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TAX INCENTIVES FOR RENEWABLE ENERGY IN TURKEY AND THE EU-27*

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Abstract

While increasing energy use has negative impacts on the environment and life, renewable energy (RES) sources have the potential to reduce these impacts. In this study, tax incentives in increasing renewable energy investments and consumption are compared on the basis of Turkey and EU-27 practices. The literature and the legal legislation in Turkey are analysed and the practices are supported with numerical data. In EU-27 countries, it is observed that incentives related to different taxes are used together and advantages are provided to small-scale investments. In Turkey, there is a need for simplification of the legislation, balancing of supply and demand side incentives and regulations covering small-scale investments. The aim of the study is to show how tax incentives can be structured in YEN support mechanisms with examples from EU-27. Thus, it is aimed to contribute to both the literature and the development of innovation incentives in Turkey.

Keywords: Renewable Energy, Public Economics, Tax Policies, Tax Incentives.
JEL Classification: K32, H2, H23, H71

TÜRKİYE VE AB-27'DE YENİLENEBİLİR ENERJİYE YÖNELİK VERGİ TEŞVİKLERİ

Öz

Artan enerji kullanımı, çevre ve yaşam üzerinde olumsuz etkiler yaratırken, yenilenebilir enerji (YEN) kaynakları bu etkileri azaltma potansiyeline sahiptir. Bu çalışmada, YEN yatırımları ve tüketiminin artırılmasında vergi teşvikleri, Türkiye ve AB-27 uygulamaları temelinde karşılaştırılmıştır. Literatür ve Türkiye'deki yasal mevzuat incelenerek uygulamalar sayısal verilerle desteklenmiştir. AB-27 ülkelerinde, farklı vergilere ilişkin teşviklerin birlikte kullanıldığı ve küçük ölçekli yatırımlara da avantajlar sağlandığı görülmektedir. Türkiye'de ise mevzuatın sadeleştirilmesi, arz ve talep yanlı teşviklerin dengelenmesi ve küçük ölçekli yatırımları da kapsayan düzenlemelere ihtiyaç vardır. Çalışmanın amacı, AB-27'den örneklerle YEN destek mekanizmalarında vergi teşviklerinin nasıl yapılandırılabileceğini göstermektir. Böylece hem literatüre hem de Türkiye'deki YEN teşviklerinin gelişimine katkıda bulunulması hedeflenmektedir.

Anahtar Kelimeler: Yenilenebilir Enerji, Kamu Ekonomisi, Vergi Politikaları, Vergi Teşvikleri.
JEL Sınıflandırması: K32, H2, H23, H71, Q56

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1. INTRODUCTION

The increasing use of energy in the world forces many problems and many actors, especially states, to cooperate in finding solutions to these problems. On the one hand, the danger of depletion of energy resources, on the other hand, the negative effects of fossil fuels, which are called traditional fuels, on life, especially on the environment, have led to an increase in the importance of RE resources.

Supporting the transition from traditional to RE sources remains crucial under current conditions. The long payback periods of RE investments and other financial barriers adversely affect progress in this sector. Despite its high social benefits, RE is financially more costly compared to conventional energy sources. For this reason, although developments in the field of RE continue rapidly, they are still at a low level compared to traditional energy technology investments. This situation hinders the realization of sustainable development and the reduction of the negative impacts caused by fossil fuels. For these reasons, states play a regulatory, supervisory, and supportive role in the development and dissemination of RE resources.

This study is structured as follows: The first section explores the relationship between sustainable development, RE and tax incentives. The second section analyzes the legal framework in Turkey. The third section presents the practices in EU-27 countries. The final section offers a comprehensive comparison of tax incentives between Turkey and the EU-27. This study employs a literature review and practical analysis to examine the subject. The primary objective is to demonstrate how tax incentives can be designed within the RE support mechanism, drawing on examples from the EU-27. The study aims to contribute both to the academic literature and to the development of tax incentives in Turkey, thereby accelerating advancements in the RE sector.

2. SUSTAINABLE DEVELOPMENT, RE AND TAX INCENTIVES

2.1. Sustainable Development and RE

With globalization, borders become increasingly porous, and environmental and economic conditions arising even at the local level can have far-reaching impacts on other regions. Environmental costs are externalized and may affect distant locations and ecosystems (Najam et al., 2007: 5-6). The danger of depletion of non-renewable energy resources forces countries to produce policies in this field. For a long time, the importance given by states to economic growth and development has prevented them from taking necessary steps on issues such as natural resource utilization and environmental pollution (Özdemir, 2009:3). Today, environmental problems and sustainability of resources are addressed together within the framework of sustainable development.

According to Townsend (2007:9), while there is an urgent need for solutions to environmental problems such as global warming, the existing economic structure is one of the biggest obstacles to this realization, therefore states need to play a decisive role in investment decisions and guide this process.

RE production costs have been declining sharply over the last decade due to continuously improving technologies, economies of scale, competitive supply chains. Between 2010 and 2019, the cost of electricity from utility-scale solar photovoltaics (PV) decreased by 82%. Replacing 500 gigawatts (GW) of existing coal-fired power plants with newly installed solar photovoltaic (PV) and onshore wind energy systems is projected to result in an annual reduction of approximately 1.8 gigatonnes of CO_2 emissions. This reduction equates to a 5% decrease in global CO_2 emissions when compared to the total emissions from the preceding year (International Renewable Energy Agency [IRENA], 2020:11).

Energy policies in the world are evolving towards cleaner and more secure energy technologies. In addition, EU-27 countries and some developed economies are trying to reduce energy-intensive

industries and shape their economies under the leadership of sectors that require lower energy use (Tonus, 2004:10). Despite the COVID-19 pandemic, RE production continued to grow with new capacity additions even in 2020, albeit below previous forecasts. The modularity of RE sources, their rapid scalability, job creation potential, and their ability to enhance competitiveness are increasingly appealing due to the economic incentives provided by various countries (IRENA, 2020:13). The contribution of RE sources to electricity generation is growing due to new investments. By the end of 2022, RE accounted for 40% of global installed capacity. In 2022, the largest increase in RE capacity to date was observed, with year-on-year additions totaling approximately 295 GW and a 9.6% increase in the total RE capacity. Solar power alone contributed nearly two-thirds of these additions, with an increase of 192 GW, while wind power added 75 GW (IRENA, 2023a). Advances in RE technologies and incentive mechanisms have significantly reduced the cost of RE, thereby accelerating the sector's development.

2.2. Tax Incentives and RE

Tax incentives are a key support mechanism employed in the RE sector to stimulate production, consumption, and technological advancement. An increasing number of states are implementing tax reductions to support RE sources in energy production, with the aim of reducing carbon emissions and ensuring energy security. Various tax incentives are being introduced to promote the use of RE sources (KPMG, 2011:1).

Bahar et al. (2013:43) state that investment-based tax incentives can be granted to investors in the field of RE, either partially or fully exempt from tax obligations, for both commercial and household applications, and these applications may vary from country to country. For commercial applications, some countries provide Value-added taxes (VAT) deductions or exemptions for investments in electricity generation facilities generated from RE sources, while others provide VAT deductions for services and materials used in similar commercial investments.

In addition to investment-based tax incentives, another support instrument is production-based tax incentives. Various tax facilities and advantages are provided to both producers and consumers in order to increase RE production. According to Clement et al. (2005:3), production tax incentives are the provision of tax deductions or tax credits at an agreed rate per kilowatt hour produced by RE facilities.

Heshmati et al. (2015:91) state that tax incentives are applied to consumers as well as producers and investments in the support of RE resources. Tax credits, which are used among policies targeting consumption, are also used in the installation and purchase of RE investments. Uluatam (2010:37) at the same time, these incentives are not only for large-scale investments but also for small-scale individual installations. Faber et al. (2001:25) consider various tax incentives, such as income tax deductions as well as electricity production tax exemptions, as complementary to other support mechanisms (such as subsidies and rebates), and state that the practices in Denmark and Sweden in particular demonstrate the importance of tax incentives within the RE support mechanism.

Some taxes are classified as incentive taxes, designed to guide and motivate both producers and consumers toward specific objectives. These taxes aim to influence the use of particular inputs, pollutants, or services by altering their prices, thereby encouraging or discouraging certain behaviors (Özdemir, 2009:18). For example, Organisation for Economic Co-operation and Development [OECD] (2015:21) emphasizes that household and commercial RE consumption decisions are influenced by consumer-oriented investment credits, sales and consumption tax deductions, VAT deductions, customs duty deductions for RE installation equipment of households and commercial buildings, and taxes on conventional fuels. While tax incentives can lower the costs of RE resources (Clement et al., 2005:3-4),

energy production costs are expected to rise with the imposition of energy taxes. Consequently, the impact of such taxes will vary depending on factors such as usage patterns, production output, and the quantity of energy consumed.

Tax incentives provide a great deal of flexibility with respect to consumers and investment types and technology differences. Tax incentives can target a single RE technology or all technologies. At the same time, only residents and businesses in a certain geographical area can be supported or nationwide companies can be supported. Some types of incentives focus on equipment installation while others focus on equipment production. Some programs are limited to a few years while others have no time limit (Clement et al., 2005:5). In general, it can be said that the most widely used tax incentives are corporate tax (CT) rate reductions, i.e. discounted CT. The intensity of use of other incentives varies between developed and developing countries. In OECD countries, the declining balances method, special reductions in CT and reductions in other taxes are widely used tax incentives. In developing countries, tax holidays, import duty exemptions and refunds, and reduced CT rates are widely used (OECD, 2007:8).

There is a general consensus in the dairy literature that Tax Incentives have a positive impact especially on RE investments (Kaya and Bayraktar, 2021:201). In the study, tax incentives for supporting RE resources are discussed as: diminishing balances method, personal income tax (PIT) incentives, VAT deductions or exemptions, other consumption taxes and environmental taxes (electricity, taxes on fossil fuels, etc.), customs duty exemptions, CT incentives, R&D tax incentives and property tax incentives.

3. LEGAL LEGISLATION ON RE AND INCENTIVE MECHANISM IN TURKEY

The role of energy in the Turkish economy is becoming increasingly important, with energy imports contributing significantly to the foreign trade deficit. This, in turn, constitutes a substantial portion of the account deficit. As energy imports rise, the foreign trade deficit shows a parallel upward trend, further highlighting the critical impact of energy on the country's economic balance (Soydal et al., 2012:131). While Turkey's energy import dependency ratio was 65.3% in 2000, this ratio increased to 70.8% in 2021. In the EU-27, it decreased from 56.2% in 2000 to 55.5% in 2021 (Eurostat Database, 2023a). While in 1990, the contribution of RE resources in primary energy consumption in Turkey was 18.4%, this ratio reached 15.6% by 2021 due to the decrease in fuel wood consumption and the increase in total energy consumption. In EU-27 countries, the contribution of RE resources in primary energy consumption was realized as 21.8% in the same year (T.C. Çevre, Şehircilik ve İklim Değişikliği Bakanlığı, 2024). Greenhouse gas emissions in the European Union have decreased in most sectors since 1990, except transportation. Emissions from energy supply, the largest source of EU-27 emissions, have fallen by about 43 percent since 1990. The reduction in energy supply emissions is one of the main drivers for the EU-27's annual net GHG emissions to fall by more than 30 percent from 1990 levels (Statista, 2024). In Turkey, the total amount of greenhouse gas emissions in 1990 was 228 million tons of CO_2 equivalent, while in 2022 it was 558.3 million tons of CO_2 equivalent. In 2022, the largest share in total greenhouse gas emissions in Turkey in terms of CO_2 equivalent was energy-related emissions with 71.8% (Türkiye İstatistik Kurumu [TÜİK], 2024). Energy accounts for a large portion of emission releases. Therefore, RE resources have an important role in achieving various environmental goals, especially in reducing greenhouse gas emissions, while reducing dependence on energy imports. Therefore, the importance of regulations in the field of RE in Turkey has increased especially in recent years.

3.1. Regulations For RE In Turkey

After the Law No. 5346 on the "Yenilenebilir Enerji Kaynaklarının Elektrik Enerjisi Üretimi Amaçlı Kullanımına Dair Kanun" which entered into force in 2005, progress has been observed in the field of RE in Turkey. However, the lack of secondary regulations related to the RE legislation and relatively low levels of fixed price guarantees caused the level of investments in RE resources to be limited between 2005 and 2010. With the amendment to the RE Law in December 2010, higher feed-in tariffs and various cash and non-cash incentives were introduced for some resources. Thus, it can be said that the developments in the RE sector have gained momentum since 2010 compared to the 2005-2010 period (T. C. Enerji ve Tabii Kaynaklar Bakanlığı [ETKB], 2014:11).

Law No. 6094 on the "Yenilenebilir Enerji Kaynaklarının Elektrik Enerjisi Üretimi Amaçlı Kullanımına Dair Kanunda Değişiklik Yapılmasına Dair Kanun" is considered as a very important step. Moreover, the implementation of a fixed price guarantee for the purchase of electricity generated from RE sources, with differentiated tariffs based on the type of energy and prices set in U.S. dollars, has significantly accelerated investments in this sector. Another noteworthy innovation is the introduction of a five-year domestic content incentive, coupled with the doubling of the upper limit for exemptions from licensing and company formation requirements.

With the amendments to Law No. 4628, the "Elektrik Piyasası Kanunu," in 2007 and 2008, real and legal persons establishing generation facilities with a maximum installed capacity of five hundred kilowatts, as well as micro cogeneration facilities based on RE sources, were exempted from the requirement to obtain a license and establish a company, thereby simplifying the regulatory procedures for such facilities. In 2011, the "Elektrik Piyasasında Lisanssız Elektrik Üretimine İlişkin Yönetmelik" provided further clarification on these facilities through secondary legislation.

The "Elektrik Enerjisi Piyasası ve Arz Güvenliği Strateji Belgesi" outlines a target of achieving at least a 30%[2] share of RE sources in electricity generation by 2023. Key priorities for 2023 include fully harnessing the country's hydroelectric potential for electricity generation, increasing wind energy's installed capacity to 20,000 MW, bringing the entire 600 MW geothermal potential into operation, and promoting the widespread use of solar energy by closely monitoring technological advancements in the field. In Turkey, by 2035, the installed capacity is projected to reach 29.6 GW in wind energy (24.6 GW onshore and 5 GW offshore) and 52.9 GW in solar energy. The installed capacity for other renewable energy sources is expected to increase to 35.1 GW for hydroelectric power plants and a total of 5.1 GW for geothermal and biomass power plants (ETKB, 2022:14-15).

R&D activities play a crucial role in lowering the costs of RE resources and fostering the development of a sustainable market for these technologies. In 2010, with the "Enerji Sektörü Araştırma-Geliştirme Projeleri Destekleme Programına (Enar) Dair Yönetmelik", many issues related to RE technologies and greenhouse gas mitigation were included in the scope of R&D projects to be supported[3].

The "Enerji Verimliliği Strateji Belgesi 2012-2023" was adopted by the High Planning Council during its meeting on February 20, 2012. This document established key targets for 2012, including the promotion of buildings utilizing RE resources, improving energy efficiency, setting obligations for related projects, and the establishment of a specialized organization to oversee and support initiatives in this field.

[2] In 2022, the share of electricity generated from renewable sources in Turkey's total electricity production was 42% (Türkiye Elektrik İletim Anonim Şirketi [TEİAŞ], 2024).
[3] This regulation on R&D activities is a positive progress.

3.2. Tax Incentives For RE In Turkey

It is observed that tax regulations on RE resources in Turkey have been developed since 2012. The tax incentives for RE resources in Turkey consist of the "Yatırımlarda Devlet Yardımları Hakkında Karar", published in the Official Gazette dated June 19, 2012 and numbered 28328. With the Decree No. 2012/3305 on "Yatırımlarda Devlet Yardımları Hakkında Karar", a new incentive system was introduced in 2012. With the general incentive mechanism, which forms a part of the investment incentive system, some tax incentives have been introduced that RE resources can also benefit from. According to the general incentive system, customs duty and VAT exemption is envisaged for investments that are not covered by other types of incentives and meet the minimum investment requirement according to regions. In addition, if the investments are realized in the sixth region, they can also benefit from income tax withholding support. Emphasis has been placed on supporting energy investments under the general incentive system. Within the framework of Decree No. 2012/3305, a discounted CT is applied to investments made under large-scale investment and regional incentive schemes. Pursuant to Article 32/A of the "Kurumlar Vergisi Kanunu" No. 5520, this practice involves applying reduced tax rates until the projected investment contribution amount is reached.

Support mechanisms applied to priority investments can benefit from regional supports applied in the fifth region. However, if these investments are located in the sixth region, they are subject to the regional incentives. These incentives consist of customs duty exemption, VAT exemption, tax deduction, employer's national insurance contribution support, investment location allocation and interest support. Additionally, under the framework of strategic investments, RE projects exceeding 50 million TL are eligible for various incentives, including exemptions from customs duties and VAT, tax reductions, employer national insurance contribution support, allocation of investment locations, and interest support. For investments exceeding 500 million TL, a VAT refund is also provided. Furthermore, income tax withholding and insurance premium support are available exclusively for investments in the sixth region. R&D and environmental investments benefit from VAT exemption, customs duty exemption and interest support, as well as income tax withholding and insurance premium support for investments realized in the sixth region (Sanayi ve Teknoloji Bakanlığı, 2020a).

In the 2012 incentive program, it is seen that some adjustments were made in the following years with the articles added to the priority investments for RE resources and energy efficiency. These can be listed as follows:

(Paragraph added by Article 2 of the Cabinet Decree dated 27/1/2014 and numbered 2014/6058. Effective: 19.06.2012) Except for the "Non-Incentivized Investments" in Annex-4, investments for energy efficiency to be realized in existing manufacturing industry facilities with a minimum annual energy consumption of 500 TOE (tons of oil equivalent), providing at least 20% energy savings per unit product and with a maximum investment return period of 5 years, based on the project approval of the Ministry of Energy and Natural Resources.

(Paragraph added by Article 2 of the Cabinet Decree dated 27/1/2014 and numbered 2014/6058. Effective: 19.06.2012) Investments for the generation of electricity by recovery from waste heat in a facility (excluding natural gas based electricity generation facilities).

(Effective 19.11.2015, added by Article 1 of the Cabinet Decree dated 9/11/2015 and numbered 2015/8216) Investments in the manufacture of turbines and generators for RE production and the manufacture of blades used in wind energy production.

With the paragraph added by Article 1 of the Cabinet Decree dated 20/8/2015 and numbered 2015/8050, "Priority investments with a minimum fixed investment amount of over three billion Turkish

Liras are considered strategic investments. However, the amount of interest support to be provided for these investments cannot exceed seven hundred thousand Turkish Liras."

According to Provisional Art. 4 (a) and (b) of the "Elektrik Piyasası Kanunu" No. 6446, legal entities holding generation licenses will be granted a fifty percent discount on transmission system system usage fees for a period of five years from the date of commissioning, and during the investment period, transactions related to generation facilities will be exempt from fees and papers issued will be exempt from stamp tax. No favorable arrangement is envisaged for RE resources. Within the scope of the privatization of electricity distribution companies and electricity generation facilities by this Law, it is stated that the gains arising from the transfer, merger, spin-off, partial spin-off transactions to be made until 31/12/2024 will be exempt from CT, and it is also added that the deliveries and services made within the scope of the said article will also be exempt from VAT. In addition, "Damga Vergisi Kanunu" No. 488 includes some exemptions for investments with investment incentive certificates.

Law No. 6745 on "Yatırımların Proje Bazında Desteklenmesi ile Bazı Kanun ve Kanun Hükmünde Kararnamelerde Değişiklik Yapılmasına Dair Kanun" and the Cabinet Decree No. 2016/9495 introduced a new investment incentive period as of September 7, 2016. Thus, in addition to the broad-based support system, project-based incentives were introduced. In this way, it has been deemed appropriate for RE projects (exceeding USD 100 million[4]), which will ensure supply security and reduce external dependency, to benefit from a wide range of incentives in line with the nature and needs of the project. The Ministry of Economy will issue incentive certificates to the projects whose minimum fixed investment amount exceeds the minimum amount determined and which are evaluated by taking these qualifications into consideration, and they will be able to benefit from one or more of the incentives offered. Accordingly, the tax incentives that RE projects that meet the conditions can benefit from can be counted as customs duty exemption, VAT exemption, VAT refund (for building construction expenditures), tax deduction and exemption, income tax withholding support[5] (2016/9495 sayılı Bakanlar Kurulu Kararı, 2016: md.3).

Within the scope of income tax incentives, artisan exemption is a regulation that exempts small tradesman from income tax if they meet certain conditions. This exemption supports small businesses to continue their activities by reducing their tax burden. With the Law No. 7103 and subparagraph 9 added to Article 9 of the "Gelir Vergisi Kanunu" No. 193, "Real persons who produce electricity in facilities established in owned or rented residences based on renewable energy resources within the scope of activities that can be carried out without a license according to Law No. 6446, and who sell the surplus, will be able to benefit from tradesmen exemption" (Tok Demircan, 2024:57; 193 Sayılı Gelir Vergisi Kanunu, md.9).

With Article 17 of Law No. 7161 dated 17/1/2019, an amendment was made to subsection (j) of the first paragraph of Article 13 of the VAT Law No. 3065. This subparagraph has been amended as "deliveries of goods and services to organized industrial zones and small industrial sites regarding the construction of water, sewage, treatment, natural gas, electricity, communication, renewable and other energy facilities and road construction and the construction of workplaces in small industrial sites, to them or to the economic enterprises created by them". Within the scope of this article, RE has been included within the scope of VAT exemption (Sanayi ve Teknoloji Bakanlığı, 2020b).

[4] Minimum 50 million TL within the scope of the Technology-Oriented Industrial Move Program and minimum 500 million TL for other investments (Sanayi ve Teknoloji Bakanlığı, 2020b).

[5] Other supports provided include employer's national insurance contribution support, investment location allocation interest and dividend support, energy, qualified personnel support, capital contribution, public procurement guarantee, infrastructure support, permission, allocation, licensing, license and registration facilitation (Sanayi ve Teknoloji Bakanlığı, 2020b).

Finally, it should be noted that there is no other tax regulation directly related to the environment other than the sanitation tax in Turkey, even though the steering effect is very limited and the revenues from this tax are very low (Duman and Şare, 2016:89). In Turkey, there are no environmental taxes such as consumption tax, energy tax, etc. that are applied in a planned manner to support RE resourcesIn accordance with Cabinet Decree No. 2005/8704, a tax exemption has been introduced for the Special Consumption Tax (SCT) levied on gasoline when domestically produced bioethanol from agricultural products is blended with gasoline. This exemption applies to the portion of the SCT corresponding to the ratio of bioethanol in the blend, up to a maximum of 2% (2005/8704 sayılı Bakanlar Kurulu Kararı, 2005).

In Turkey, Motor Vehicle Tax (MVT) is one of the taxes that motor vehicles are subject to, while the other taxes are SCT and VAT applied at the initial purchase of the vehicle. While there is no privileged VAT regulation for electric and hybrid vehicles in Turkey, the SCT regulation for electric and hybrid vehicles is intended to encourage the sale of these vehicles. Regarding the MVT regulation, there is only a reduced rate for electric vehicles (Cengiz and Yavuz, 2020:101-103). Therefore, MVT is only used as a tax incentive tool to encourage electric vehicles.

With the Law No. 7521 "Bazı Kanun ve Kanun Hükmünde Kararnamelerde Değişiklik Yapılmasına Dair Kanun" published in the R.G. dated 26.07.2024 and numbered 32613, it was decided that hybrid vehicles will benefit from a reduced SCT rate if they meet the conditions regarding the emission values and other provisions of those that can be charged outside the vehicle. Although it is a positive regulation to take into account the emission release of these vehicles, it is still seen that this incentive will only be encouraging for certain model HEVs. When the SCT regulation is evaluated, it can be said that the SCT regulation especially for hybrid vehicles is insufficient to produce the expected results in supporting the sales of these vehicles. More importantly, there is no regulation specifically for the use of electricity from RE sources in alternative fuel vehicles. Therefore, emission-based taxation regulations are still needed.

Property tax exemptions provided for RE investments in Turkey are indirectly included in the "Emlak Vergisi Kanunu" No. 1319. Article 5 (g) provides temporary exemption for buildings constructed within the scope of investment incentive certificate. This paragraph states that 'Buildings constructed within the scope of the Investment Incentive Certificate shall benefit from temporary exemption for a period of five years starting from the budget year following the date of the end of their construction.' Article 15 of the same law also regulates temporary exemptions regarding land tax. As can be seen, although there is no special exemption for RE investments, investments made within the scope of the Investment Incentive Certificate can benefit from the general exemption provisions (Tok Demircan, 2024:61-62; 1319 Sayılı Emlak Vergisi Kanunu). Table 1 shows the sources of tax incentive legislation in the field of RE in Turkey. Tax incentives are basically based on the legal regulations in Table 1.

Table 1. Sources of Tax Incentive Legislation in the Field of RE in Turkey

Tax Incentives	**Legal Regulation**
Corporate Tax Incentives	Law No. 6446
	Law No. 6745
	Decision No. 2012/3305
Income Tax Incentives	Decision No. 2012/3305
	Law No. 6745
	Law No. 193
Value Added Tax Incentives	Decision No. 2012/3305
	Law No.3065
	Law No. 6745

	Law No. 6446
Stamp Duty Incentives	Law No. 6446
	Law No. 488
Customs Duty Incentives	Decision No. 2012/3305
	Law No. 6745
Property Tax Incentives	Law No. 1319
Special Consumption Tax Incentives	Decision No. 2005/8704
	Law No. 4760
Motor Vehicle Tax Incentives	Law No. 197

Source: (Related Laws and Decisions)

4. TAX INCENTIVES FOR RE IN EU-27

In accordance with the EU Directive 2009/28/EC, EU-27 countries are trying to increase their share in final energy consumption. In order to increase the share of RES in energy production and consumption, they are implementing various policies in order to increase both the investments in RES and their production and consumption. Increasing the share of RES in final energy consumption is an even more important issue especially for countries with high final energy consumption.

When Eurostat statistics on the share of RE in gross final energy consumption by sectors are analysed, it is seen that the share of RE sources in the final energy consumption of EU-27 countries increased from 9.6% in 2004 to 21.8% in 2021. The share of RES in the transport sector increased from 1.4% to 9.0%, in electricity generation from 15.8% to 37.7% and in heating and cooling from 11.7% to 22.9% for the same years (Eurostat Database, 2023b).

It is seen that tax incentives of RE support mechanisms are widespread in the world. In the KPMG (2016b:13-28) report, it is stated that in addition to production tax credits, investment tax credits are also applied in the USA. China, one of the world's leading countries in the field of R&D, applies a reduced CT rate to new technology initiatives in the field of R&D. It also provides a 50% VAT refund on the sale of energy from wind and geothermal energy. Mexico introduced a 30% tax credit for electric vehicle charging equipment investments in January 2017 OECD (2017c:61). To promote renewable energy, governments have also developed financial incentive policies. Within this framework, by maintaining low tax rates or providing tax exemptions, efforts are made to reduce the costs for investors. EU member states similarly support renewable energy sources through various tax incentive mechanisms (Kaya and Bayraktar, 2021:189). Member states support RE sources through various tax incentive instruments. These incentives to support RE sources consist of property tax incentives, diminishing balances method, tax incentives for R&D activities, customs duty incentives, investment and production tax credits, PIT incentives, CT incentives, VAT incentives, other consumption, energy, sales, fossil fuel, carbon dioxide tax, etc. environmental taxes. In addition, in the study, each tax incentive is divided into three groups as electricity, transport, heating and cooling and given with sample country applications.

4.1. PIT Incentives

Income and tax incentives can be defined as the exemption, reduction, or elimination of some or all taxes applied to the income of individuals and companies for a specific purpose. Through these discounts, deductions, and exemptions, the tax burden on individuals and companies is reduced. By lowering the cost of investments, the aim is to facilitate the financing of these investments for companies (Duran, 2003:37-38). Belgium and France provide exemptions based on the cost of investments for electricity generation. Belgium offers a PIT incentive only for solar PV technologies, while France provides this incentive for the cost of small wind, biomass and hydropower investments (up to a

maximum of 3kWp) (Cansino et al., 2011b:109). The Czech Republic, on the other hand, provides PIT exemption for investments in small hydro power (up to a maximum of 1 MW), solar photovoltaic systems, biogas and biofuel equipment, wind units and geothermal energy systems for own use, as well as income tax exemption on the income from the sale of electricity generated from RES (International Energy Agency [IEA] / International Renewable Energy Agency [IRENA], 2017; Cansino et al., 2010:6002). Luxembourg applies a similar exemption only for the sale of electricity from small-scale photovoltaic power plants. Income from the sale of electricity generated by small photovoltaic systems with a capacity of 1-4 kWp is not considered commercial and therefore not subject to tax (Cansino et al., 2010:6003). In Denmark, special agreements are required to exempt income from energy sales (Bundgaard and Lexner, 2011:515-516). The Netherlands, on the other hand, benefits from PIT exemption for capital investments in green funds (KPMG, 2016a:47). PIT exemptions for electricity generation are applied in six EU countries (Belgium, France, Czechia, the Netherlands, Denmark and Luxembourg) in order to support the RES. Some of these countries offer exemptions for RE investments, while others offer exemptions for earnings. In addition, some countries apply incentives limited to a single source of RES, while in other countries they are applied more broadly.

In terms of incentives for heating and cooling, Belgium offers a PIT deduction of 40% of expenditure on energy efficiency investments and certain energy technologies for heating (solar photovoltaic, solar-thermal and geothermal energy), while Greece offers a PIT deduction of 20% (expenditure related to solar energy and external heating) (International Energy Agency [IEA], 2009:56, 59; Cansino at al., 2011a:3808). Germany and France provide tax credits for some energy resource purchases and building renovations in the heating sector (Neuhoff et al., 2011:4-6; Najdawi, 2017). In Finland, 60% of labor costs are tax deductible, and in Sweden a certain proportion of the installation of RE equipment and renovations for heating purposes (EuroACE, 2009:21; Poblocka-Dirakis, 2017b). In Italy, a total of 55% of investment in solar thermal systems (and other energy efficiency investments) is deductible from PIT (Cansino et al., 2011a:3808). The PIT incentive in the field of heating and cooling is applied in seven EU countries, namely Belgium, Germany, Greece, France, Sweden, Finland, Italy. These incentives generally support these technologies by deducting a certain portion of investments from PIT.

4.2. CT Incentives

In order to attract foreign direct investments, both developed and developing countries apply a reduced CT rate on certain incomes as a tax incentive. This reduction can be applied to all foreign and domestic investors, or to income from specific activities, depending on its source (foreign-sourced income), to the income of non-residents, or to some combination of these (Clark, 2000:1146). As a tax incentive, investors may be granted full exemption from the application of CT, or a differentiated CT rate may be applied. Tax incentives can take the form of offsetting the tax liabilities of corporations or enterprises, providing tax deductions, or offering tax credits. CT incentives may be restricted to projects related to the location where the energy is produced and consumed or may be limited to utility-scale RE power plants, whose primary purpose is to generate energy for wholesale energy markets. These incentives can be implemented to promote either increased investment or production (Lantz and Doris, 2009:2). Countries that use CT incentives for electricity generation are the Netherlands, Hungary, Spain, Belgium, Greece, and the Czech Republic. The Netherlands uses this incentive for both electricity and heating and cooling (Neuhoff et al., 2012:241). In Romania, there is an exemption for reinvested dividends for energy generated from RES sources such as wind, solar, geothermal, geothermal, biomass, fermentation gas from residues and hydraulic energy used in power plants with a maximum installed capacity of 10 MW, as well as the possibility to deduct corporate profits (limited to the fiscal year of

investment) (KPMG, 2016a:59). Hungary similarly offers a CT exemption for 30% of energy efficiency investments (OECD, 2017c:61). Spain, Belgium and Greece, among other countries that use CT incentives in electricity generation and investments, allow for a certain amount of deduction of investments made for electricity generation (Cansino et al., 2011b:109). The Netherlands, Hungary and Germany use CT incentives for heating and cooling. Only Ireland uses this tax incentive for heating and cooling (Neuhoff et al., 2011:4-6; Neuhoff et al., 2012:241; OECD, 2017c:61; Res Legal Europe, 2017).

4.3. The Method of Diminishing Balances

Depreciation rules allow companies to benefit from the time value of money by reducing tax expenses in the early years through the declining balance method, thereby increasing investment capacity (Barradele, 2010:7706). The method of diminishing balances is another incentive that allows companies to deduct income tax on RE equipment in the first years of operation. These incentives are applied in Belgium, Ireland and the Netherlands (Bahar et al., 2013:43). Romania is the country that applies the method of diminishing balances for tax purposes for technological equipment, tools and computer installations and related peripherals (KPMG, 2016a:59). Similarly, in France, companies can use this incentive for some equipment used to generate RE (KPMG, 2016a:27). Sometimes this incentive is offered to all RE investments, or, as in Sweden, a specific energy source (wind) may be supported (KPMG, 2016a:67). Portugal applies the method of diminishing balances for solar technologies in order to reduce the costs of RE units and equipment as soon as possible through the depreciation method (https: //sovos.com/blog/9-tax-incentives-for-renewable-energy-equipment-leasing/).

While these incentives are generally offered to production companies, small-scale investors or households can also be offered this tax incentive for specific purposes. For example, in Germany, this method can be offered to households and businesses for renovation of existing buildings for heating purposes (Neuhoff et al., 2011:4-6).

4.4. R&D Tax Incentives

Timilsina et al. (2011:39) argue that the level of incentives is not sufficient to significantly increase the share of solar energy in the world energy supply and emphasize the importance of R&D activities in the development and diffusion of these technologies. In addition to the direct costs of incentive policies that require the use of more expensive electricity, they can also lead to market inefficiencies. However, along with these criticisms, he adds that the biggest obstacle to solar energy, for example, is costs and that these technologies can be expanded and developed in the short and medium term thanks to subsidies. R&D studies and production capacity developed on a commercial scale are significantly costly to cover the expected initial start-up costs of technology investments, so supporting these activities is seen as a necessity to overcome the barriers to RE technologies. Therefore, R&D tax incentives are tax instruments used by governments to support this field.

While Belgium, France and Italy provide tax credits for these activities (KPMG, 2016a:27; Deloitte, 2017:4; Deloitte, 2015:2), one of the policies to support RE sources in the Greek Administration of Southern Cyprus is the tax breaks given to both individuals and companies for R&D activities in the field of eco-innovation (Eco-Innovation Observatory, 2015:19). Ireland, Greece and Spain also support these activities of both individuals and companies through tax deductions (Çelikkaya, 2017:17; KPMG, 2016a:65).

4.5. VAT Incentives

VATs refer to the taxation of added value at various stages of production, with the added value simply defined as the difference between the value of goods (or services) (Metcalf, 1995:122). The

deferral or exemption of VAT on capital goods also creates tax incentives and constitutes VAT support. The scope of VAT support, which is generally applied to machinery and equipment, can be expanded and extended to cover many expenditure items (Duran, 2003:50). Cansino et al. (2011b:110) argue that theoretically, VAT is one of the most appropriate indirect taxes for supporting the sources of RE. It is seen that some EU-27 countries offer VAT-related incentives for goods and services purchased for various purposes such as the installation of these technologies, building renovations in order to increase the production and consumption of RE. In order to increase energy investments, Czechia, France, Italy, Portugal and Malta use VAT reductions. Czechia applies a reduced VAT rate of 5% for all RE technologies, while France applies a reduced VAT rate of 7% for some technologies (solar, wind, biomass and hydropower) and regions. Italy applies a reduced VAT rate of 10% only for the purchase of goods and services related to wind and solar energy technologies. Portugal applies a reduced VAT rate (12%) on machinery and equipment related to energy production from RE sources (Bahar et al., 2013:43), and finally Malta uses this type of incentive (Çelikkaya, 2017:17).

Reduced VAT rates in areas such as heating and cooling and increasing energy efficiency are also applied in France, Italy and Latvia. France and Italy offer reduced VAT rates for households' purchases of basic products such as installations based on wind and solar energy technologies and building improvements.Latvia applies a VAT rate of 12% instead of 21% on the use of biofuels and biogas for heating purposes (Najdawi, 2017; Cansino et al., 2011a:3808-3809; Upatniece, 2017).

In the field of transportation, Austria applies VAT reduction for zero CO_2 emission cars (e.g. electric and hydrogen-powered cars) (European Automobile Manufacturers' Association [ACEA], 2020).

4.6. Property Tax Incentives

Property tax reductions can help reduce up to 100 per cent of property taxes on land and costs for RE generation facilities.Property tax reductions are a particularly important incentive tool for capital-intensive technologies such as wind turbines and solar energy.In addition, this type of incentive can help to reduce the cost disadvantages arising from the tax incentives provided to fossil fuels (Clement, et al., 2005:9). In addition to rebates, exemptions are also widely used in EU countries. Bulgaria and the Czech Republic seem to emphasize these incentives specifically in areas such as heating and energy efficiency. Bulgaria applies two different exemptions based on certification for 5 and 10 years, while the Czech Republic allows only certain technologies to benefit from this exemption (biogas-based heat, biomass, hydro, geothermal and heat pumps) (Naydenova, 2017a; KPMG, 2016b:10, Valach, 2017a).

Spain, Romania, Sweden, Poland and Italy are other countries that have implemented property tax incentives for purposes such as RE investments and increasing electricity generation. It is observed that some countries, such as Spain, offer property tax incentives to specific technologies. For example, Spain offers a 50% discount on solar energy investments (Cansino et al., 2011b:109), while Romania provides exemptions from some local taxes for hydroelectric, thermoelectric and nuclear energy (KPMG, 2016a:59). Sweden, on the other hand, applies a reduced property tax of 0.5% for facilities generating electricity from renewable sources or fossil fuels, 0.2% for wind energy, and an increased tax of 2.8% for hydroelectric power plants (Poblocka-Dirakis, 2017b). It can be said that these incentives, which are also applied in Poland and Italy, are generally offered to production facilities for electricity generation (Çelikkaya, 2017:17; Jimeno, 2017a; Cansino et al., 2011b:109).

4.7. Customs Duty Incentives

'Customs duty exemption is the partial or complete exemption of capital goods from the taxes to be paid on their importation'. With customs exemption, it is aimed to reduce investment costs by

removing taxes on capital goods (Duran, 2003:49-50). Customs exemptions and import taxes constitute one of the important factors taken into account in investment decisions and many investors consider these practices as the most useful type of incentives among investment incentives (Easson and Zolt, 2002:23). Customs duties appear as an element that increases RE costs. Reducing or completely eliminating these taxes, especially until the manufacturing process is realised, is beneficial for the development of RE technologies (Sawin and Flavin, 2004:19). Among the EU-27 member states, only Czechia recognises customs duty exemption for all RE technologies (Çelikkaya, 2017:17-18). Customs duty incentives are not a common support tool among EU countries.

4.8. Environmentally Related Taxes

Yeliven (2015:106) states in his study that there is no single tax type valid for each country in environmental taxes, political concerns, public expectations, and even culture cause differences in the tax composition to be applied. It is also stated in their study that Northern European countries are more successful than other countries of the world in terms of the type and number of taxes they apply. Factors such as the level of development of countries, national income per capita, taxation capacity and environmental policies have an impact on the type and scope of policies to be implemented. Therefore, although environmental taxes are a tool in supporting the RE resources, these taxes alone are not considered sufficient for the development and dissemination of RE resources. Therefore, in addition to environmental taxes, other taxes have been introduced in EU countries with the aim of internalising externalities and reducing these activities in order to prevent environmental damage (Özdemir, 2009:16). Looking at EU countries, in Estonia, RES is exempt from electricity tax (Çelikkaya, 2017:18), while Sweden does not levy taxes on electricity producers limited to capacity (Poblocka-Dirakis, 2017b). At the same time, wind power electricity generation facilities are exempt from excise tax only on the electricity they generate and consume (Cansino et al., 2011b:110). In Slovakia, Poland, Romania, the Netherlands and Lithuania, electricity generated from RE sources is also exempt from consumption tax. Moreover, in Lithuania, biofuel plants also benefit from environmental pollution tax reduction. In Finland, electricity consumption based on RE sources is taxed with electricity consumption tax, but this tax is reimbursed or compensated through subsidies (Klein, 2017; Blumbergaa et al., 2014:4; Cansino et al., 2011b:110-111). In Denmark, only electricity generated by wind, solar PV, hydropower and small-scale units is exempt from consumption tax (Cansino et al., 2011b:110).

Germany, Sweden, Denmark and the Czech Republic are the countries that offer energy tax exemption for REN sources used for heating and cooling purposes. Germany and Bulgaria apply this excise tax exemption only to biofuels, while Latvia applies reduced rates (Cansino et al., 2011a:3808; Valach, 2017a; Poblocka-Dirakis, 2017a; Poblocka-Dirakis, 2017b; Naydenova, 2017a; KPMG, 2016b:10; Upatniece, 2017). Denmark, Finland and Sweden apply carbon dioxide tax exemptions, while the Netherlands has reduced rates (Poblocka-Dirakis, 2017b; Cansino et al., 2011a:3808; Poblocka-Dirakis, 2017a; OECD, 2017a). At the same time, Denmark, Poland, Estonia and Sweden tax emissions that cause air pollution and apply exemptions to RE sources (Poblocka-Dirakis, 2017b; International Institute for Labour Studies, 2011:4). While fossil fuel taxes are applied in Austria and Czechia, Austria exempts biofuels from fossil fuel tax and Lithuania from environmental tax (Cansino et al., 2011a:3808; Çelikkaya, 2017:18; Tallat-Kelpšaitė, 2017).

The large share of transport in energy use and the fact that the transport sector plays an important role in the process of integrating production and markets, as stated by Tonus (2004:9-10), cause environmental pollution and technological barriers to the use of alternative energy sources create dependence on oil, the EU encourages the use of rail transport in the transport sector.

Austria and Slovakia provide exemptions or reductions in the mineral oil tax, while Portugal provides biofuel producers with an exemption from the oil production tax. France provides exemption from taxes on polluting activities, Sweden provides CO_2 tax exemption, Lithuania provides environmental tax exemption to owners of vehicles using biofuels (Borek, 2016; Valach, 2017b; Jimeno, 2017b; KPMG, 2016a:27; Poblocka-Dirakis, 2017b; Tallat-Kelpšaitė, 2017).

In the field of transport, Bulgaria, Czechia, Hungary, Portugal, Lithuania, Slovenia, Croatia offer excise tax exemptions for biofuels, while Finland, Slovakia, Latvia offer excise tax reductions (KPMG, 2016b:10; International Institute for Labour Studies, 2011:6; Valach, 2017a; Borek, 2017; Jimeno, 2017b; Tallat-Kelpšaitė, 2017; Naydenova, 2017b; Res Legal Europe, 2012:46,52; Valach, 2017b; Siniloo, 2017; Upatniece, 2017).In the field of transport, Germany offers MVT exemption for hybrid and electric vehicles, while Slovenia and Latvia levy this tax based on carbon dioxide emissions (IRENA, 2015:41; OECD, 2017b:61; NREAP, 2010:24). In the Czech Republic (limited to a certain date) and Cyprus, road tax exemption is applied to electric, hybrid and alternative fuel vehicles. Belgium offers reduced licence plate tax for zero emission vehicles in some regions, as well as vehicle registration tax exemptions, as do Denmark, the Netherlands and Cyprus. Malta imposes taxation based on emissions and age and does not apply emission tax for pure electric vehicles (ACEA, 2018).

5. COMPARISON OF TAX INCENTIVES FOR RE IN TURKEY AND EU-27

In 2021, the contribution of RE resources in primary energy consumption in Turkey was 15.6%, while the EU average was 21.8%. Looking at the support mechanisms in the EU-27, it is seen that tax incentives can be designed in various ways and can be used in accordance with the countries' own tax systems and in line with RE targets. While environmental taxes are widely used in EU-27 countries in order to support RE, there is no other environmental support instrument other than Environmental Cleaning Tax in Turkey. In EU-27 countries, environmental taxes are used to increase both production and consumption. In nine EU countries, namely Estonia, Sweden, the Netherlands, Lithuania, Poland, Romania, Finland, Slovakia, Denmark, exemption from some environmental taxes and excise taxes is offered for electricity generation and consumption of energy generated from RE sources. In the field of heating and cooling, incentives can be implemented in the form of exemption from consumption, carbon dioxide and some environmental taxes, as well as taxation of non-REN resources. It is also seen that the EU is trying to increase the use of RE in this field through tax incentives provided in the field of transport and the tax incentives used in the field of transport are generally related to biofuels. In Turkey, only fossil fuels are subject to a lower tax rate in case they are blended with biofuels (ethanol and biodiesel). The 2% of biodiesel and bioethanol blended from domestic raw materials is exempt from SCT. In the field of transport, it is observed that in some EU countries, MVT is applied depending on emission releases and vehicles using alternative energy sources are exempted from some taxes. In Turkey, there is no taxation based on emission releases. Only the reduced SCT regulation for some hybrid vehicles in 2024 is a tax incentive for some low-emission vehicles. This regulation and the legislation on SCT base and rates for the purchase of alternative fuel vehicles are incentives only for electric and some hybrid vehicles. In Turkey, MVT is a tax incentive only for electric vehicles.

VAT incentives, on the other hand, are used by fewer number of member states to support RE compared to other consumption taxes. Among the EU-27 member states, Czechia, France, Italy, Latvia, Malta and Portugal are the countries that use the reduced VAT rate to support RE technologies. While some of these countries use this type of incentive in order to increase RE investments, some countries apply this incentive instrument in areas such as heating and cooling, transport, etc., generally for households and enterprises. Under Article 13 of VAT Law No. 3065, some RE investments are also subject to VAT exemption. Within the scope of Decision No. 2012/3305 and the regulations added to

this decision, RE investments with some incentive certificates can benefit from VAT exemption. Law No. 6745 provides VAT exemption and VAT refund (for building construction expenditures) for RE projects that are deemed eligible for support. According to the Law No. 6446, VAT exemption is applied in cases specified in the law, but there is no specific regulation for enterprises operating in the field of RE.

One of the widely used tax incentive instruments in the field of RE is PIT incentives. In EU-27 practices, PIT incentives are mostly used to support small-scale installations for specific resources, electricity generation, heating and cooling, while some countries offer tax exemption only for self-consumption. EU countries that offer these incentives in the field of RE are Belgium, Czech Republic, Denmark, Germany, Greece, France, Italy, Luxembourg, the Netherlands, Finland and Sweden. In Turkey, investments that are deemed appropriate to be supported within the scope of Decree No. 2012/3305 and Law No. 6745 can benefit from this incentive if they meet the specified conditions. According to Article 9 of Tax Law No. 193, within the scope of the activities that can be carried out without a licence in accordance with the Law No. 6446, within the scope of electricity generation based on RE resources, although the installed power limit is applied, those who meet the conditions written in the law can benefit from the exemption of tradesmen. Apart from this provision, there is no specific PIT reduction or exemption for small-scale energy producers and users in the field of transport, heating and cooling and electricity generation in Turkey.

There are nine countries in the EU that apply CT incentives. Spain, Belgium, Greece, Czechia and Romania use this incentive in the field of electricity from RE sources, Ireland and Germany in the field of heating-cooling. The Netherlands and Hungary apply CT incentives both in the field of electricity from RE sources and in the field of heating-cooling. These countries allow taxpayers to use a certain amount or proportion of the investments made, or earnings from these sources, to reduce the tax base through tax deductions or tax credits. Incentives can be applied only to certain sectors and resources, or they can be used as a support tool in the form of full or partial exemption. In Turkey, within the scope of the privatisation of electricity distribution companies and electricity generation facilities under Law No. 6446, CT exemption is applied to the gains arising from the transfer, merger, spin-off, partial spin-off transactions to be carried out until 31/12/2024. In Turkey, CT exemption is applied only to RE investments, which are included in the scope of priority investments, for any technology in the fields of transport, heating and cooling and electricity generation. Apart from this regulation, within the framework of Decree No. 2012/3305 and Law No. 6745, investments and projects deemed appropriate to be supported can also benefit from the CT discount in the field of RE. Pursuant to Article 32/A of the Corporate Tax Law No. 5520, this practice involves the application of reduced tax at certain rates until the envisaged investment contribution amount is reached.

The diminishing balances method and property tax incentives can also be specificised and support can be shaped according to the sector, resource and investment scale. In 7 EU countries, namely the Netherlands, Belgium, Ireland, France, Portugal, Romania and Sweden, the diminishing balances method is applied in order to support RER resources. The diminishing balances method is applied in order to increase the investments by enabling the rapid deduction of the costs of assets such as tools, equipment, etc. used in the installation or operation of RE investments. While this method is generally offered for the purpose of reducing the costs of the investments of RE production facilities, it is not applied for the support of RE resources in Turkey.

Bulgaria and Czechia use property tax incentives in the field of heating and cooling, Spain, Romania, Sweden, Poland and Italy in the field of electricity from RE sources. These countries are trying to increase the interest of investors towards RE resources by applying property tax exemption or

reduced rates, and specific sectors can be supported. In addition, certain limitations in terms of technology types can be restricted only for the technology to be supported. In Turkey, there is no property tax exemption applied only for the purpose of supporting RE resources, and the elements that are subject to this tax in the field of RE can benefit from general exemption and regulation conditions.

R&D activities are included in the incentive mechanism by the member states in many ways. Seven EU countries provide tax incentives for R&D activities based on reasons such as the development and dissemination of RE technologies and increasing the energy efficiency of existing ones with new methods. These countries are Belgium, Ireland, Greece, Spain, France, Italy and GKRC. In Turkey, incentives for R&D activities have been introduced within the scope of supporting project-based studies. This is a positive development in terms of the expansion of activities in this field. In addition, R&D activities considered within the scope of priority investments can also benefit from the 5th Region supports if they meet certain conditions.

Among EU-27 member states, only Czechia recognises customs duty exemption for all RE technologies. In Turkey, investments and projects with investment incentive certificate within the scope of Decree No. 2012/3305 and Law No. 6745 can benefit from this tax exemption. However, there is no regulation specifically for RE resources (KPMG, 2015:68).

6. CONCLUSION

Turkey's 15.6% share of RE in its primary energy consumption in 2021 falls significantly below the EU average of 21.8%. Turkey's current approach to RE support mechanisms reveals areas for improvement, particularly in comparison to the EU-27. While EU-27 countries implement a broad spectrum of tax incentives aimed at promoting RE production, consumption, and related infrastructure, Turkey's policies remain limited in scope. As Turkey seeks to increase the share of RE, valuable lessons can be drawn from EU-27 member states where various tax incentive mechanisms, such as environmental taxes, excise duty exemptions, and VAT reductions, have proven effective in encouraging RE production and consumption across various sectors, including electricity generation, heating, cooling, and transport.

In the EU, these tax incentives not only target producers but also aim to influence consumer behavior. Some countries offer tax exemptions and rebates for vehicles using RE, biofuels, and other environmentally friendly technologies. In contrast, Turkey’s current incentives, such as reduced SCT for hybrid vehicles and biofuel blending, remain limited. Moreover, Turkey lacks a comprehensive emissions-based tax system, which further constrains efforts to mitigate the environmental externalities associated with energy consumption. The incentive system could be expanded to include exemptions such as waivers of stamp duty on registration fees for licenses and vehicle registration, exemptions from taxes, duties, and fees related to notarial procedures in vehicle transactions, exemptions from banking and insurance transaction taxes for loans used to purchase these vehicles, and waivers of fees and similar obligations related to emissions testing.

The EU's approach to RE extends beyond direct consumption incentives to include CT reductions, PIT incentives, and property tax exemptions, all of which encourage investment in renewable technologies. These fiscal policies have proven effective in stimulating the growth of small-scale RE installations, electric and hybrid vehicles, and energy-efficient heating and cooling systems. While some RE projects in Turkey benefit from tax incentives under Decree No. 2012/3305 and Law No. 6745, these measures primarily target large-scale investments and do not comprehensively address smaller, consumer-based projects. Additionally, the absence of sector-specific CT incentives for renewable technologies limits broader industry participation in the transition to cleaner energy sources.

R&D plays a critical role in advancing RE technologies and reducing their costs. The EU incentivizes research and innovation through comprehensive support mechanisms. Although Turkey has taken steps to support R&D, especially after the 2016 regulations, shortcomings remain in providing consistent and long-term financial incentives for RE projects. Enhancing Turkey's RE incentive framework by incorporating more flexible, transparent, and comprehensive tax policies—such as reintroducing the declining balance method and expanding regional tax benefits for RE investments—could further encourage investment in this sector.

In conclusion, a more holistic and well-structured tax incentive system is necessary for Turkey to significantly reduce its dependence on energy imports and achieve sustainable development. This system should address both the supply and consumption dimensions, with targeted incentives for energy efficiency, small-scale RE projects, and consumer-based RE technologies. By learning from the EU's multifaceted tax mechanisms and extending these practices to cover a broader range of RE investment and consumption, Turkey can accelerate its transition to a RE future while reducing the negative externalities associated with fossil fuel dependence.

Ethical Statement

The rules of Research and Publication Ethics have been complied with in the writing and publishing processes of the study titled "Tax Incentives For Renewable Energy In Turkey and the EU-27". Ethics committee permission is not required for the study.

Contribution Rate Statement

All the authors in the study contributed to all processes of writing and drafting the study and the final version of the study has been read and approved by them.

Conflict Statement

This study did not lead to any individual or institutional/organizational conflict of interest.

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Extended Abstract

TAX INCENTIVES FOR RENEWABLE ENERGY IN TURKEY AND THE EU-27

Increasing energy use causes serious problems in many areas, especially in the environment. In the literature, it is stated that RE sources are an effective solution to reduce the problems caused by fossil fuels. However, developments in this field need to be supported, especially because cost barriers pose a significant problem. One of the mechanisms implemented by governments to support RE is tax incentives. In this study, the role of tax incentives in increasing RE investments and consumption is discussed comparatively on the basis of literature, Turkey and EU-27 practices. Tax incentives are classified as PIT incentives, CT incentives, VAT incentives, R&D tax incentives, the method of diminishing balances, customs duty incentives, property tax incentives and other taxes. Within the framework of this classification, the study provides an analysis in the context of EU-27 and Turkey through legal legislation, practices and numerical data. This study is expected to contribute to the literature and practices in Turkey.

Turkey's energy import dependency rate is approximately 70%. This situation poses serious risks for Turkey's energy security and budget balance and increases the importance of alternative energy sources. The share of RE in Turkey's primary energy consumption as of 2021 was recorded as 15.6%. In the same year, this ratio was 21.8% in EU-27 countries. In EU-27 countries, tax incentives are widely used in areas such as electricity generation and consumption, transport, heating and cooling. When the support mechanisms of the EU-27 are analysed, it is seen that tax incentives can be designed and implemented in different ways in line with the countries' own tax systems and RE objectives. Moreover, it is understood that these incentives can be customised according to criteria such as sector, resource type and investment scale. In Turkey, there are significant deficiencies in terms of both legislation and support mechanisms. There is a need to simplify the legislation and increase the effectiveness of support mechanisms. It is of utmost importance to implement emission-based taxation in the transport sector as soon as possible. In addition, tax incentives can be provided for the cultivation of energy crops to be used in biofuel production and the amount of these incentives can be increased. Incentives for alternative fuel vehicles using renewable energy should be determined at a level that will encourage the purchase of these vehicles. Supporting RE-sourced electricity with incentives not only for producers but also for all stakeholders involved in transmission, distribution and consumption processes can make a significant contribution to the widespread use of RE. However, the fact that support mechanisms in Turkey largely target only large-scale investments leads to the neglect of other types of investments. This situation creates inequality of opportunity for small and medium-sized investors. In the field of heating and cooling, Turkey is insufficient in terms of support for RE resources compared to EU-27 countries. Supports in this field need to be increased and improved. Looking at the practices of EU-27 countries, it is seen that tax incentives are designed in a target-oriented and flexible manner. For example, while incentives are provided for electric vehicles to reduce carbon emissions in the transport sector, the use of resources such as solar energy and geothermal energy is encouraged in the field of heating and cooling. Moreover, supporting RE investments with R&D activities helps to encourage innovation and reduce costs. It is possible for Turkey to improve its legislation and practices by benefiting from such examples. A comprehensive reform process is needed for Turkey to increase the utilisation of RE. It is necessary to simplify the legislation, develop incentive mechanisms suitable for different sectors and scales, encourage small and medium-sized investments, and implement innovative practices in areas such as transport, heating and cooling. In this way, Turkey's dependence on energy imports can be reduced, the budget balance can be improved and environmental sustainability targets can be achieved. A strategy to be formulated by taking advantage of the experiences of EU-27 countries will contribute to Turkey's more effective utilisation of RE resources.

In conclusion, tax incentives can be used as an effective tool in the dissemination of RE resources. However, the effectiveness of these incentives depends on the correct design of legal legislation, application areas and incentive amounts. Turkey's addressing its shortcomings in this area and establishing a more holistic support mechanism will be a critical step in increasing RE investments.