

Environmental Taxation in Portugal: A Contribution to Sustainability



Sara Sousa

Abstract Environmental taxation represents a key tool in a country's sustainable development strategy, being an important factor of conciliation between environmental protection and economic growth. As a result of high population growth, intense industrialization and fossil fuels' overuse, the world deals with serious environmental problems, namely unacceptable values of greenhouse gas emissions and severe climate changes. Its mitigation and resolution depend on the adoption of a set of concrete measures and policies to combat pollution and promote deep changes in polluters' behavior and, in this context, we highlight the key role of the environmental taxation policy. Some years after one of the most important reforms, this research proposes to analyze and interpret some of the main statistics on the environmental taxation in Portugal. The final aim is to provide policy makers with more information, allowing them to consolidate an efficient strategy regarding the promotion of a more sustainable development, through the application of an efficient environmental taxation.

Keywords Sustainable development · Environmental protection · Environmental taxation · Portugal

1 Introduction

The twentieth century witnessed considerable increases in global population, industrialization, and fossil fuels consumption. Despite its unquestionable importance in some key economic areas, such as power generation and transport, the overuse of fossil resources, such as natural gas, coal, and oil, raises serious environmental sustainability issues. In addition to being nonrenewable and therefore finite resources, the use of fossil fuels is responsible for high levels of greenhouse gas

S. Sousa (✉)

Coimbra Business School/ISCAC and CERNAS, Polytechnic Institute of Coimbra, Coimbra, Portugal

e-mail: ssousa@iscac.pt

(GHG) emissions, namely carbon dioxide (CO₂), with harmful consequences on the global warming of Planet Earth. According to the Intergovernmental Panel on Climate Change (IPCC 2018), GHG emissions released by human activities are estimated to have caused approximately 1.0 °C of global warming above preindustrial levels (i.e., since the start of the Industrial Revolution), with a likely range of 0.8–1.2 °C. If these emissions continue to increase at the current rate, global warming is likely to reach 1.5 °C between 2030 and 2052—an additional warming of 0.5 °C from today's level. The world's future global warming evolution strongly depends on global annual decarbonization rates.

There are some solutions to address these environmental problems and promote a sustainable development strategy, namely through a significant investment in more efficient use of resources, adoption of carbon capture and sequestration technologies, and increased use of non/less polluting and renewable energy sources (RES) (Silva et al. 2019). Regarding the renewables, despite not being impact-free (e.g. Botelho et al. 2016, 2018), its increasing use, as an alternative to fossil fuels, represents an exceptional opportunity for mitigation of GHG emissions and reducing global warming (Panwar et al. 2011; Borenstein 2012), namely by allowing to satisfy, in a more sustainable way, a growing world energy demand which is expected to increase by 30% until 2040 (IEA 2016).

These environmental issues have been the subject of intense debate in the European Union (EU), which is strongly committed to undertaking ambitious environmental protection policies, particularly with regard to combating climate change, having ratified the Paris Climate Agreement on 5 October 2016. Under the framework of this international agreement, all parties are pledged to undertake considerable efforts to reduce GHG emissions by 20% by 2020 and by at least 40% by 2030, compared to 1990, with the purpose of controlling and containing the rise in global temperature. This goal requires that all economies adopt a deep decarbonization strategy in order to achieve a global carbon neutral balance (UN 2015; EC 2019). In line with this strategy, Portugal must reduce its CO₂ emissions in the near future, which requires the adoption of some key public policies to lower the national carbon footprint, namely an effective environmental taxation policy—a key tool in the promotion of a sustainable development, representing a crucial link between environmental protection and economic development.

The remainder of this paper is organized as follows. Section 2 provides an overview of the key concept of sustainable development, essential for understanding the relations between economy, society, and environment. In Sect. 3, we present some of the main arguments for a country levying environmental taxes as an essential tool for promoting sustainable development, making a serious commitment to present and future generations to respect and protect the environment. Following, in Sect. 4, after a brief presentation of the national context regarding GHG emissions, we analyze some of the key statistics on environmental taxation in Portugal, allowing a better knowledge of the national Government's strategy in the pursuit of a sustainable development. Finally, the main conclusions are presented.

2 The Concept of Sustainable Development

A more detailed analysis of the literature allows us to realize that the concept of sustainable development is a very rich and broad concept, for which there are different interpretations and definitions according to the authors' approaches. Different organizations participated in the creation of the notion of sustainable development, but the most significant is the United Nations (UN), founded in 1945, with currently more than 190 Member States. The UN has several goals and one of them is to promote sustainable development. Since its establishment, UN has been very proactive, being responsible for the organization of numerous conferences, actions, and publications in order to achieve and promote a sustainable development and the Millennium Development Goals (MDGs) (Klarin 2018).

Despite not being the first publication or meeting organized by the UN, we can say that the concept of sustainable development was firstly introduced in its true sense and gained international relevance with the publication "Our Common Future" of 1987, also known as "Brundtland Report," according to which, "sustainable development is one that meets the needs of the present without compromising the ability of future generations to meet their own needs" (WCED 1987, p. 43).

Many other UN meetings and publications followed, contributing to further consolidate the concept of sustainable development. We highlight the following. In 1992, the importance for all nations to achieve a sustainable development was strengthened in the UN Conference on Environment and Development (UNCED), held in Rio de Janeiro, Brazil. In the preamble of its final report—"Agenda 21"—it is stated: "Humanity stands at a defining moment in history. We are confronted with a perpetuation of disparities between and within nations, a worsening of poverty, hunger, ill health and illiteracy, and the continuing deterioration of the ecosystems on which we depend for our well-being. However, integration of environment and development concerns and greater attention to them will lead to the fulfilment of basic needs, improved living standards for all, better protected and managed ecosystems and a safer, more prosperous future. No nation can achieve this on its own; but together we can—in a global partnership for sustainable development" (CNUMAD 1997, p. 9). Some years later, in 1997, the UN publishes the document "Agenda for Development" and, in its first paragraph, it is referred that: "Development is one of the main priorities of the United Nations. Development is a multidimensional undertaking to achieve a higher quality of life for all people. Economic development, social development and environmental protection are interdependent and mutually reinforcing components of sustainable development" (UN 1997, p. 1).

Since then, the discussion about sustainable development has been intensely developed and today we find in the literature different interpretations, which complement and prove how rich and comprehensive the concept is. According to Costa (1999, p. 62): "sustainable development is a huge umbrella, capable of harbouring a wide range of innovative, progressive proposals/approaches, or at least moving

towards greater justice improvement of the population's quality of life, more dignified and healthier environments and commitment to the future."

From all the definitions and considerations presented, it is easily understood that debating sustainable development involves the cross-fertilization between distinct disciplines (Hui 1997). In its evolution, the concept of sustainable development has been popularized as a concept based on three main pillars or dimensions of sustainability settled in balance: economic, environmental, and social. Hopwood et al. (2005, p. 39) states that "The concept of sustainable development is the result of the growing awareness of the global links between mounting environmental problems, socio-economic issues to do with poverty and inequality and concerns about a healthy future for humanity. It strongly links environmental and socio-economic issues."

It is also important to underline that the concept of sustainable development is closely related with the notion of justice regarding the ecosystems' use and conservation: justice between different people of the current generation—intragenerational justice; and justice between people of different generations—intergenerational justice (Aragão 2012; Emas 2015; Mendes 2016). As stressed by Spijkers (2018), Planet Earth can be seen as a valuable and irreplaceable resource, used by past generations, currently being used by current generations and it is expected to be used by future generations. The main challenge is to find a balance between intragenerational equity—all people, rich and poor, of the current generation and intergenerational equity—present and future people. Particularly attention must, however, be given to those of the upcoming generations since they have no voice. In sum, "sustainable development requires the integration of economic, environmental, and social objectives across sectors, territories, and generations" (Emas 2015, p. 3).

3 Environmental Taxation

The world is facing a host of complex environmental problems such as GHG emissions from fossil fuels combustion, deforestation, air, soil, and water pollution, inefficient resource management, and climate change. All these environmental aggressions have become particularly evident in the second half of the past century worldwide. While some are confined to local areas and may be the result of a few polluters, others occur at the global level and are brought about by millions of different actors. It is also observed that as economies grow richer and become more industrialized, the awareness about environmental problems increases and the desire and ability to confront these challenges growth as well (OECD 2011a, b, c). The relation between environmental degradation and national income is well documented in the Environmental Kuznets Curve literature (Grossman and Krueger 1993).

It is observed that, while poor countries value further income more than environmental quality, rich countries are willing to forgo further industrialization in favor of more environmental protection (Dorsch 2011).

In order to achieve environmental protection and sustainable development, governments have a range of tools at their disposal, such as regulations, information programmes, innovation policies, environmental subsidies and taxes. Environmental taxation is a key part of this toolkit and widely accepted as a powerful instrument for combating complex environmental problems worldwide (e.g., Cottrell and Falcão 2018; Aidt 2010; Bachus et al. 2019; Gago et al. 2007; OECD 2011a, b, c).

We present some of the main reasons for using environmental taxes as follows:

- (i) Internalization of external environmental costs: one of the main arguments for using environmental taxes is to bring the costs of pollution and other environmental aggressions into the prices of the goods and services. Such environmental costs—negative externalities—are not included in the prices paid by the involved agents, which creates significant market distortions, since it encourages activities that are costly to society even if there are considerable private benefits. The application of an environmental tax allows to bring these external costs to prices, so that social and private costs are as similar as possible. This internalization of the negative externalities will lead to a reallocation of resources of an economy according to “fair and efficient” prices by redistributing the costs (EEA 1996, 2016; EC 1992, 1995).
- (ii) Implementation of the polluter pays principle (PPP): environmental taxes implement the PPP, since they confront polluters with the costs caused by their harmful behavior. Moreover, the application of taxes on the polluting activities incentivizes other alternative environmentally sustainable options, namely: cleaner production processes; measures to capture and neutralize harmful emissions before they enter the environment; and development of less polluting products. In the cases where it is difficult to tax directly the polluting activity, close intermediate goods or activities can provide a good tax base. For instance, it would be very difficult and expensive to tax directly the CO₂ emissions from individual motor vehicles, but, since the release of these emissions is highly correlated with fuel use, taxing fuels is an efficient alternative. Thus, the most efficient method to combat environmental degradation is direct taxation at the polluting source (good or service, behavior or activity). However, when this is not possible, close intermediate goods, services, or activities should be taxed so that the source of environmental pollution is not unpunished (OECD 2011a, b). Regarding the PPP, we highlight the research developed by Aragão (2014) in which the author deepens in detail the importance of this principle in environmental policy.
- (iii) Creation of incentives: an environmental tax provides an incentive for producers to use, or generate, less of the polluting substance being taxed. On the other side, with the raise of prices, consumers are also incentivized to buy less of the taxed products. Environmental taxes may be targeted directly on consumers or on producers, but in all cases they end to affect all agents by changing relative prices and therefore behaviors (EEA 1996, 2016).

But the incentive effect is not exhausted in the processes just described. Environmental taxes provide an ongoing incentive for innovation, as firms and

consumers seek cleaner solutions in response to the price put on pollution. To further reduce their tax burden, firms are incentivized to invest in research and development (R&D) towards new production technologies generating lower levels of pollution and, consequently, with a lighter environmental footprint. If these R&D activities are successful, the same level of production can be realized with lower pollution. Thus, the new production technology results both in substantial tax savings as in lower environmental damages. The wider context is also determinant for the innovation outcomes of environmental taxes: the regime of intellectual property rights, the higher education system, and cultural norms towards innovation are just some examples of key tools to a country promote its innovation capacity (Fullerton et al. 2008; OECD 2011a, b; Vollebergh 2012).

- (iv) Double dividend: a potential double dividend from environmental taxes was initially suggested by authors such as Pearce (1991) and Oates (1991). According to the double dividend argument, applying taxes on polluting products and behaviors provides two different benefits: (i) on the one hand, there is an environmental gain because the environmental behaviors of both consumers and producers have become more responsible; (ii) on the other hand, with the application of environmental taxes, an additional tax revenue is generated, which allow governments to reduce the tax burden on, for example, the labor, resulting in an increase in employment, which represents an economic gain (Borrego 2016). In this case, taxes on “bads” such as polluting products and behaviors create additional revenues that can replace the revenue raised by taxes on “goods” such as labor, thereby shifting the tax burden from the “goods” to the “bads” (EEA 2000).

However, it should be stressed that if there are no doubts regarding the first dividend, the same cannot be said about the second one. The double dividend literature can be divided in two strands. On the one hand, some authors, particularly the Europeans, focus on the impact that environmental taxation revenues can have on the macroeconomic variable employment. Thus, this specific form of double dividend, where both emissions and unemployment are reduced by the environmental taxation, is usually named “employment double dividend.” On the other hand, we have another group of contributions, most from the United States (US), focusing upon the distortions of the tax system, before and after an environmental tax. According to this approach, the second gain results from the reduction of the negative impact of the tax system on the economy: by reducing taxation on capital, income and other taxes, which have a distortion effect on the economy, then the economy becomes more efficient and competitive (Bosello et al. 1998; Alves and Roseta-Palma 2004).

Regarding the first dividend, there is no doubt about the concept, despite the difficulty in knowing the exact values of the environmental gains from green taxation. With regard to the second dividend, in addition to different interpretations regarding the concept, there is also some controversy regarding the sign of this dividend on the economy: if some authors argue that environmental taxation

provides positive effects on the economy (e.g., Goulder 1995; Parry and Bento 2000; Labandeira et al. 2004; Glomm et al. 2008; Stavickiene and Ciuleviciene 2014), others consider the existence of a second dividend, but with a negative impact on the economy (e.g., Bovemberg and Mooij 1994, 1995; Bohm 1996; Bosquet 2000; Chiroleu-Assouline 2001).

4 The Case of Portugal

Before addressing some of the key environmental tax statistics in Portugal, it is important to evaluate the degree of pollution in the country. To this end, we present below a portrait of Portugal regarding GHG emissions, one of the main threats to the Planet's sustainability.

4.1 National GHG Inventory

The greenhouse effect is considerably influenced by human activity, mainly by the use of fossil fuels, which increases the amount of carbon dioxide (CO₂) in the atmosphere. There are others harmful gases such as methane (CH₄) and nitrous oxide (N₂O), which are mainly emitted by agricultural activities. The emission of GHG is responsible for temperature rise, which leads to climate changes, affecting severely life conditions on the planet. This is why reducing GHG emissions is probably the most important global environmental challenge of the present generation (Castanheira et al. 2008).

According to the Portuguese National Inventory Report on Greenhouse Gases (see APA 2019), in 2017, total Portuguese GHG emissions, without land use, land-use change, and forestry (LULUCF), were estimated at about 70.7 million tonnes (Mt) CO_{2e}, representing an increase of 19.5% compared to 1990 levels and an increase of 7.0% compared to the previous year, 2016.

The Portuguese GHG emissions over the last three decades reflect largely the evolution of the national economy. During the 1990s, the unprecedented rise in energy demand and mobility resulted in a steady increase of the emissions. Then, in the early 2000s, the growth of emissions has been more moderate and started to stagnate, mainly due to a large investment in RES and an increased efficiency in energy use. Thereafter, in particular after 2005, the emissions registered a decrease as a result of the later economic recession and, after a slight decline in 2016, total emissions in 2017 increased significantly by 7.0% compared to the previous year, which raise serious concerns (APA 2017, 2019).

Through a detailed sectoral analysis, we conclude that the energy sector, including transport, remains the main responsible for GHG emissions, with 72.6% of total national emissions in 2017. In this sector, energy production and transport are the main polluters, accounting for around 29.5% and 24.3% of national emissions,

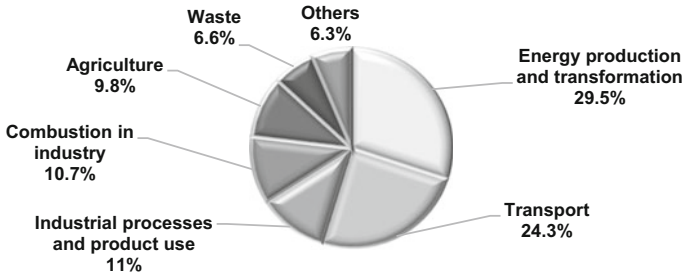


Fig. 1 Sectoral GHG emissions in Portugal, 2017 (LULUCF excluded). Source: APA (2019)

respectively, reflecting the country's high dependence on fossil fuels for electricity generation and transports (Fig. 1). With considerable lower levels of pollution, industrial processes and product use, agriculture and waste sectors have approximate weights, representing 11.0%, 9.8%, and 6.6%, respectively. It is also important to highlight the role of LULUCF (land use, land-use change, and forests) sector, being a net emitter or a carbon sink depending on the occurrence of forest fires in Portugal. In 2017, this sector returned to being a net emitter, with a total of 7.2 MtCO_{2e}, representing 9% of the country's total emissions as a consequence of the exceptional and tragic year in terms of forest wildfires, associated to an exceptional dry year, high temperatures and unusual strong winds, phenomenon that can be related to climate change (APA 2017, 2019).

In 2016, the Portuguese government pledged to achieve carbon neutrality by 2050, through the adoption of a strategy of intense decarbonization of all sectors of the national economy, in accordance with the Paris Agreement. This commitment implies achieving a balance between GHG emissions and carbon sequestration, which is only possible through substantial decreases in emissions and/or substantial increases in carbon sinks are required. In this national strategy, all economic sectors, with particular attention to the energy and transport, must reduce their emissions and adopt more sustainable production methods (MATE 2019).

This is a path that can no longer be delayed and requires the participation and action of all individuals, both producers and consumers, whose behavior must change in favor of environmental protection and the survival of present and future generations. Governments have a toolkit to promote and encourage individuals' environmentally benign and sustainable behaviors.

Following, we deepen environmental taxation in Portugal, one of the most effective tools in promoting a sustainable development.

4.2 Environmental Taxation in Portugal

In September 2014, a Commission for Environmental Tax Reform, appointed by the Portuguese government, submitted a report containing a proposal designed to guide Portugal to a triple dividend in the long run: (i) to protect the environment and to reduce external energy dependence; (ii) to promote growth and employment; (iii) to contribute to fiscal responsibility and to reduce external imbalances (CRFV 2014). That same year, in 31 December 2014, the Portuguese parliament approved the Law n.º 82-D/2014, the piece of legislation that implements key changes in the national environmental tax norms regarding several issues such as energy and emissions, transport, water, waste, land use, forests, and biodiversity (Diário da República 2014; MAOTE 2015).

The Green Tax Reform came into force on the first day of 2015, with the introduction of a set of key green tax measures, including:

- (i) Creation of a carbon tax on non-emissions trading scheme uses (non-EU-ETS), with a rate indexed to the price of the carbon in the EU-ETS sector.
- (ii) Incentives to electric mobility as well as increases of vehicle tax according to CO₂ emissions.
- (iii) Introduction of a tax on plastic bags by 8 cents/bag plus VAT.
- (iv) Rebates for the replacement of end of life vehicles were reintroduced.
- (v) Introduction of benefits for car sharing and bike sharing.

A few years after this reform, it is important to analyze and interpret some of the main statistics on environmental taxation in Portugal.

In 2017, environmental tax revenues reached about 5 billion euros, which represents an increase of 4.8% over the previous year. This was the fifth consecutive year with revenue increases for this type of tax, as shown in Fig. 2.

An analysis by tax category allows to observe that, in 2017, oil and energy taxes represented 72.1% of total environmental tax revenues. Transport taxes (single road tax and vehicles tax) accounted for 27.2%. Resources and pollution taxes, on the other hand, had an insignificant expression in the structure of environmental taxes (0.4% and 0.3%, respectively) (INE 2018). Figure 3 presents green taxes by category in Portugal for the year of 2017.

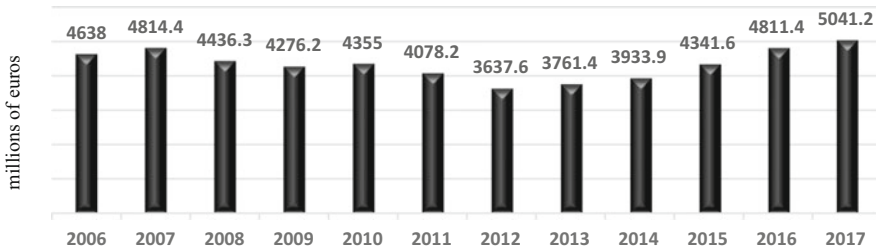


Fig. 2 Environmental tax revenues in Portugal, 2006–2017. Source: INE (2018)

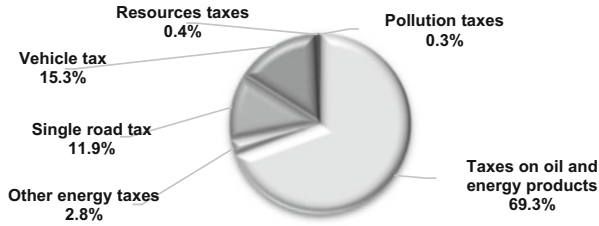


Fig. 3 Environmental tax categories in Portugal, in 2017. Source: INE (2018)

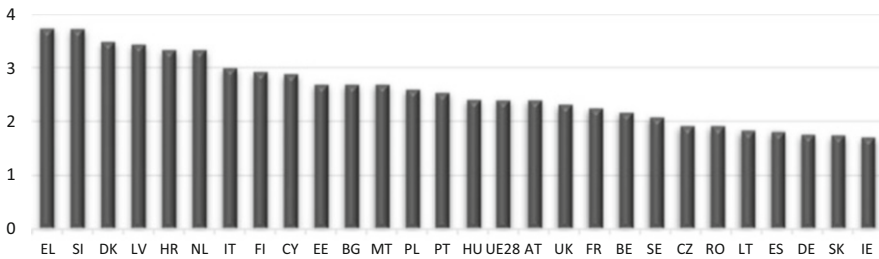


Fig. 4 Environmental tax revenues in % of GDP, 2017. Source: Eurostat (2019)

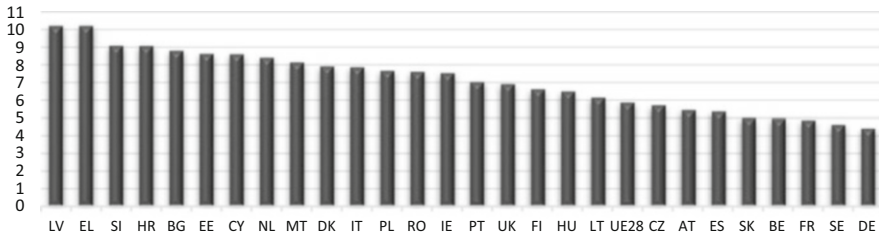


Fig. 5 Environmental tax revenues in % of total revenues from taxes and social security contributions. Source: Eurostat (2019)

In comparison with the other EU countries, in 2017, the share of environmental tax revenues in the national Gross Domestic Product (GDP) amounted to 2.59%, a value slightly above the EU-28 average of 2.40% (EC 2019; Eurostat 2019). Figure 4 presents the share of environmental tax revenues in the GDP of each EU-28 Member State.

In the same year, environmental taxation in Portugal contributed 7.02% of total revenues from taxes and social security contributions. Although this figure is above the Community average (5.86%), we consider that there is still some scope for, for example, transferring labor taxes to environmental taxes (EC 2019; Eurostat 2019). Figure 5 shows the importance of environmental tax revenues in total tax revenues and social security contributions in EU-28.

5 Conclusion and Discussion

Since at least the 1980s, the world has been well aware of the seriousness of environmental problems, namely the high level of GHG emissions, responsible for considerable negative impacts on human health and endangering the survival of both present and future generations. These environmental concerns have been at the center of intense debates in EU institutions, which, over the past decades, have been strongly committed to finding efficient strategies to combat pollution and change individuals' behaviors.

As an EU State Member, Portugal ratified the Paris Climate Agreement in 2016 and pledged to achieve neutrality of its emissions by the end of 2050, outlining a strategy to promote an intense decarbonization of the national economy. Focused in reducing the national carbon footprint, over the last years the Portuguese government has been adopting and reforming some important public policies, namely environmental taxation—a key tool in the promotion of the country's sustainable development, representing a crucial link between environmental protection and economic development.

Published in 31 December 2014, the Green Tax Reform in Portugal implemented key changes in national environmental tax norms regarding several issues such as energy and emissions, transport, water, waste, land use, forests, and biodiversity. These changes were decisive for the consolidation of the national environmental protection strategy and promotion of the country's sustainable development.

The analysis of some environmental statics reveals that: in the last 5 years, environmental tax revenues have consecutively been increasing, reaching 5 billion euros in 2017; the majority of these taxes are collected on oil and energy products (72.1%); the environmental tax revenues represent 2.59% of the national GDP, a value above the EU-28 average (2.40%); the environmental taxation represents 7.02% of total revenues from taxes and social security contributions represent a value above the EU-28 average (5.86%). Although national values are above the EU-28 averages, there is still some scope for transferring labor taxes to environmental taxes.

The final aim of this research study is to provide policy makers with more information on environmental taxation in Portugal, allowing them to consolidate a more efficient strategy for the country regarding the promotion of environmental protection and sustainable development.

References

- Aidt, T. S. (2010). Green taxes: Refunding rules and lobbying. *Journal of Environmental Economics and Management*, 60, 31–43.
- Alves, M. R., & Roseta-Palma, C. (2004). Impostos ambientais e o duplo dividendo: experiências europeias [Environmental taxes and the double dividend: European experiences]. *Economics Working Papers* (Vol. 14, pp. 1–24).

- APA (Portuguese Environment Agency). (2017, December). 7th National Communication to the United Nations Framework Convention on Climate Change. In *3rd Biennial Report to the United Nations Framework Convention on Climate Change, 4th National Communication in the Context of the Kyoto Protocol*, Amadora, Portugal. Amadora: Portuguese Environment Agency.
- APA (Portuguese Environment Agency). (2019). *Portuguese National Inventory Report on Greenhouse Gases, 1990-2017*. Amadora: Portuguese Environment Agency.
- Aragão, A. (2012). Desenvolvimento Sustentável em tempo de crise e em maré de simplificação. Fundamento e limites da proibição do retrocesso ambiental [Sustainable Development in times of crisis and in tide of simplification. Foundation and limits of prohibition of the environmental setback]. *Estudos em homenagem ao Prof. Doutor José Joaquim Gomes Canotilho*. Vol. IV (1). Coimbra: Coimbra Editora.
- Aragão, A. (2014). O princípio do poluidor-pagador: pedra angular da política comunitária do ambiente [The polluter pays principle: the cornerstone of community environment policy]. In J. R. M. Leite & A. H. Benjamin (Eds.), *Série Direito Ambiental para o Século XXI* (Vol. 1). São Paulo: Instituto O Direito por um Planeta Verde.
- Bachus, K., Ootegem, L. V., & Verhofstadt, E. (2019). No taxation without hypothecation: towards an improved understanding of the acceptability of an environmental tax reform. *Journal of Environmental Policy & Planning*, 21(4), 1–12.
- Bohm, P. (1996). Environmental taxation and the double dividend: fact of fallacy? *Working Paper n.º GEC 96-01*. CSERG.
- Borenstein, S. (2012). The private and public economics of renewable electricity generation. *The Journal of Economic Perspectives*, 26(1), 67–92.
- Borrego, A. C. (2016). Diploma da Fiscalidade Verde – Finalmente uma Fiscalidade Ambiental Integrada em Portugal? [Diploma of Green Taxation - Finally an Integrated Environmental Taxation in Portugal?]. *Revista de Gestão Social e Ambiental*, 10(3), 51–68.
- Bosello, F., Carraro, C., & Galeotti, M. (1998). The double dividend issue: Modelling strategies and empirical findings. In *National conference on energy and environment*, Rome, Italy.
- Bosquet, B. (2000). Environmental tax reform: does it work? A survey of the empirical evidence. *Ecological Economics*, 34(1), 19–32.
- Botelho, A., Pinto, L. M., Lourenço-Gomes, L., Valente, M., & Sousa, S. (2016). Public perceptions of environmental friendliness of renewable energy power plants. *Energy Procedia*, 106, 73–86.
- Botelho, A., Lourenço-Gomes, L., Pinto, L. M., Sousa, S., & Valente, M. (2018). Discrete-choice experiments valuing local environmental impacts of renewables: Two approaches to a case study in Portugal. *Environment, Development and Sustainability*, 20, 145–162.
- Bovemberg, A. L., & Mooij, R. A. (1994). Environmental levies and distortionary taxation. *American Economic Review*, 84, 1085–1089.
- Bovemberg, A. L., & Mooij, R. A. (1995). Environmental taxes, international capital mobility, and inefficient tax systems: Tax burden vs. tax shifting. *International Tax and Public Finance*, 5, 7–39.
- Castanheira, É., Dias, A. C., Arroja, L., Ferreira, A. J. D., Carreiras, M., & Pereira, C. D. (2008, July 6–10). The contribution of the dairy sector for greenhouse gas emissions in Portugal. In *Proceedings of the 8th European IFSA Symposium*, Clermont-Ferrand, France.
- Chiroleu-Assouline, M. (2001). Le double dividende: Les approches théoriques. *Revue Française d'Economie*, 16(2), 119–147.
- CNUMAD (United Nations Conference on Environment and Development). (1997). *Agenda 21*. Curitiba: IPARDES.
- Costa, H. (1999). Desenvolvimento Urbano Sustentável: uma contradição de termos? [Sustainable Urban Development: a contradiction of terms?]. *Revista Brasileira de Estudos Urbanos e Regionais*, 2, 55–71.
- Cottrell, J., & Falcão, T. (2018). *A climate of fairness - Environmental taxation and tax justice in developing countries*. Vienna: VIDC.

- CRFV (Commission for Green Taxation Reform). (2014). *Projecto de Reforma da Fiscalidade Verde [Project of Green Taxation Reform]*. Lisbon: Ministério do Ambiente, Ordenamento do Território e Energia.
- Diário da República. (2014). *1.ª série, N.º 252, 31 de dezembro de 2014*. Lisbon: Imprensa Nacional.
- Dorsch, M. (2011). The willingness to pay for environmental protection: Are developing economies different? In *Proceedings of the German Development Economics Conference*, Berlin.
- EC (European Commission). (1992). *Towards sustainability - a European Community Programme of Policy and Action in Relation to the Environment and Sustainable Development*, Vol. II, COM (92) 23 final. Luxembourg: Publications Office of the European Union.
- EC (European Commission). (1995). *Towards fair and efficient pricing in transport - Policy options for internalizing the external costs of transport in the European Union*. Luxembourg: Publications Office of the European Union.
- EC (European Commission). (2019). *The Environmental Implementation Review 2019 - Country Report Portugal*. Luxembourg: Publications Office of the European Union.
- EEA (European Environment Agency). (1996). *Environmental taxes - Implementation and environmental effectiveness*. Luxembourg: Publications Office of the European Union.
- EEA (European Environment Agency). (2000). Environmental taxes: Recent development in tools for integration. *Environmental Issues Series*, n. 18. Luxembourg: Publications Office of the European Union.
- EEA (European Environment Agency). (2016). Environmental taxation and EU environmental policies. *European Environment Agency Report N.º 17/2016*. Luxembourg: Publications Office of the European Union.
- Emas, R. (2015). *The concept of sustainable development: Definition and defining principles, brief for GSDR (Global Sustainable Development Report) 2015*. New York: United Nations.
- Eurostat. (2019). *Environmental tax revenues*. Luxembourg: Publications Office of the European Union.
- Fullerton, D., Leicester, A., & Smith, S. (2008). Environmental taxes. *NBER Working Paper* 14197.
- Gago, A., Picos, F., Labandeira, X., & Rodriguez, M. (2007). Environmental taxes in Spain: A missed opportunity. *International Studies Program Working Paper* 06-09.
- Glomm, G., Kawaguchi, D., & Sepulveda, F. (2008). Green taxes and double dividends in a dynamic economy. *Journal of Policy Modelling*, 30, 19–32.
- Goulder, L. H. (1995). Effects of carbon taxes in an economy with prior tax distortions: An intertemporal general equilibrium analysis. *Journal of Environmental Economics and Management*, 29(3), 271–297.
- Grossman, G., & Krueger, A. (1993). Environmental impacts of the North American Free Trade Agreement. In P. M. Garber (Ed.), *The U.S.-Mexico free trade agreement* (pp. 13–56). Cambridge: MIT Press.
- Hopwood, B., Mellor, M., & O'Brien, G. (2005). Sustainable development: Mapping different approaches. *Sustainable Development*, 13, 38–52.
- Hui, S. C. M. (1997, November 25–27). From renewable energy to sustainability: The challenge for Hong Kong. In *Proceedings of POLMET'97 conference*, Hong Kong Institution of Engineers, Hong Kong, pp. 351–358.
- IEA (International Energy Agency). (2016). *World Energy Outlook 2016*. Paris: OECD/IEA.
- INE (National Institute of Statistics). (2018). *Impostos e Taxas com Relevância Ambiental 2017 [Environmental Taxes and Fees 2017]*. Lisbon: INE.
- IPCC (Intergovernmental Panel on Climate Change). (2018). *Global warming of 1.5°C*. Geneva, Switzerland: IPCC.
- Klarin, T. (2018). The concept of sustainable development: From its beginning to the contemporary issues. *Zagreb International Review of Economics & Business*, 21(1), 67–94.
- Labandeira, X., Labeaga, J. M., & Rodriguez, M. (2004). Green tax reforms in Spain. *European Environment*, 14, 290–299.

- MAOTE (Ministry of the Environment, Spatial Planning and Energy). (2015). *Green growth commitment*. Lisbon: Ministry of the Environment, Spatial Planning and Energy.
- MATE (Ministry of Environment and Energy Transition). (2019). *Roadmap for carbon neutrality 2050 (RNC2050) - Long-term strategy for carbon neutrality of the Portuguese Economy by 2050*. Lisbon: Ministry of Environment and Energy Transition.
- Mendes, L. F. (2016). *A Justiça Intergeracional [Intergenerational justice]*. Law's Master Degree, University of Coimbra.
- Oates, W. E. (1991). *Pollution charges as a source of public revenues*. University of Maryland, Department of Economics Working Paper No. 91-22.
- OECD (Organization for Economic Cooperation and Development). (2011a). *Environmental taxation: A guide for policy makers*. Paris: OECD Publishing.
- OECD (Organization for Economic Cooperation and Development). (2011b). *Taxation, innovation and environment: A policy brief*. Paris: OECD Publishing.
- OECD (Organization for Economic Cooperation and Development). (2011c). *Green growth studies: Energy*. Paris: OECD Publishing.
- Panwar, N., Kaushik, S., & Kothari, S. (2011). Role of renewable energy sources in environmental protection: A review. *Renewable and Sustainable Energy Reviews*, 15, 1513–1524.
- Parry, I., & Bento, A. (2000). Tax deductions, environmental policy, and the “double dividend” hypothesis. *Journal of Environmental Economics and Management*, 39(1), 67–96.
- Pearce, D. (1991). The role of carbon taxes in adjusting to global warming. *The Economic Journal*, 101, 938–948.
- Silva, S., Soares, I., & Afonso, O. (2019, 16–17 May). The double dividend of a new environmental tax reform with promotion of resource substitution. In *Proceedings of the 4th international conference on energy and Environment: bringing together Engineering and Economics (ICEE)*. University of Minho and University of Porto, Guimarães, Portugal.
- Spijkers, O. (2018). Intergenerational equity and the sustainable development goals. *Sustainability*, 10(11), 3836–3848.
- Stavickiene, A., & Ciuleviciene, V. (2014). Comparative assessment of environmental taxes in the European Union States. *European Scientific Journal*, 10(14), 1–12.
- UN (United Nations). (1997). *Agenda for development*. New York: UN.
- UN (United Nations). (2015). *United Nations framework convention on climate Change. Adoption of the Paris agreement*. Report no. FCCC/CP/2015/L.9/Rev.1. New York: UN.
- Vollebergh, H. (2012). *Environmental taxes and green growth - Exploring possibilities within energy and climate change*. The Hague: PBL Netherlands Environmental Assessment Agency.
- WCED (World Commission on Environment and Development). (1987). *Our common future*. Oxford; New York: Oxford University Press.