ENVIRONMENTAL TAXATION AND EXTRA-FISCALITY IN PROMOTION OF RENEWABLE ENERGY

Victor Augusto de Abreu Ferreira[1]
Luciano Matias Diniz[2]

Abstract: This study analyzes environmental taxation and extra-fiscality in the context of the promotion of renewable energy in Brazil, seeking to understand how these policies can encourage sustainable behaviors and reduce dependence on non-renewable sources. The objective is to investigate the potential of environmental taxation and its application in the Brazilian energy matrix, using a descriptive approach with bibliographic review and documentary analysis. The results indicate that well-designed tax policies, such as tax exemptions and taxation of polluting activities, have a positive impact on the adoption of renewable energy, especially solar and wind energy.
Despite progress, challenges such as sectoral resistance and lack of government coordination limit the effectiveness of these measures. It is concluded that robust implementation of environmental tax policies is essential for the energy transition, highlighting the need for collaboration between government, business and society for a sustainable future.

Keywords: Environmental Taxation, Extrafiscality, Tax Law.

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1 INTRODUCTION

As expressed in article 225 of the Federal Constitution, everyone has the right to a healthy and balanced environment, which both the government and the population must value and protect the environment, using resources in a conscious way. To ensure these rights, it is up to the Public Authorities to ensure their conservation through policy.

The National Environmental Policy, regulated by Law No. 6,938, was born with the aim of guaranteeing the rights expressed in article 225 of the CF, with its main objectives: preservation, improvement and recovery of environmental quality. With industrial advancement, politics has become the most important reference for environmental protection.

In recent years, studies focused on alternative energy sources have increased, photovoltaic energy being one of the most satisfactory options, considering the consequences future environmental issues. Despite being a non-polluting and renewable source, solar energy corresponds to only 1.2% of the electricity matrix in 2022 (EPE, 2023). It is understood that the use of this resource is due to its high cost and lack of political interest (Bussadori, 2019).

Paulsen (2024) deals with tax law not only as a way of collecting resources, but can also be used in the practice of controlling and guiding conduct to be followed, assuming a different stance according to political interests. This means is given by the concept of extra-fiscality, making it possible to dictate the behavior of citizens and excluding what may challenge the common good.

In this sense, Morete (2013) states that taxes play a role fundamental as instruments of government intervention in the economy. In the context environmental, when used strategically, they encourage polluters to seek ways to reduce environmental degradation and adopt behaviors aligned with environmentally correct standards. In addition, the revenue from these taxes enables the financing of environmental measures and policies.

Given this context, the article is guided by the following research question: how environmental taxation and extra-fiscality can promote ecologically sound behavior positive?

In this way, the research in question aims to highlight the concepts of environmental taxation, extra-fiscality and tax incentives through bibliographic research and analysis of legislation, with the aim of investigating how tax policies can promote environmentally friendly behaviors by encouraging the adoption of

clean energy and discouraging the use of non-renewable sources. Therefore, it is understood how environmental taxation and extra-fiscality positively influence the ecological behavior.

Based on this assumption, the importance of this research is to allow the reflection on the possibility of applying political mechanisms in favor of the environment, as well as the obstacles that exist in the face of this practice.

2 THEORETICAL BASIS

This chapter will provide a comprehensive theoretical basis on the relationship between the matrix Brazilian energy, environmental taxation, tax incentives and extra-fiscality in the promotion renewable energy, with emphasis on solar energy. The importance of environmental taxation to encourage sustainable practices, the use of tax incentives to promote clean energy and the role of extra-taxation in directing behaviors more sustainable economic developments, especially in the context of renewable energy. This basis theoretical is fundamental to support the analyses and recommendations of the study on taxation environmental and renewable energy.

2.1 Brazilian energy matrix

The Brazilian energy matrix is diversified, composed of renewable and non-renewable sources. renewable energy sources used to meet the country's energy demand and contribute to its economic, technological and scientific development. This diversification reduces the risk of a possible energy crisis, with one source being able to supply the needs of another (Miranda; Oliveira; Ramalho, 2022). From this perspective, we consider two types of existing energies: renewable and non-renewable.

Non-renewable energies, known as "dirty sources", are those that are are depleted in nature and cause environmental impacts, being of organic origin and taking a long time millions of years to form. If exhausted, they cannot be easily regenerated, which generates pollutants and impacts such as global warming and loss of biodiversity due to burning of these fuels. (Miranda; Oliveira; Ramalho, 2022).

Currently, oil and its derivatives make up 67.87% of non-carbon energy. renewables in the country (EPE, 2024). According to the International Energy Agency Renewable (IRENA), this is because it is the source with the highest utilization rate.

Although the finiteness of oil and its derivatives is a factor to consider, the issue the depletion of world oil reserves still seems distant. Every day, hundreds of thousands of barrels are produced and sold, which contributes to this perception. In addition, the volatility of the price of a barrel is another impasse to consider, a since, as it is a *commodity,* its value is influenced by the law of supply and demand worldwide. In this sense, the development of alternative energy sources emerges as a viable solution to reduce external dependence on oil (Buainain, 2015).

Another problem faced is the environmental impact resulting from excessive consumption of petroleum and derivative products. This unbridled consumption results in the emission of gases pollutants in the atmosphere, thus contributing to the worsening of the greenhouse effect and the consequent global warming (Sena, 2023).

The burning of fossil fuels contributes to global warming, therefore it is necessary to seek renewable energy sources that cause less environmental impact. Although renewable energies such as wind, water, biomass, solar and geothermal are more sustainable, it is still necessary to constantly study and evaluate their impacts to reduce them to the maximum.

Renewable energies, also called "clean sources", are obtained from natural resources that are naturally replenished continuously. In addition, another A characteristic of this type of energy is its low environmental impact, therefore its use is portrayed as low-polluting and ideal (EPE, 2024).

Photovoltaic solar energy is a promising alternative for energy generation sustainable, using solar energy to produce electricity. This system has several advantages, such as not consuming fuel, not polluting the environment, having long lifespan, be resistant to adverse weather conditions and require little maintenance. The Brazil presents favorable conditions for investing in photovoltaic systems due to its solar incidence and high production of silicon, an essential material for solar panels (Silva, 2022).

In Brazil, photovoltaic energy arouses great interest due to its characteristics geographic, climatic and availability of land for generating facilities, without impacts negative environmental impacts or in agricultural production. Furthermore, it is a sustainable energy source, since the sun is an inexhaustible source of energy.

Solar energy is collected by solar panels that contain photovoltaic cells made of semiconductor materials, such as silicon. When sunlight falls on these cells, it is transformed into electricity. This energy can be used in many different ways, from

large-scale electricity production to water heating in homes and buildings
commercial. Furthermore, solar energy can be used not only to heat water in homes and
commercial buildings, through solar water heaters, but also allows
homeowners to produce their own electricity through power systems
residential photovoltaic systems. Both systems contribute to reducing energy consumption.
electrical energy and environmental impact (Netherlands, 2023).

One of the most impressive and noteworthy aspects of photovoltaics lies in
in its extraordinary ability to generate electricity in a decentralized manner. This
feature significantly distinguishes it from traditional power plants, which, for
standard, are located far from urban centers. In contrast, energy systems
solar panels offer the flexibility of being installed directly on the roofs of buildings
residential and commercial. This possibility not only democratizes access to energy, but
also significantly reduce the energy losses that occur during
process of transmission and distribution of electricity. This proximity between the point of
generation and consumption has the potential to revolutionize the way energy is distributed
in cities, strengthening sustainability and energy efficiency (Netherlands, 2023).

However, solar energy also has some limitations to consider.
For example, its efficiency is directly linked to direct exposure to sunlight for the
electricity generation. Thus, unfavorable weather conditions, such as days
cloudy or rainy, can impact energy production (Holland, 2023).
Additionally, it has limitations such as high investment costs and the need for
storage or alternative sources during periods without sufficient radiation. However, the
In the long run, solar electricity production may prove more profitable than
conventional electricity (Vian, 2021).

Despite being a renewable energy source with several benefits associated with it,
its use, it is important to highlight that, according to the 2023 National Energy Balance
released by EPE, its contribution of solar energy to the current energy matrix is
only 1.2%. Of this total, it can be seen that 80% is destined for residences, 17% for the sector
commercial and only 3% to industries. It is understood that the use of this resource is
if limited due to its high cost and the lack of relevant political engagement for the
its promotion and implementation. (Bussadori, 2019).

Finally, solar energy can contribute significantly to diversifying the energy matrix
energy, reducing dependence on fossil sources such as oil and natural gas. This
transition can minimize the impacts of fluctuations in fossil fuel prices and

strengthen the resilience of the energy system to climate change. The use of energy photovoltaic energy promotes development opportunities by providing clean and sustainable, boost the economy, raise the standard of living of communities and reduce dependence on non-renewable sources.

2.2 Environmental taxation

Environmental taxation is a public policy that aims to encourage more sustainable behaviors and protect the environment. It is based on the idea that human activities that cause environmental damage must be held accountable for these damage, thus encouraging the adoption of cleaner and more sustainable practices. One way to environmental taxation is the taxation of the production and consumption of products that cause harm environmental issues, such as toxic chemicals or non-recyclable materials. This can be done through taxes on the use of natural resources, such as water, or on the production of waste (Netherlands, 2023).

Environmental taxation is an effective instrument to encourage the adoption of practices more sustainable and reduce the environmental impacts of human activities. However, it is It is important that this taxation is balanced and fair, so as not to harm companies and individuals who already adopt more sustainable practices. Furthermore, it is essential that resources collected from environmental taxation are applied in a transparent manner and efficient in public policies that promote environmental protection (Holland, 2023).

According to the Organization for Economic Cooperation and Development (OECD), the implementation of an effective environmental taxation policy should be based on two essential pillars. Firstly, the taxes imposed must serve as instruments to mitigate negative externalities, integrating them into the total cost of economic activities the environmental damage caused during the production process. The second premise holds that tax policy should encourage less harmful practices to the environment by taxpayers, encouraging them to adopt methods that are align with environmental sustainability principles in their operations.

Environmental protection is a fundamental theme that permeates the entire Constitution, highlighting its relevance in Brazilian society. It is noteworthy that the The 1988 Constitution gave special emphasis to this issue by reserving a chapter exclusively dedicated to the environment. This chapter consists of a single article, the Article 225, which is divided into seven paragraphs.

The decision to devote an entire chapter to environmental protection reflects the commitment of the constituent legislator to the preservation of the environment and need to establish a robust legal framework for environmental issues in Brazil. Article 225 and its paragraphs establish principles, guidelines and responsibilities related to the conservation and sustainable use of natural resources, demonstrating the recognition of the 1988 Constitution on the importance of environmental protection for current and future generations.

2.3 Extra-fiscality and tax incentives

Taxes represent revenue generated by the State from the assets of individuals, being of a compulsory and fiscal nature. Taxation entails an increase in transaction costs and can shape the decisions made by citizens. Furthermore, taxes and taxes can be used as instruments to achieve economic, social, environmental or political, through extra-fiscality. However, it is essential that the use of extra-taxation is aligned with the principle of tax capacity, in order to avoid unequal and unfair taxation. Otherwise, there is a risk of overburdening individuals with lower purchasing power and discourage investments and business initiatives, negatively impacting the nation's progress (Paula, 2023).

In the legal-tax context, it is pertinent to consider the possibility of applying differentiated from the tax burden between companies that share identical capacity contributory. Such differentiation can be justified in the context in which one of the corporations carries out its activities from a sustainable ecological perspective, while the other opts for not adopt environmentally responsible practices. This approach is not only compatible with the principle of taxable capacity, but also reaffirms the imperatives of equity and tax proportionality in relation to the economic capacity of business entities. The granting of tax benefits as an incentive to adopt sustainable practices constitutes an effective mechanism to promote environmental responsibility in the business sector, without harm to compliance with basic tax principles (Fiorillo, 2017).

The Federal Supreme Court (STF), in its professional assessment, argues that the use of taxes with an extra-fiscal function to influence individual behavior does not violate the Constitution, as long as there is no confiscation of assets or disrespect for contributory capacity. However, it is the responsibility of the interested party to present the specific case details for a validity analysis. Extra-fiscal taxation is subject to to two types of control: constitutional limitations on the power to tax and limits on

interventionism in the economic domain, respecting principles such as national sovereignty, free competition, consumer protection and the environment, thus ensuring adequacy and effectiveness of taxation in achieving the desired objectives (Paulsen, 2024).

The renowned author Hugo de Brito Machado Segundo mentions the institute in his work of extra-fiscality, highlighting its application in the economic context through the tax on import and export tax:

> This is the case of import tax and export tax, which are increased or reduced to interfere in foreign trade, sometimes stimulating imports, sometimes discouraging them, to protect and control the domestic market. Suppose there is a very large supply of a certain imported product at very low prices, putting Brazilian factories of that same product at risk: the Federal Government will increase the import tax, but it will not be doing so to collect more. In fact, it will increase the tax so that imports will decrease. (2023, p. 154).

In this situation, the effectiveness of the extra-fiscal tax is clearly evident. The increase simple import tax promotes a significant change in trade, directing it according to the country's economic interests. This dynamic also applies reflects in the social, environmental and political spheres.

The regulatory function of taxation not only aims to promote compliance with positive patterns and desirable behaviors, but it can also discourage activities and unwanted behavior. In this professional sense, the use of the Tax as an instrument tax in the exercise of Police Power can be effective in promoting inspection environmental and guarantee its financing through a specific tax category.

Incentives granted by the State with the aim of promoting practices of ecological productions can be offered in different ways, such as granting benefits or the imposition of higher taxes when the activity harms the environment environment.

An example of this is Law No. 10,365 of September 22, 1987, which establishes in its article 17 a tax incentive for the municipality of São Paulo. This incentive consists of a fifty percent discount on Urban Property and Land Tax, applied in accordance with with the amount of tree vegetation present on the property, as long as it is declared as a permanent preservation area and that all legal preservation conditions are met met.

In the context of solar energy, the Goiás Solar Program stands out, established by Law State No. 19,473, of September 22, 2016, and regulated by State Decree No. 8,886, of September 22, 2016, which aims to boost energy production solar energy in the state of Goiás. One of the main attractions is the exemption from ICMS on

electricity generated by microgeneration and distributed minigeneration systems, as per determined by SEFAZ Ordinance No. 249, of November 21, 2017. These incentives contribute to reducing the costs associated with solar energy, encourage the adoption of photovoltaic systems, promote environmental sustainability and act as catalysts for economic progress and job creation in the renewable energy sector.

Tax on Transactions relating to the Circulation of Goods and on Services of Interstate and Intermunicipal Transportation and Communication Services plays a crucial role in promoting sustainability due to its extra-fiscal nature. It is worth noting, in this context, the ecological ICMS, a national mechanism that seeks to encourage municipalities to seek solutions to environmental issues, as well as to implement actions to preservation and environmental protection. This ensures that municipalities receive a larger share of financial resources from the state collection of ICMS. This incentive is in accordance with legislation such as State Law No. 18,030/2009, in its article 1, IV.

Taxation for the benefit of the environment is contemplated in several projects law, as is the case of Bill No. 403 of 2022, which provides for the exemption from the Tax on Import for electric and hybrid vehicles. The objective is to promote the use of these vehicles, taking into account the high environmental impact resulting from the use of fuels such as gasoline or ethanol, which emit carbon dioxide into the atmosphere, sulfur dioxide, nitrogen oxides, volatile organic compounds, non-carbon hydrocarbons burnt and other toxic substances.

Therefore, there are several ways of using taxation as an instrument preservation of natural resources. Its effectiveness stands out in encouraging the participation of citizens, as taxpayers, in partnership with public authorities in preservation and defense of the environment.

3 MATERIALS AND METHODS

This study aims to carry out a meticulous analysis of the Brazilian energy matrix current, with a special focus on the impact exerted by environmental taxation. Through extra-fiscal strategies, we investigate how such tax policies can foster environmentally desirable behaviors, promoting the use of clean energy while discourage dependence on non-renewable sources.

To achieve this objective, the research adopted a descriptive approach, with the aim of to identify, analyze and describe the main characteristics of the topic in question. This

approach allowed a detailed investigation of the peculiarities surrounding the extra-fiscality of taxation, thus evaluating how taxation can operate as a dual mechanism – encouraging the use of renewable energy and restricting non-renewable energy.

The development of this work was based on a bibliographic review that, according to Silva (2017), it plays a fundamental role as an auxiliary branch of science, enable the precise location of relevant sources, books and scientific materials necessary for carrying out scientific work. This bibliographic review has with the aim of providing a comprehensive and well-founded view of the central themes of research, which include environmental and extra-fiscal taxation and its application within the scope legal. For this, the integrative review technique was used, which allows gathering and synthesizing existing knowledge on the topic in a critical and structured way.

For data collection, the selection of sources was conducted based on criteria rigorous, ensuring the relevance and quality of the documents used. Firstly, the following inclusion criteria were established: articles published in the last 10 years, with the exception of classical works that establish central concepts, publications in journals scientific research with recognized impact in the environmental and legal fields, and studies that address specifically the topics related to this research, excluding those that do not directly address the problem studied. This method enabled the critical construction of arguments based on the Brazilian energy reality and the role of taxation as catalyst for sustainable practices, with special attention to the promotion of renewable energies.

To analyze the data collected in the review, the data analysis approach was used. content proposed by Bardin (2011), which allows categorizing and interpreting in a way systematically the main topics covered in the articles. The technique was chosen due to its flexibility and adaptability to qualitative studies, allowing the identification of trends, gaps and convergences in the reviewed research.

Thus, the analysis was carried out in three stages: Pre-analysis, exploration of the material and treatment and interpretation of results. The source selection process followed the established inclusion criteria, such as publication date, relevance to the topic addressed and methodological quality. In total, 56 articles were identified, of which 33 were excluded for not meeting the inclusion criteria, such as duplication, not relevance to the topic or inadequate methodology. Thus, 23 studies remained for analysis detailed, in addition to materials from reliable websites, legislation, among others, being selected the works with the greatest proximity to the theme.

Throughout this investigation, it was possible to outline the current panorama of the matrix country's energy sector and assess how environmental tax policies can be effective in encouraging the energy transition to more sustainable sources. Thus, this study contributes significantly to the understanding of the dynamics between taxation, use of energy and sustainability, highlighting possible paths for promoting a future cleaner and more responsible energy.

4 RESULTS AND DISCUSSIONS

In this chapter, the main topics will be presented and discussed in detail. results obtained through meticulous analysis of the data collected during the course of this research. The fundamental objective of this study is to understand in depth how the application of environmental taxation, characterized by its extra-fiscal role, can have an impact significant positive effect on Brazil's energy matrix. Therefore, we seek to investigate the potential of this taxation in promoting an effective transition to energy sources renewable sources and, at the same time, reduce dependence on non-renewable sources. To this end, several studies were selected and examined, conducting the analysis from a perspective criticism that emphasizes the complex interrelationships between taxation, sustainability and the economic and environmental behaviors within the Brazilian energy context.

Careful review of the collected data revealed that environmental taxation has emerged as a crucial incentive mechanism for the energy transition in Brazil. Policies specific, such as tax exemptions targeted at renewable energy technologies, exemplified in solar and wind power, have played a fundamental role in expansion of these energy sources in the national territory. In this context, it is worth highlighting the Bill No. 403 of 2022, which proposes the exemption of Import Tax applied to electric and hybrid vehicles. This legislative measure illustrates in a concrete way how environmental taxation can be strategically used to encourage practices sustainable, thus contributing to greater competitiveness of energy sources renewables in the Brazilian market, as pointed out by Holanda (2023).

Furthermore, the implementation of targeted incentive policies, exemplified by the Goiás Solar program, demonstrates that the tax relief applicable to systems photovoltaic systems have resulted in a notable increase in the adoption of these systems in the state of Goiás. This trend has generated positive impacts in reducing dependence on energy fossils, reinforcing the effectiveness of the extra-fiscal measures under analysis. According to Fiorillo and Ferreira

(2017), such strategies are essential to align fiscal policies with environmental goals. Given the results observed, this research contributes meaningful way to understand how environmental taxation policies can be effectively implemented to assist in the transition to a more sustainable in Brazil.

On the other hand, in-depth analyses reveal that the implementation of measures extra-fiscal, particularly through the imposition of environmental taxes on activities notoriously polluting or that have a considerable environmental impact, plays a crucial role in minimizing the appeal of non-renewable energy sources. The current legislation, exemplified by Law No. 18,030/2009 of the state of Minas Gerais, which regulates the distribution of the ICMS share destined to municipalities according to criteria environmental, unequivocally illustrates how extra-fiscality can impose sanctions economic reasons for the use of energy sources with a high negative impact, such as oil and coal.

Studies recently published by Bussadori (2019) and Miranda; Oliveira; Ramalho (2022) corroborate this perspective, suggesting that the implementation of taxes more onerous carbon emissions taxes have contributed to an increase in costs relative to fossil fuels compared to clean energy sources. This measure has, consequently, a progressive transition in energy consumption patterns is encouraged. However, the aforementioned authors warn that, despite the progress observed, taxation focused on environmental sustainability remains underutilized in several sectors, which restricts the full effectiveness of its benefits.

Although available data indicate a beneficial impact of taxation environmental in promoting sustainable practices, the investigation also revealed several challenges inherent in the effective implementation of such policies. As pointed out by Paula (2023), the lack of efficient coordination between different levels of government, added to the complexity inherent in the Brazilian tax system, results in inconsistencies that compromise the full applicability of extra-fiscality. In several instances, the overlapping tax obligations and the lack of a tax harmonization policy between the states create a scenario of legal uncertainty that, according to Machado Segundo (2023), can act as a disincentive to investment in sustainable energy sources.

An additional challenge identified is related to the resistance of economic sectors highly dependent on non-renewable energy sources. The energy transition, although essential, entails adaptation costs that are not easily absorbed by large

companies, especially in traditional industries such as steel and petrochemicals. Therefore, the review indicates that, to make environmental tax policies more effective, it is planning is needed that includes progressive incentives, such as temporary subsidies for the transition and training programs for affected companies and workers.

In Brazil, given that renewable energy sources are abundant in the country, but still underutilized, as pointed out by the Energy Research Company (EPE, 2023). According to Morete (2013), Brazil must adopt a more comprehensive approach, which encompasses not only taxation, but also the creation of a regulated carbon market and the promotion of a broader green economy.

The results suggest that if environmental taxation is widely implemented and improved, it could play a decisive role in transforming the Brazilian energy matrix. The combination of tax incentives, taxation of non-renewable sources renewables and policies to stimulate technological innovation in the energy sector presents a promising path for the country to become a reference in renewable energy. However, as pointed out by Sena (2023), it is crucial that policies are accompanied by a framework solid regulatory framework and incentives for research and development.

The analysis suggests that, despite the obstacles, environmental taxation can be a vital driver for Brazil towards a more sustainable future. This transition will require effective collaboration between public bodies, private companies and civil society. The importance of the extra-fiscal approach is not limited to economic administration, but also plays a key role in addressing global environmental challenges.

These results highlight the need for environmentally-friendly fiscal policies. environment in the advancement of the Brazilian energy matrix. Extra-fiscal taxation can be a crucial element in driving this transition.

5 FINAL CONSIDERATIONS

This article sought to present the relevance of environmental taxation and extra-fiscality in the context of renewable energies, emphasizing the need to rethink the Brazilian energy model in the face of growing environmental concerns and changes climate. The results obtained demonstrate that well-designed tax policies have the potential to not only encourage the adoption of sustainable energy sources, but also to create an environment conducive to a collective commitment to sustainability. This

change may reflect more conscious economic and social practices aligned with principles of environmental protection.

However, it is important to recognize the limitations of this research. The lack of data updated and political resistance that can hinder effective policy implementation highlight the complexity of the issue. Furthermore, the difficulty in measuring the real impact of environmental taxation on individual and corporate behaviors presents itself as a challenge to be faced by future investigations.

In this sense, the identified gaps open space for new studies, which could explore, for example, the application of tax incentives in other regions or sectors, as well as the comparative analysis between different models of environmental taxation. The research could also evaluate the effectiveness of measures in different contexts, contributing for a more comprehensive understanding of the possibilities and limits of taxation as environmental intervention tool.

In summary, this work not only highlights the importance of environmental taxation as a vector for change, but also signals the need for a continued effort to overcome the challenges that limit its effectiveness. A tax system oriented towards sustainability can be a fundamental pillar for an environmentally responsible future in Brazil, highlighting that environmental protection is a collective objective that requires collaboration between government, businesses and citizens.

REFERENCES

BARDIN, Laurence. Content analysis. São Paulo: Edições 70. Brasil.(2014a). Manual for combating violence against the elderly. Brasília: Human Rights Secretariat of the Presidency of the Republic, 2011.

BRAZIL. Chamber of Deputies. **Bill No. 403, of 2022.** Grants exemption from Import Tax for electric and hybrid vehicles. Available at: <https://www25.senado.leg.br/web/atividade/materias/-/materia/151951>. Accessed on: June 27, 2024.

BRAZIL, CONSTITUTION OF THE FEDERATIVE REPUBLIC OF BRAZIL OF 1988. **LAW Nº 11.473, OF MAY 10, 2007.** Available at: https://www.planalto.gov.br/ccivil_03/_ato2007-2010/2007/lei/l11473.htm. Accessed on: June 30, 2024.

BRAZIL. **CONSTITUTION OF THE FEDERATIVE REPUBLIC OF BRAZIL OF 1988.** Available at: https://www.planalto.gov.br/ccivil_03/constituicao/constituicao.htm. Accessed on: June 25, 2024.

BRAZIL. **Law No. 18,030/2009.** Distribution of the Portion of the Revenue from the Proceeds of the Collection of ICMS Belonging to the Municipalities of Minas Gerais. Available at: < http://iepha.mg.gov.br/images/Documentos/Programas/DN_01- 2016_e_DN_03-2017_exerc_2018.pdf.>. Accessed on: June 27, 2024.

BUAINAIN, Antônio Márcio et al. Oil, **the era of commodities and Brazilian agriculture.** Journal of Agricultural Policy, v. 24, n. 4, p. 32-45, 2015;
BUSSADORI, Helena Sarino. **Energy sources and impacts on contemporary society.** Resgates Magazine, n. 9, p. 105-24, 2019. Available at: https:// stockler.com.br/. Accessed on: June 18, 2024.

EPE - ENERGY RESEARCH COMPANY. **National energy balance 2023. Base year 2022.** Available at: https://www.epe.gov.br/sites-pt/publicacoes-dados-abertos/publicacoes/PublicacoesArquivos/publicacao-748/topico-681/BEN_S%C3%ADntese_2023_PT.pdf. Accessed on: June 12, 2024.

EPE - ENERGY RESEARCH COMPANY. **Energy Sources.** Available at: https://www.epe.gov.br/pt/abcdenergia/fontes-de-energia#:~:text=S%C3%A3o%20exemplos%20de%20fontes%20renov%C3%A1veis,das%20mar%C3%A9s%20e%20das%20ondas).. Accessed on: June 29, 2024.

FIORILLO, Celso Antônio P.; FERREIRA, Renata M. **Environmental tax law:** SRV Editora LTDA, 2017. *E-book.* ISBN 9788547228248. Available at: https://integrada.minhabioteca.com.br/#/books/9788547228248/. Accessed on: July 8, 2024.

FOMENTO GOIAS. **Fomento Goiás - Access to information.** Available at: https://www.goiasfomento.com/. Accessed on: March 12, 2024.

HOLANDA, Vanessa Alves. **Environmental taxation as an instrument of socio-environmental development in the context of the use of solar energy in the state of Ceará.** 2023. Doctoral Thesis. University of Fortaleza.

MACHADO SEGUNDO, Hugo de Brito. **Tax Law Manual:** GEN Group, 2023. *E-book.* ISBN 9786559774883. Available at: https://integrada.minhabioteca.com.br/#/books/9786559774883/. Accessed on: July 8, 2024.

MIRANDA, Pedro Paulo Costa; OLIVEIRA, Grazielle Alves de; RAMALHO, Daniella Aparecida Silva. **TYPES OF RENEWABLE AND NON-RENEWABLE ENERGY.** 2022;

MORETE, Vânya Senegalia. **ENVIRONMENTAL TAXATION AND SUSTAINABILITY:** Environmental taxation and sustainability. ARGUMENTUM, Espirito Santo, v. 14, n. 140, p. 14, Nov. /2013. Available at: http://ojs.unimar.br/index.php/revistaargumentum/article/view/981/601. Accessed on: June 1, 2024.

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT (OECD). **Declaration on a two-pillar solution to address fiscal challenges arising from the digitalisation of the economy.** Available at: https://www.oecd.org/content/dam/oecd/en/topics/policy-issues/beps/declaracao-

on-a-two-pillar-solution-to-address-the-fiscal-challenges-arising-from-the-digitalisation-of-the-economy-8-october-2021.pdf. Accessed on: 7 Jul 2024.

PAULA, Yhara Gregorio de et al. **Extra-fiscality as a way to encourage sustainable actions.** 2023.

PAULSEN, Leandro. **Complete tax law course.:** SRV Editora LTDA, 2024. *E-book.* ISBN 9788553620906. Available at: https://app.minhabioteca.com.br/#/books/9788553620906/. Accessed on: July 8, 2024.

SÃO PAULO (STATE). **Law No. 10,365 of September 22, 1987.** Regulates the cutting and pruning of tree-sized vegetation in the municipality of São Paulo, and contains other provisions. Available at: <https://legislacao.prefeitura.sp.gov.br/leis/lei-10365-de-22-de-setembro-de- 1987>. Accessed on: June 7, 2024.

SENA, Isabela Dativo. **Analysis of environmental taxation for the promotion of renewable energy.** 2023.

SILVA, ACR da: **Research methodology applied to accounting.** Salvador: UFBA, Faculty of Accounting Sciences, 2017.

SILVA, Heitor Marques Francelino; ARAÚJO, Francisco José Costa. Photovoltaic solar energy in Brazil: a bibliographic review. **Ibero-American Journal of Humanities, Sciences and Education,** v. 8, n. 3, p. 859-869, 2022.

VIAN, Ângelo. **Solar Energy Fundamentals Technology and Applications.:** Editora Blucher, 2021. *E-book.* ISBN 9786555500592. Available at: https://app.minhabioteca.com.br/#/books/9786555500592/. Accessed on: July 6th. 2024.