social damage caused at the optimal level of output. The main challenge with Pigouvian taxes is to measure marginal external cost and therefore to define what level of tax will be sufficient to internalize the negative externalities.

Although not all environmental taxes are Pigouvian taxes, this type of taxes (i.e. aimed at pricing environmental harmful activities) have been considered as an efficient form of internalizing negative impacts from consumption and production (Baumol and Oats 1988).

Apart from the Pigouvian approach that considers social costs as the base for defining tax rates, research as demonstrated that the tax rate should also vary based on the elasticity of demand. Such approach is based on Ramsey's rule, according to which the more inelastic the demand the higher the tax rate should be.[6] This approach has the advantage of reducing the inefficiency, or "dead weight costs" of taxes, i.e. the distortive effect of taxation on economic activities (Eurostat 2013).

Environmental taxes are often included in a broader context of an environmental tax reform ("ETR") reform. ETR is viewed as the use of environmental tax revenues to reduce

[5] Named after the British economist Arthur C. Pigou who has addressed taxes on economic activities that generate negative extarnilities in is work *The Economics of Welfare, 1920*.
[6] Note that Ramsey's optimal taxation is just "optimal" considering the efficiency criterium. Ramsey's rule is not optimal if we consider both efficiency and equity.

other distortionary taxes such as labor taxes. This can be attained by shifting the tax burden from labor to environmental taxes[7].

The ETR concept is based on the “double dividend principle”, according to which by using environmental tax revenues to shift the tax burden from labor taxation to environmental taxes, a double gain is achieved: on one hand the positive environmental effects and on the other the societal gains of reducing labor and other distortive taxes and therefore increasing available income for families (Bovenberg and de Mooij 1994).

[7] The EEA (2005) defines an ETR as “… the term used for changes in the national tax system where the burden of taxes shifts from economic functions, sometimes called 'goods', such as labour (personal income tax), capital (corporate income tax) and consumption (VAT and other indirect taxes), to activities that lead to environmental pressures and natural resource use, sometimes called 'bads'.”

2. Relevant considerations when implementing an environmental tax policy

Environmental taxes should be adopted within a broader legislative package. Such a package should take into consideration several factors, namely the positive and negative incentives that are provided in each specific jurisdiction. A one-size fits all solution would be hard to implement, due to the different features of each jurisdiction: different emissions, from different sources, as well as a diverse macroeconomic framework.

Furthermore, before adopting an ETR, governments should pay close attention to the implications that increasing taxation or adopting new types of taxes may have on the general economic activity.

This is especially relevant when regarding the distributional consequences and the potential regressivity of some environmental taxes. Studies show that public acceptability of environmental taxes is directly connected to the perceived fairness with regards to how these taxes are applied (EC 2020: p. 49). Revenue recycling and the double dividend hypothesis play a very important role in making sure that low-income households are not more affected than medium and high-income households from price increases caused by the adoption of environmental taxes.

When designing the adequate environmental tax package, positive and negative impacts on innovation should be weighed carefully. The ETR should serve as an incentive for green innovation by (i) increasing prices and remove harmful tax incentives to polluting practices; and (ii) using resources from environmental taxation to create beneficial incentives – e.g. tax exemptions – to foster innovation and search for environmentally friendly alternatives.

In the following paragraphs, we will address some of the aspects that are most relevant when considering the adoption of an ETR. Due to the limited nature of the present paper, the following sections shall only present brief literature and empirical evidence with the objective of raising awareness of some of the main factors to be considered by policy makers.

2.1. Impact on competitiveness and innovation

Environmental taxes provide incentives for efficiency gains, green investment, and innovation. Carbon pricing is an incentive in the sense that, entrepreneurs are likely to research and use low-emission production technology to avoid paying additional taxes (OECD 2010).

An example of the impact of taxation in fostering green innovation is put forward on a study by Calel and Dechezleprêtre (2016: p.173) that demonstrated that even though the average price of carbon in the EU is still lower than desirable, low-carbon innovation as increased by as much as 10%.

Combined with subsidies and tax incentives, environmental tax policy may have the power to increase the cost of environmental harmful practices, while reducing the cost of investment in green innovation. Several academic studies have pointed out the importance of subsidies and tax incentives for research and development as a key factor for the development of green innovation. [8]

However, tax incentives and subsidies cannot be regarded as a substitute for carbon taxes in reducing GHG emissions or even on promoting green innovation. Both instruments should be used complementarily to achieve better results (OECD 2010: p.16).

This hypothesis has been theoretically discussed across literature. Porter (1991) and Porter and Linde (1995) have proposed the so called “Porter Hypotheses” according to which the environmental regulations may play an important role in securing competitiveness and green innovation, when green taxation is implemented by means of efficient and flexible regulation that includes the use of economic instruments (EC 2020).

In practice however, competitiveness considerations lead countries to provide harmful exemptions and rebates to certain industries. This has direct impact in the effectiveness of environmental taxes, especially on carbon taxes, while increasing the administrative burden for administrations caused by the increased complexity of tax systems. Simultaneously, showing concerns over competitiveness are pondered when adopting a tax policy, increases public acceptability of these type of measures.

[8] https://citizensclimatelobby.org/carbon-taxes-accelerating-innovation-while-cutting-emissions/#_ednref18

Regarding the competitiveness of business subject to green taxes, it is also worth mentioning the discussing around the so called "carbon leakage". Carbon leakage happens when businesses decide to relocate their polluting activities to other jurisdictions, where environmental taxes are not charged.

In principle, businesses that decide to relocate their carbon intensive activities to other jurisdictions, are able to sell their products in jurisdictions where green taxes are in place for more competitive prices than those practiced by their competitors that did not move their activities.

However, there is few evidences in literature that carbon leakage actually takes place. In fact, studies have shown that the EU ETS[9] as well as environmental tax reforms in seven EU member states, have not caused carbon leakage (Naegele and Zaklan, 2017; Joltreau and Sommerfeld, 2019). As pointed out by Lowe (2019), this may be due to the fact that in its early years of existence, the EU ETS did not have a relevant impact on prices (EC 2020).

To counter the effects of possible carbon leakage with the rise of environmental tax charges, the commission (in the context of the EU green deal) has proposed the implementation of a carbon border adjustment mechanism ("CBAM"), that would put a price on imports of certain carbon intensive goods produced outside the EU. The CBAM would reduce competitiveness issues caused by the relocation of certain EU business to jurisdictions where green taxes are not charged.

Under the proposal presented by the Commission on the past July (in the context of the 'Fit for 55' package), EU importers would buy carbon permits to ensure that the carbon price that would have been charged had the goods been produced in the EU is paid. In case the non-EU producer paid a price on carbon in its jurisdiction, the EU importer is allowed to deduct the full price paid by the producer (EC 2021a).

2.2. Emissions reduction: effectiveness of environmental taxes in reducing emissions

Measuring the real impact of environmental taxation in reducing emissions is of outmost importance. Firstly, because it allows governments to track and adapt

[9] Naegele and Zaklan (2017) and Joltreau and Sommerfeld (2019) have not found evidence for carbon leakage in EU manufacturing caused by EU ETS.

environmental taxes according to their efficiency. Secondly because by exposing data proving the correlation between the adoption of environmental taxes and the reduction of GHG emissions, public acceptability of these taxes may increase, as populations will associate taxation to a societal benefit.

The measurement of the effectiveness of environmental taxation measures based on their impact on GHG emissions, has been studied via ex-ante simulations and ex-post evaluations. With the increasing number of countries adopting GHG taxes, more ex-post studies have been produced (EC 2020).

Ex-ante studies exist mostly for Nordic countries, who were the first to implement ETRs and served to simulate the impact of a planned ETR or to simulate the potential introduction of a measure. An interesting study in this regard is the one performed by O Broin et al. (2019), which concludes that if France, Germany, Italy, Spain and the UK had introduced a carbon tax such as the one introduced in 1997 by Sweden, these countries would have reduced demand for fossil fuels by 10% to 20%.

A collection of ex-post studies performed by Andersen (2004) conducted in the Nordic countries have unanimously demonstrated that carbon taxes had indeed reduced GHG emissions and that in the case of Sweden the carbon tax reduction resulted in a carbon emissions increase (proving the effect of harmful tax incentives).

Studies have also demonstrated that the use of earmarked revenues to support the adoption of energy efficient solutions for certain businesses has had wide positive effects in energy savings. That is the case of the Danish energy savings program, that in the first five years of existence used 20% of the revenues from carbon taxation, to support adhering industries to support the change to greener production process as well as to use more environmentally friendly energy sources. As a result of the energy savings program, business that joined the program had 60% larger energy savings than business that had not joined the program.

A more recent study by Andersson (2019) found that Swedish carbon tax and VAT on transport fuel, reduced emissions in the transport sector by 11% (EC 2020).

Another study demonstrated that the ETRs were responsible for carbon tax reductions in the Nordic countries and Germany ranging from 4% to 6% between 1995 and 2004.

The same study has showed that the Netherlands and the UK have achieved less favorable results as their ETR were implemented later and were less ambitious.

It should be noted that hen conducting comparability studies on the effectiveness of environmental taxes, is a challenging task mainly for two reasons (i) the lack of harmonized definition of environmental taxation is each member states (ii) the fact that only aggregate data per each member stat is available (Bologni A. and Luchetta, G. 2020).

Another challenge is that empirical studies in different countries use different methodologies, databases, periods of time which makes it hard to compare cross-country effectiveness of carbon taxes and other environmental tax measures.

Different economic frameworks and conditions in each jurisdiction, such as the socio-economic situation or energy consumptions, as well as different tax designs also pose challenges to greater comparability across different countries.

To conclude it should be noticed that, according to the available studies, the current levels of environmental taxation are insufficient to reach medium and long-term goals set out internationally. This may be because average rates for environmental taxes are still low worldwide.

Taking the above into account, it is recommendable for harmonized criteria to be adopted within the EU. Member states should put all efforts in try their best to harmonize environmental taxes, so that more reliable ex-post and ex-ante studies may be performed and to ensure that environmental tax policy is adapted so as to reach objectives such as the EU's 2050 tax neutrality.

In particular, within a single market with open economies, environmental taxes should be designed considering the level and scope of taxation not just in the EU, but particularly in neighbor countries. For example, give the mobility of capital, a high difference in taxation between Portugal and Spain, would have distortionary effects that should be avoided. When designing an environment tax system, tax competition should be considered.

2.3. Distributional consequences: regressivity vs progressivity

Environmental taxes are often viewed as regressive taxes for both households and industries. As demonstrated above, the most relevant form of environmental taxation is taxation on energy. Taxing energy may have direct effect of increasing prices on heating, electricity, and transport, especially on road transport. It also may have negative impact on product sales of those industries in which demand is more vulnerable to price changes.

To tackle these negative effects compensation measures may be put in place via revenue recycling actions, such as reducing labor taxes or supporting companies in investing in green production.

2.4. Public acceptability of environmental tax measures

When deciding on the adoption of environmental policies, political leaders may be influenced by several factors. Aspects influencing the implementation of environmental taxes range from specific economic factors, financial crises, to lobbying and climate policy framework.

Public acceptability plays a major role in the implementation of environmental tax policies. In fact, studies have demonstrated that public acceptability regarding environmental tax measures increases the probability of implementation of such measures, and that the motivation of policymakers to introduce these types of policies is significantly influenced by public acceptability (EC 2020).

According to Jagers, Martinsson and Matti (2019) there are two aspects to consider when adopting a tax policy (i) the reasons for public support for or resistance against these policies (ii) and whether / how an existing resistance may be eliminated or mitigated.

There are several motivations that may play a role in determining public acceptability on environmental policies. These include ideology, political culture, and economic conditions. Perspectives of fairness and government trust also play a crucial role in public acceptability of environmental tax policies.

The design of the policy itself is very relevant for public perception. ETRs that seek to mitigate regressive effects, and therefore the impact on low income households, tend to

be more accepted than measures that do not consider this aspect (Bristow et al. 2010 and Jagers, Martinsson and Matti 2019)

Moreover, literature[10] suggests that governments should provide enough information on the effectiveness of carbon taxes in reducing carbon emissions, as this will increase public acceptability of this type of measures. Therefore, communication strategies from governments, that expose fairness and efficiency of environmental taxes are also fundamental for increasing public acceptability.

Research has also demonstrated that people tending to accept carbon taxes focus on the need to solve environmental issues, whereas people against them mistrust governments, and focus on the lack of alternatives and fairness of new taxes, which reinforces the importance of communication to ensure political acceptability

Ideological preferences are also pointed out by Jagers, Martinsson and Matti (2019), stating that in right wing contexts compensatory measures may be more successful, whilst in left-oriented contexts, carbon taxes without compensation seem more likely to be accepted.

[10] Carattini et al. (2018) stress the role of communication strategies as an instrument to secure public acceptability, to reduce information asymmetry and to address the main concerns, like high personal costs, regressivity of the tax, negative impact on the wider economy and the lack of an incentive effect.

3. Environmental taxes in Portugal

3.1. Introduction

Portugal has adopted its first environmental related taxes in the early 90s following the *Green Tax Reform* initiative launched by the European Commission and the OECD. In the context of the 1997 tax reform, Portugal gave its first relevant steps in the implementation of environmental taxes (in 1992 VAT with environmental purposes had already been implemented). Apart from the introduction of vehicle taxes (both upon acquisition and on property) in 2007 no substantial environmental tax measures were adopted until 2014.

In 2014 a Commission (Commission for Environmental Tax Reform or "CETR") was nominated specifically for the purpose of designing an ETR in Portugal. The Portuguese ETR had the objective of implementing policy instruments seeking to reduce negative externalities caused by environmental harmful behavior and at the same time use revenues to reduce income taxation (tax neutrality) through revenue recycling.

The Portuguese ETR was based on a triple dividend model: (i) protect the environment and reduce energy dependency; (ii) foster growth and employment and (iii) contribute to reduction of public debt. The work of the commission resulted in a proposal of 59 measures in six different fields (Governo de Portugal 2014).

Further to the proposals of the CETR, the Portuguese Parliament approved the first carbon tax in Portugal and other taxes were implemented (including a fee on plastic bags) or reformed, namely through tax rate increases.

In the context of this analysis, and throughout the following chapters, an overview of the environmental tax framework in Portugal will be presented, and comparative figures that allow the understanding of Portugal's position in the EU will be provided.

Portugal follows the framework of the Eurostat presented in chapter I and includes in the EU ETS under the energy tax category.

3.2. Framework

According to data from the INE (2020), in 2019 environmental tax revenues in Portugal have reached a total amount of 5.4 billion. This represents an increase of 2.4% regarding 2018 (lower than the average increase for the total tax revenue which was of 3.8%). With regards to the total revenue collected, environmental tax revenues correspond to 7.3% of the total tax and social contribution revenues, above the EU average of 5.9% (Eurostat 2021).

These figures confirm the increasing trend that began in 2012 and has seen a surge in 2015 (most likely caused by the ETR that increased tax rates and introduced new environmental taxes). The revenue increase follows an EU trend that has seen a sustainable increase in environmental tax revenues since 2002, with a slight decrease between 2007 and 2009, attributed to the 2008 financial crisis (Eurostat 2021).

The data published by the Portuguese statistical institute (INE 2020) shows that energy taxes represented the biggest share (73%) in environmental tax collection, below the 77.9% of the EU average. This includes revenues from the EU ETS, the *Imposto Sobre Produtos Petroliferos e Energéticos* ("ISP"), the Portuguese carbon tax (AISP see below for further detail).

Environmental tax revenues in Portugal are mostly composed of taxation related to the use acquisition of motor vehicles, representing 89,9% of the total environmental tax revenue in 2019 (INE 2020).

Transport taxation which includes the Imposto Sobre Veículos ("ISV") and Imposto Único de Circulação ("IUC") were the second most collected taxes in 2019, accounting for 26.7% of the total environmental taxation collected in Portugal (well above the EU average of 18.9%). IUC's revenues amounted to 396,1 million in 2020, which represents a slight decrease (1,5%) when comparing with the previous year.

The ISV's total revenue amounted to 727.5 million in 2019 corresponding to a decrease of 5.2% when compared to 2018. During 2020, ISV has registered an historical fall of 39.8% - total revenue of 428,3 million - which is most likely caused by the 34% drop in vehicle acquisition caused by the pandemic (ACAP 2021).

Although the INE's report regarding the environmental taxes in 2020 is not yet available, it is predictable that taxes on vehicle property and use lose weight on the overall environmental tax collection.

Pollution and resources taxes account for a total 0.7% of the environmental tax revenue when comparing to 3% in the EU (INE 2020).

3.2.1. Tax expenditure

Environmental tax expenditure (considering the main environmental taxes ISP, AISP, IUC and ISV) in Portugal has reached a total amount of 952,70 million, which corresponds to the same amount registered in 2019 (in 2018 tax expenditure stood at 811 million).

Tax expenditure with IUC reached a total amount of 16,8 million in 2020. Focusing on IUC's foreclosed revenue for environmental protection purposes has reached 1 million.

ISV tax expenditure has reached a total amount of 347,7 million in 2020 a 16,1% reduction when comparing with the previous year. Expenditure with environmental protection purposes has substantially decreased from 55 million in 2019 to 12 million in 2020.

ISP has registered the highest amounts of tax expenditure, reaching a total amount of 588,2 million in 2020 (an increase of 12.6% when comparing with 2019). Once again tax expenditure with AISP is not separated for public accounting purposes. ISP has not registered any tax expenditure for environmental protection reasons (exemptions and preferential rates are mostly 99,3% attributed to economic reasons, namely for industrial purposes).

3.2.2. Budget and execution

In 2020, the Portuguese Ministry of the Environment had a total budget of 2.027 million of which only 1.550 million were executed.

According to data from the Eurostat[11] the environmental expenditure represented 1,4% of the total budget (below an EU average of 1,7%). In 2020, the total environmental expenditure increased to approximately 1,9% of the total budget.

3.2.3. Environmental Fund ("Fundo Ambiental")

Part of the environmental expense in Portugal is performed via the Environmental Fund ("EF").

The EF is the result of the merger of several funds with environmental purposes that existed in Portugal until 2016. It concentrates the Portuguese Carbon Fund, the Environmental Intervention Fund, the Water Resources Protection Fund and the Nature and Biodiversity Conservation Fund. The aim of this merger is to create a unique fund with more resources and ability to face the increasing environmental challenges.

The EF's objectives are to support environmental policies that contribute to achieve the goals set at both a national and international level namely regarding climate change, biodiversity, and others.

To fulfill its objectives, each year the fund launches a set of incentives and finances several actions, industries and projects that promote positive environmental practices on the several areas covered by its scope of activities.

Forecasts in the beginning of 2020 predicted that the EF's revenues of rise to a total amount of 484 million. However, the revenues effectively executed, exceeded expectations, and were registered a total amount of 647,7 million (GGFA 2021).

According to GGFA (2021) in 2020 the EF executed a total amount of 567 million corresponding to 118,26% of the initial amount registered in the 2020 State Budget (which amounted to 480.722.565).

The biggest share was spent in subsidizing public transportation (the so called "PART" program) by reducing the prices in several means of transport (trains, boats, electric trams). According to the Portuguese Environment Ministry these amounts have increased

[11] https://ec.europa.eu/eurostat/cache/infographs/cofog/

the number of public transport users by 20% and 17% in Lisbon and Porto Metropolitan Areas respectively.

The Ministry estimates that this caused a drop in CO2 emissions of around 154 thousand tons. As a complementary measure the EF has also spent 4,4 million in financing the acquisition of electric vehicles and on the installation of charging stations (GGFA 2021).

Other relevant measures such as the program "Edificios + Sustentaveis" that promotes the improvement of building's energy efficiency have also been executed.

The majority of the EF's resources come from the revenues generated by the EU ETS (255.794.065). This represents most of its funding. Other funds come from partial earmarking of carbon taxes such as the ISP on fossil fuels and the AISP. Another substantial part of the EF's resources come from the earmarking of AISP's revenues to the PART program. In 2020 earmarking of AISP for the PART was of 138.6 million (of a total 232 million expenditure in public transport) (GGFA 2021).

Such earmarking is a good example of revenue recycling practices to reach the first dividend – i.e. environmental objectives.

In 2021, the Portuguese government has earmarked revenues arising from the elimination of harmful tax subsidies, to the environmental fund, which is also a positive measure in terms of revenue recycling practices.

3.3. Environmental taxes in Portugal: focus on energy and transport

According to data from the European Environmental Agency ("EEA") about 30% of the EU's total CO2 emissions come from transport. Of these 30%, 72% of emissions come from road transportation mostly form private car transportation and heavy-duty trucks (EEA 2019).

This means that to curb with further emissions and to reach the tax neutrality goal by 2050, taxation of polluting motor vehicles is an essential measure. With the right package of measures that should include both taxation (as way of increasing prices and reduce demand for highly polluting vehicles), and incentives (e.g. incentives to the acquisition of electric vehicles or to the use of public transport), these objectives may be achieved.

In 2007 Portugal has approved the vehicle tax reform and introduced two types of vehicle taxation: the IUC and the ISV.

Both taxes are based on the potential polluter pays principle [12]and intend at changing consumer behavior by increasing more the prices of the more polluting vehicles, and simultaneously providing incentives for the acquisition of less polluting vehicles.

The ISP also plays a relevant role in changing consumer behavior towards the use of less polluting vehicles, as it increases the price of fossil fuels (especially gasoline). According to data from 2019 the ISP's tax base is mainly based on fossil fuels.

In the paragraphs below, we will look into detail into these three types of taxes which together represent 94,2% (INE 2020) of the total environmental tax revenue in Portugal.

3.3.1. The Imposto Único de Circulação ("IUC") and the Imposto Sobre Veículos ("ISV")

The IUC is a vehicle property tax that is due on an annual basis. The IUC is charged on the ownership of all types of vehicles: cars, motorbikes, boats, or aircraft.

For vehicles which were registered in Portugal or in another EU country for the first time before June 30th, 2007, the IUC is calculated based on the fuel, engine capacity and registration year.

For vehicles registered after 2007 in Portugal or in another EU member state, CO2 emissions are also considered when calculating the tax. The IUC provides exemptions for electric cars.

One of the main issues pointed regarding the IUC is the fact that older cars pay less IUC than more recent ones. Such distinction is considered a negative incentive to the renewal of cars in Portugal (APREN 2020).

The ISV is a one-off vehicle registration tax and was introduced has a replacement to the former Vehicle Tax (*Imposto Automovel)* in 2007. Since that year ISV calculation is based in two components: the vehicle's engine power and the CO2 emissions (for

[12] Contrary to the ISP that more directly taxes pollution because it taxes the consumption of fossil fuels, the ISV and IUC tax, respectively the acquisition, and the annual property of the vehicle. Neither acquisition nor property itself are associated with pollution. Reason why "potential" polluter pay is used.

motorbikes and other vehicles, CO2 is not considered). In the context of the 2015 ETR ISV rates were substantially increased, and specific exemptions were introduced for less polluting vehicles.

The polluter pays principle is inherent to both the IUC and the ISV thanks to the CO2 component in which both taxes are based. The main goal of these taxes is, therefore, to reduce CO2 emissions by promoting the acquisition of less pollution intensive vehicles.

Portugal's ISV has been recently considered by the Commission as a good practice example of environmental taxes in the EU. Evidence has shown that the ISV has strongly contributed for the shift towards the purchase of less polluting vehicles and therefore for the reduction in CO2 emissions in Portugal.

Together with other complementary measures such as subsidies to the acquisition of electric cars, the IUC and ISV have proved to be effective in the reduction of CO2 emissions in Portugal.

This has been proved by the increasing number of electrical vehicles that have been acquired in Portugal. In 2020, there was an increase of 55,3% on the acquisition of electrical vehicles when comparing with 2019.

This has confirmed a growing trend since 2015 towards the acquisition of both hybrid and electric vehicles in Portugal. According to data from the ACAP in 2015, 711 electric vehicles and 483 hybrid vehicles had been acquired in Portugal, this compares to a total of 7.830 electric and 11.867 hybrid plug-in vehicles in 2020 (Nascimento, M. 2021). This represents a 55,3% increase when compared to 2019, even in the atypical pandemic year of 2020 which led to a decrease on the acquisition of combustion engine vehicles of around 40%.

In the future, the Portuguese authorities may be required to re-think the tax bases of these type of taxes, since as consumer behavior changes, tax bases will end up being eroded and tax revenues reduced.

A good example of how ISV's tax base is unstable, is the 39.8% revenue drop that occurred in 2020, due to the above-mentioned decrease in the sale of carbon intensive vehicles.

In the 2021 State Budget[13] there was a relevant shift in the taxation of hybrid and electric vehicles in favor of this second group. The political and economic argument was that hybrid vehicles are very much used in combustion mode and not in electric mode so that they are not as effective in reducing emissions.

3.3.2. The Imposto sobre os produtos petrolíferos ("ISP") e energéticos and the Adicional ao Imposto sobre os produtos petrolíferos e energéticos ("AISP").

ISP

The ISP is an excise duty which is regulated in accordance with the ETD.

As a general rule, the ISP is charged over the use of carburant or fuel taxes. The ISP is the main energy tax in Portugal, representing 67,5% of the total environmental taxes in Portugal.

According to the special consumption taxes code ("IEC"), ISP taxes the following products:

- All energy and petrol-based products.
- Other products that although not being petrol based are used as carburants.
- Other hydrocarbons that are destined to be used as fuel.
- Electricity.

Although the ISP taxes several products as described above, according to INE's data from 2019 most revenues from this tax come from the consumption of gasoline and diesel. This makes the ISP's tax base particularly vulnerable to fluctuations in the consumption of these energy sources.

ISP revenues have shown a steady increase over the period ranging from 2015 to 2019. However, as a result of the pandemic's effect in overall mobility, a substantial decrease in the consumption of gasoline (-17.7%) and diesel (-13.5%) and also a decrease on international crude prices, a loss of ISP revenue for 2020 amounting to 348 million has been registered.

[13] Article 391 of the 2021 State Budget.

These figures show that ISP's revenues are strongly dependent on fluctuations on the consumption of fossil fuels. Therefore, if ISP is successful in reaching its environmental objectives (changing consumers behavior) it is likely that tax revenues from this particular tax will be reduced substantially. Governments should find ways to expand the scope of energy taxes otherwise tax revenues will decrease over the years.

According to the INE, 45.7% of energy taxes (which as shown above are almost wholly composed by the ISP) are paid by families whilst 51.2% are paid by other sectors.

The IEC code provides a specific list of products that should be considered as petrol based or energetic products.

Taxable units for each different product are calculated based on different criteria according to each product's characteristics (e.g. electricity MWh; natural gas gigajoule; some petrol-based products 1000 kg and 1000 liters).

Contrary to the AISP (as detailed below) the ISP does not consider CO2 components as a taxable base.

According to the IEC code the rates of each product subject to ISP, are defined by the government taking into account the principle of market freedom as well as the different environmental impact of each of the energy products subject to ISP, gradually favoring the less polluting products.

Tax rates are then calculated on each different base. The table below resumes the main rates applied by energy product:

Product	Tax rate (Euros)
Leaded petrol	650
Unleaded petrol	359
Oil	302
Colored and marked oil	0
Diesel	278
Colored and marked diesel	21
Fuel oil with sulfur content greater than 1%	15
Fuel oil with a sulfur content less than or equal to 1%	15
Electricity	1

Table 1 Source: Portuguese Special Cosumption Taxes Code

One of the aspects that has been mostly criticized in the ISP is the fact that it charges lower rates for diesel than for gasoline, although diesel is more polluting than gasoline.

As a result of such difference in taxation of these two types of fuel, diesel and gasoline prices are substantially different (APREN 2021).

The difference between rates applied to gasoline and diesel has led to a substantial shift in consumer behavior towards the acquisition of diesel cars which has been preferred by consumers for a long time and constitutes the majority of the vehicles in circulation in Portugal. This tendency is being inverted by the increasing acquisition of electric and hybrid vehicles.

However, matching diesel with gasoline is essential to reduce diesel car acquisition and circulation. In the context of the European Commission's revision of the ETD, minimum taxation for gasoline and diesel should be matched, and Portugal should amend the ISP in line with such amendment. (APREN 2021).

This aspect should be reviewed so that tax rates of gasoline and diesel are matched. (APREN 2021).

The IEC code also provides for long range of exemptions namely regarding the fuel used in commercial aviation and shipping. These exemptions, which cover a wide scope of emissions, are also being reviewed under the ETD and should also be considered in Portugal.

The IEC code has been amended in the 2021 budget law, that extend the scope taxation of the ISP to energy production activities (previously excluded by the IEC code). This is a relevant step in expanding the scope of carbon emissions subject to ISP. The amendments to the ISP and the AISP on the 2021 budget law will be exposed below.

AISP

The AISP is the Portuguese carbon tax and was introduced in the context of the Portuguese 2014-2015 ETR. Until 2015 all taxes which had as reference energy taxation – i.e. the ISP - were considered as environmental taxes in the statistics.

However, as demonstrated above the ISP is not calculated based on the carbon emissions released to the atmosphere. The Portuguese carbon tax covers the non-ETS sectors allowing a wider coverage of the carbon emission taxation in Portugal.

The AISP is levied on the following products:

- Petrol.
- Oil and colored and marked oil.
- Diesel (includes road diesel, colored and marked diesel and heating diesel).
- LPG (methane and petroleum gases) used as a fuel or propellant.
- Natural gas used as a fuel or propellant.
- Fuel Oil.
- Petroleum coke.
- Coal and coke

The AISP was implemented with the objective of expanding the scope of carbon taxation in Portugal to cover the non-ETS sector, and internalizing negative externalities caused by activities out of that sector.

The AISP is calculated based on the CO2 tonnage of a particular energetic or petrol-based product (as defined for the purpose of applying the ISP). The rate of the AISP is defined by arithmetic average of the price resulting from the EU ETS auctions in Portugal. The reason for this is to avoid distorting market incentives across EU ETS and non-ETS sectors.

Portugal has almost doubled its full carbon tax rate from 12.74/tCO2e to 23.619/tCO2e. In 2021 this rate has been again increased to 23.921/tCO2e (Santos, A.S. 2020). The Portuguese carbon tax currently covers for 29% of the total GHG emissions (World Bank 2020).

Although having surged in the last two years, the Portuguese carbon tax is still below the 35.85/tCO2e average of the 16 European countries that apply a carbon tax. According to the data from the World Bank (2020), in April Portugal was tied with Denmark in 8th place of the total 16 countries on highest carbon tax rates.

The last place is occupied by Poland with a carbon tax rate of 0.09/tCO2e and the first by Sweden at 108.81/tCO2e. When comparing the share of GHG covered by the carbon tax Portugal is a mid-table country comparing to 62% coverage in Norway and 3% in Spain. This shows a lot of room for extending the emissions coverage of the AISV (World Bank 2020).

In 2020 Portugal has begun charging carbon tax on certain coal-fired energy generation and co-generation facilities that are covered by the EU ETS. The carbon tax rate for 2020 for these facilities is based on 50 percent of the difference between the full carbon tax rate and a target carbon price of 25/tCO2e, resulting 0.69/tCO2e on top of the EU ETS.

In addition to this, non-ETS emitters are subject to taxation on fuel oil and natural electricity in 2020 at 25% and 10% percent of the carbon tax rate, respectively, whereas they were previously fully exempted.

It is relevant to note that there is no clear separation of the revenues obtained with the AISP as these are integrated in the ISP's total revenues.

In the future, and for the sake of transparency the Portuguese authorities should seek to differentiate the revenues of the two taxes in statistics. This will increase transparency on the AISP's tax collection which has demonstrated in chapter two is fundamental for ensure public acceptability. Amounts subject to revenue recycling should also be explicitly published to increase public acceptability.

Earmarking of revenues

According to the objectives of the Portuguese ETR the AISP's revenues should also pursue the so-called double and triple dividends throughout revenue recycling measures (Governo de Portugal 2014).

As mentioned above, apart from the environmental purposes inherent to the AISV, the implementation of this tax had also the objective of strengthening growth and employment as well as to contribute for a stronger budgetary position.

This would be achieved through mixed revenue recycling: i.e. reinvesting the revenues from the AISV in environmental incentives, as well in reducing more distortive taxes such as income taxes. Such strategy is in line with what is proposed at international level namely by the OECD.

Pereira, Pereira and G. Rodrigues (2015) have demonstrated that long term revenue recycling may have positive effects on GDP and reduce public dividend. The CETR had proposed a system according to which revenues from carbon taxes would be

allocated to investment tax credits, 25% to reducing personal income taxes (“PIT”) and 25% to finance lower social security contributions.

A study by Pereira, Pereira and G. Rodrigues (2015) published in the year after the implementation had concluded that the implementation of the AISV by the Portuguese parliament, had not followed the ETR commission’s advice in terms of revenue recycling.

A more recent study by Seixas, Fortes Gouveia, Simões, Pereira e Pereira (2017) reinforces the idea that adopting revenue recycling strategies has a positive effect in accelerating the decrease in carbon emissions, reduce public and foreign debt and simultaneously produce positive macroeconomic effects. By applying economic models that simulated the application of these measures, researchers demonstrate through model simulation positive effects in reducing debt as well as increasing employment and GDP.

However, since 2015 the earmarking of tax revenues from carbon tax is very low in Portugal and does not go in line with the objectives of the plan. In 2015 earmarking of AISP’s revenues was limited to 30 million towards the environmental fund. However, in the years that followed until 2020, this amount was reduced to 10 million only to be raised again 2020 to 30 million. From 2019 AISP’s revenues were earmarked (limited to around 140 million?) to finance the public transportation tariff reduction program.

The 2021 budget law presents other specific measures such as the earmarking of carbon taxes on electricity to the environmental fund and towards the National Electrical System to reduce the subsidy debt that the state has toward the electric sector, which is paid by consumers.

This demonstrates that, although there has been an effort to expand the scope of activities covered by the AISP, there is still no clear effort to pursue an effective revenue recycling strategy especially with regards to the reduction of distortive taxes such as PIT (“IRS”) and CIT (“IRC”).

Earmarking is currently performed at low percentages and is mostly directed at the environmental fund, where it is indirectly used for environmentally friendly investments (such as the investment in public transportation and incentives to the acquisition of electric vehicles).

Portugal should pursue good practices such as the one pursued by Denmark, that earmarks 60% of carbon tax revenues to reduce taxes on labor and 40% for environmental purposes.

3.3.3. State Budget Law 2021: New rules

The 2021 state budget law has introduced some changes to the ISP and the AISP. The changes are in line with the objectives of expanding the scope of these measures, eliminating harmful tax incentives, and increasing the earmarking of the revenues collected.

In line with EU recommendations in the context of the Green Deal, the Portuguese budget law has also introduced a new tax on air and sea travel. Although these means of transport substantially contribute for air pollution in the EU, the have been successively exempt from the scope of environmental taxation.

The paragraphs below resume the most relevant measures that were approved in the context of the 2021 budget law:

IUC

Higher rates for certain diesel vehicles are maintained (introduced in 2020).

ISV

Increased taxation on hybrid, hybrid plug-in and gas moved vehicles with higher cubic or power and higher emissions.

ISP

- The exemption of ISP on diesel and fuel oil used in dredging of ports and waterways is revoked.
- Advanced biofuels are fully exempt from ISP if they are certified with the biofuel title (“Título de Biocombustível” or “TdB”). Renewable gases are also fully exempt if they are certified with guarantee of origin.
- Increase in the taxation of carbon intensive products used in the production of electricity, combined heat and power and town gas, for entities whose main activity is electricity production. The additional taxation is based on

percentages of ISP and AISP (from 50% to 75% or from 25% to 50%). Until 2020 energy producing entities based on Madeira and Azores were exempt from this additional taxation[14]. From 2021 ISP and AISP apply at a 20% or 25% depending on the products used.

- All these rates are expected to progressively increase to 100% (in most cases) until 2025.
- ISP is maintained over gasoline and diesel. Diesel rates are still lower than the rates applied to gasoline.
- Carbon tax on air and sea travel: a 2 per passenger travelling by air or sea from Portuguese airports or ports. This is a carbon tax in the sense that internalizes the price of negative externalities that are caused by emissions generated by these types of transport. It is a positive step in the sense of increasing the coverage of Portuguese carbon taxes, and it is in line with the recommendations from the EU and the OECD (2019).

[14] Madeira and Azores have a very peculiar taxation framework that go against some basic principles of fiscal federalism. The Portuguese Constitution approved in 1976, two years after the revolution, establishes that all tax revenues generated in the territory are revenues to be applied on the territory. Therefore, there is no revenue sharing with central government, and tax regimes are very autonomous of the main “continental” tax regime.

4. Conclusion and recommendations

Portugal is in the right trajectory for reaching its climate objectives. However, in order to reach carbon neutrality by 2050, a strong and integrated environmental tax policy is required. Such a tax policy should be complemented with beneficial tax incentives and elimination of harmful subsidies.

Based on the analysis performed above, we have reached the following conclusions and recommend the following measures in respect to the Portuguese environmental tax framework:

- The gap of gasoline and diesel tax rates which have proven to incentivize the increasing consumption of diesel vehicles, should be eliminated.
- In line with the measures that have been approved in the context of the 2021 State Budget Law, the scope of carbon emissions subject to taxation should continue to expand. This may be reached by finding new tax bases and rethinking environmental taxes. As noted above almost 100% of environmental tax measures are related to vehicles or fuel used for vehicle purposes (agricultural and farming polluting activities are barely taxed).
- Keep the path in eliminating harmful tax incentives, as recommended by the Commission in the context of the EU Green Deal.
- Increase transparency regarding the use of carbon tax revenues. As demonstrated above the lack of transparency and communication strategies may lead to the eroding of public support of this type of measures. As carbon taxes keep increasing this is an issue of greater importance to avoid polemics and ensure public acceptability.
- Earmarking of carbon revenues is one of the most relevant aspects to be addressed by the Portuguese authorities. As demonstrated in the chapters above, revenue earmarking is still very low in Portugal, although having increased in the last two years (since 2019 part of the AISP's revenues is earmarked towards the public transportation program PART). This is preventing the carbon tax to achieve its double or triple dividends as initially planned by the CETR. Since it is predictable that the carbon tax burden increases over the years, revenue recycling will become increasingly relevant in preventing negative macroeconomic and regressive effects that may arise from the introduction of new carbon taxes. This is objective is

highlighted the Roadmap for Carbon Neutrality 2050 (RCN 2050: p.82) as well as in the program of the socialist part which is now in office. However, as demonstrated above revenue recycling is still in infancy in Portugal.

- Ex-post studies should be performed so as to measure concrete impact on innovation, competition, income distribution and effectiveness of environmental taxes in reducing GHG emissions should be sponsored by the government and published in a transparent way. These studies are especially relevant to adapt environmental tax policy to economic reality and to ensure public acceptability of environmental tax measures. An internet platform like the currently used for the environmental fund may be used for this purpose.
- AISP and ISP revenues should be separated for statistical purposes so that revenues for each of these taxes are easily accessible. This information could be presented in the above-mentioned internet platform.
- Energy and vehicle tax bases should be re-thought taking into consideration that the more efficient they are in attaining their objectives the less tax revenue is collected. As mentioned in the APREN (2021) report, this will mean identifying "other environmental externalities not adequately taxed at present (e.g. environmental pollution, noise, border carbon, etc.)". Taxation of other gases such NOx and SOx is also a possibility that should be considered. The Portuguese authorities should pay special attention to the *fuel shifting* phenomena that may arise from the change in consumer habits towards more environmentally friendly consumption (e.g. the shift from fossil fuel to electric vehicles).
- The Fit for 55 program poses especially demanding challenges in this field, as it pushes for further taxation of fossil fuel usage, particularly with regards to the update in the taxation criteria defined by the ETD. In the long term and depending on the implementation of these measures by the Portuguese authorities, they may lead to a substantial reduction on the amounts of environmental taxes collected (provided that indeed their objective is indeed attained). Given that environmental taxes represent approx. 10% of the total tax collection in Portugal, this aspect should duly safeguarded, and alternative sources of revenue should be found in order to avoid a substantial decline in the State's resources.

As a conclusion and advice for future studies it should be noted that aggregate data with respect to environmental taxation is still very scarce, especially with regard to revenue recycling or the use of environmental tax revenues. It would also be relevant, and beneficial for governments to have clear information on the effectiveness of environmental taxes in Portugal. Information in this regard is also very incipient, and the low transparency in this regard may lead to decreases in public approval.

The next environmental tax reform should look at environmental taxation as well as other forms of taxation which are not considered in the official statistics of environmental taxation but have a strong environmental composed. According to the APREN (2021) the total revenue from energy taxes (included taxation on electricity VAT and others) hits 11 billion, which makes it more visible that the expenditure in environment as still a margin to expand.

Acronyms

GHG – Greenhouse emissions

EPI – Environmental policy instruments

EU ETS – European emission trading system

EU – European Union

OECD - Organization for Economic Co-operation and Development

ETD – Energy Tax Directive

CO2 – Carbon Dioxide

TFEU – Treaty on the Functioning of the European Union

EC – European Commission

CBAM – Carbon border adjustment mechanism

VAT – Value Added Tax

CETR – Commission for Environmental Tax Reform

ISV – *Imposto Sobre Veículos*

INE – *Instituto Nacional de Estatística*

IUC – *Imposto Único de Circulação*

ISP - *Imposto sobre produtos petrolíferos e energéticos*

AISP – *Adicional ao Imposto sobre produtos petrolíferos e energéticos*

EF - Environmental Fund

EEA – European Environmental Agency

IEC - Special Consumption Taxes / *Impostos Especiais Sobre o Consumo*

PIT/IRS – *Imposto sobre o Rendimento das Pessoas Singulares /* Personal Income Tax

GDP – Gross Domestic Product

CIT/IRC – *Imposto sobre o Rendimento das Pessoas Colectivas /* Corporate Income Tax

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