

# REVIEW OF FISCAL MEASURES FOR PROMOTING RENEWABLE ENERGY IN PUBLIC FINANCE

By

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## ABSTRACT

*Financial systems across the globe have been directed financial resources to encourage the growth of the renewable energy sector in recent decades. This initiative is necessary because an uninterrupted transition to renewable energy is unlikely to occur by chance. Therefore, policies must facilitate a clean transition to renewable energy. Thus, the volume of investments in renewable energy is persistently increasing across all markets. Scholars have argued that the volume of fiscal measures deployed is the critical tool that pulls resources towards the renewable energy sector. This study reviewed the fiscal policy measures deployed by the authorities in achieving the dual purpose of increasing green investments and stabilising the state of disequilibrium in public finance.*

## 1.0 INTRODUCTION

The energy policies are assessed based on measuring each approach and its effectiveness. The standard for measuring efficiency is classified into commercial, environmental, and environmental efficiency (Carlsson et al., 2002). Each change in energy policy meant a reallocation of rents and, thus, the need to solve the fears of incurring losses by some stakeholders (Gawel, Strunz, and Lehmann, 2017). The energy approaches are often too dependent on estimating their viability. The effect of certain measures might be unfavourable to RETs because the competitiveness has increased, even though a free energy market may offer a favourable environment for the healthy growth of RETs (Painuly, 2001). Nonetheless, a free-market energy sector may provide a favourable environment for developing renewable energy (Painuly, 2001).

Governments must have the main role of creating RETs by setting up crucial policies and delivering satisfactory mechanisms. These arrangements frequently influence traditional and renewable energy costs to utilise favourable fiscal measures (Gastli and Armendariz, 2013). Nonetheless, Abdmouleh, Alammari and Gastli (2015) stated that the 'policy package' techniques are more effective than most authorities' stand-alone policies. Also, there is no possibility of a single global energy policy. For example, a global carbon tax is uncommon for countries because they consent to a different policy (Pietrzak et al., 2017). In some remarkable cases, rigorous and timely policy endeavours to reduce exhaustible energies and institutional dormancy (Gawel, Strunz, and Lehmann, 2017).

Some primary environmental policy tools include green certificate schemes, carbon-energy taxation, and carbon trading (Ju et al., 2016). Optional policies applied for environmental protection are in the form of monetary incentives and non-incentive guidelines. For instance, financial supports include incentives for utilising sustainable

energy and tariffs on petroleum product consumption (Abolhosseini and Heshmati, 2014).

It is also assumed that a trade-off exists between supply security, affordability, and sustainability, which tends to slow the progress of the energy transition. Most energy providers are in politically insecure locations, like Africa, Latin America, and the Middle East, presenting severe threats to energy security (Heshmati and Abolhosseini, 2017). Thus, environmental change and energy security concerns have strengthened the significance of producing eco-friendly energy and are further supported by political insecurities in the Middle East and excessive petroleum products. The concerns for energy security have been continually on the alert since the embargo on Arab oil in 1973. Oil-consuming European and other advanced economies faced the impacts of restricted energy supplies and high oil prices (Heshmati and Abolhosseini, 2017). These threats call for an internal energy search among energy-consuming nations. Subsequently, some of these energy-importing countries expanded their internal energy supply to decrease their reliance on importation, a step they viewed as a strategic need. Therefore, renewable energy innovations are an option for energy production and reduce reliance (Heshmati and Abolhosseini, 2017). Since the 1970s, there has been dynamic global innovative work in sustainable renewable energy technologies and designs since the oil emergencies.

## **2.0 GREEN ENERGY POLICIES**

Energy policies aim to enhance energy-saving innovations, energy efficiency, and similar management procedures that can impact energy performance and result in carbon reduction and energy conservation (Jiang et al., 2013). Energy policy is a technique where the public authority chooses to address energy advancement and improve the energy sector to support its development, including energy generation, distribution, and utilisation. Generally upheld by industry-based strategies and driven by financial interests, energy policies are given noticeable value globally by public and legislative backing. It assumes a crucial part in alleviating the effects of global warming and the challenges of energy inaccessibility (Solangi et al., 2011).

An uninterrupted transition to renewable energy is unlikely to take place by chance. Therefore, policies must be employed to facilitate a clean transition to renewable energy. In achieving this, global energy policies must be effective rather than merely transferring emissions from location to location (Pietrzak et al., 2017). Some studies examined government policies: economic incentives schemes and command-and-control programmes and their impacts on the ecological system. Some scholars opined that the economic-based scheme yields more than an order-and-control scheme because it gives greater adaptability to monetary instruments (Bernauer et al., 2007; Jaffe et al., 2004). Frondel et al. (2004) discovered that tougher regulations have higher effectiveness and should be given priority. However, others viewed that each instrument varies with the context used. Thus, no single best policy arrangement is optimum for all cases; each should consolidate distinctive strategy instruments. Financial policies can be utilised as motivators for improving the generation and utilisation of eco-friendly energy sources. Additionally, charging tariffs on environmental discharge are among the options (Heshmati and Abolhosseini, 2017).

The incentives scheme normally depends on similar approaches to ecological policies: for example, price-based methodologies for frameworks in which electric distributors are obliged to buy power from green energy producers at feed-in-tariffs; organised competitive bidding processes, volume-based procedures where the regulators set a goal

to be reached (Menanteau, Finon and Lamy, 2003). Tax policy is additionally a valuable instrument for diminishing consumption (Abolhosseini and Heshmati, 2014). Numerous researchers believe a carbon tax may be the most immediate approach to internalised ecological damage. Nonetheless, carbon charges produce solid obstruction by starting ventures favouring cap-and-trade programmes since they are more likely to remove rents (Gawel, Strunz, and Lehmann, 2017).

Significant transition programmes need to be put in place immediately to guarantee an ideal ecological outcome; the upcoming policy framework ought to be adequately adaptable to empower variation to unanticipated difficulties (for instance, technological uncertainties) and to be sufficient to facilitate deploying of clean energy (Gawel, Strunz, and Lehmann, 2017). Consequently, private sector investors may have a considerable monetary incentive and a chance to invest through economic policies since it enhances their liquidity (Abolhosseini and Heshmati, 2014). Centres for eco-friendly energy demand need to be designed to advance market liquidity. Creating sustainable energy has depended on economic incentive programmes and public support (Heshmati, Abolhosseini, and Altmann, 2015).

An efficient solution to establishing a free market between energy-producing innovations would be to remedy the imperfections in the market through ecological tax (Menanteau, Finon and Lamy, 2003). It is more gainful if the legislation supporting RES and pressuring demands towards the gainful areas at public cost is empowered instead of unnecessarily heavy taxes on fossil resources.

The capacity to carry out effective RET policies consists of three interconnected political economy dynamics (Isoaho, Goritz, and Schulz, 2017). This can be actualised by various types of economic instruments specified by Abolhosseini and Heshmati (2014), which incorporate tools like utility procurement, grants to infrastructure, and capital grants; another government support incorporates national financing instruments, vocational training, export promotion (Cetykovic, Buzogany, and Schreurs, 2016).

Economic factors assume a fundamental part in influencing the transition to renewable energy. Heshmati and Abolhosseini (2017) noted that the prices of stocks of principal producers of wind turbines in Denmark and solar panels in China have diminished because of a sharp collapse in petroleum prices. This could mean that monetary conditions are necessary for influencing the clean energy policy more than ecological concerns. Financial support systems are important in upgrading sustainable energy production (Abolhosseini and Heshmati, 2014). This might be through dramatic policy changes regarding retroactive RES-support reductions (Gawel, Strunz, and Lehmann, 2017).

Green policies must be dynamic; Miller et al. (2013) stated that the first-generation RES policies should form the basis for other RES frameworks. This can be fortified if institutional processes have autonomous administrative power. A motivation behind the strategy is liberating the market, which is intended to expand the energy sectors' efficiency by allowing free competition in the energy market (Painuly, 2001). From a hypothetical viewpoint, Menanteau, Finon and Lamy (2003) affirm that management backing can be vibrant because it plans to address negative externalities by utilising petroleum derivatives. Even though advanced economies that import unrefined petroleum products have implemented carbon taxes for a long time, they aid in

safeguarding the ecological system's natural purposes (Abolhosseini and Heshmati, 2014).

Generally, fiscal measures can help boost investment in RE and energy-saving ventures. Tax exemption can boost the private sector's participation in putting resources into RE activities (Abdmouleh, Alammari and Gastli, 2015). Similarly, the tax credits provide aid like subsidies on investment of around 25–35%, depending on the organisation's profit and monetary status (Sieminski, 2013). Abdmouleh, Alammari and Gastli (2015) suggest that, for vigorous fiscal measures, structured tax policies accompanied by rigorous administrative backing are required. They will help make the incentives effective.

Rickerson, Sawin and Grace (2007) examined European support components and assessed how they apply to US policies. They referenced the European discussion about Renewable Portfolio Standards (RPS) and FITs, proposing a single harmonised system in the US market. They stressed that the US states are not constrained to agree with a single harmonised system. Consequently, they can apply various approaches to exploiting renewable energy strategies. Also, Ringel (2006) investigates the typical forms of supportive tools in the European Union (EU), including green certificates and FITs, to assess their benefits and weaknesses regarding viability and proficiency. The outcomes show that FITs effectively urge people to utilise environmental-friendly power sources, with wind energy mainly in Germany and Denmark. FITs have been a successful instrument in advancing sustainable power arrangements in Europe. Some authors' investigations reveal that FITs that could be utilised for upcoming energy innovations, such as PV and RPS, should improve sustainable energy innovations (Abolhosseini and Heshmati, 2014).

## 2.1 Feed-in-Tariffs

The Feed-In-Tariffs (FIT) scheme ensured a fixed price for producing power that would be continually available for a stable period (say 15–20 years). A contract of sale or purchase obliges utility companies to purchase green power for definite long-run contracts (Abolhosseini and Heshmati, 2014). From 2012 to 2014, the producers of renewable energy technologies in the EU could select between a sliding feed-in premium and a fixed feed-in tariff (Gawel, Strunz, and Lehmann, 2017). This feed-in tariff program encompasses a commitment on electric utilities to buy sustainable power produced by renewable energy producers in their territory as determined by their local council. The notable feature of FITs is that the service is guaranteed longer. This implies that the feed-in tariff arrangement offers a fixed contract and ensures that it covers the cost of power produced; it gives uninterrupted accessibility and stability to deal with a buying commitment by the utility distribution firms, which is for explicit long-lasting period contracts (15–20 years).

Couture et al. (2010) stated that the feed-in tariff is an energy-supply programme tailored to support improving clean energy projects. A FIT offers a long-run purchase agreement for producers to sell RE generated. Consequently, feed-in-tariff (FIT) is a strategy for supporting interest and investment in clean energy innovations (Abolhosseini and Heshmati, 2014). Couture and Gagnon (2010) highlighted three fundamental arrangements for a successful FIT scheme: costs determined on the unit expenses of power produced by sustainable power sources, stable, long-term power-purchase arrangements, and access to the grid.



The three significant support instruments states generally utilise to advance sustainable power are renewable portfolio standards (RPS), tax incentives, and feed-in-leivies (FIT). The EU has applied both FIT and RPS instruments in creating sustainable power innovations, and in this way, it has experienced both options. The FIT approach has prompted the fast development of power generation through sustainable power sources. These strategies show that FIT is a functional scheme (Heshmati and Abolhosseini, 2017). FIT approaches are reasonable for empowering environmentally friendly power sources, whereas the RPS instrument should be used to sustainable power sources elevated to a specific level (Couture et al., 2010).

FITs are compared with auction and quota systems to see their effectiveness in supporting energy advancement in Germany and the UK by assessing project originators (Butler and Neuhoff, 2008). The outcome showed evidence against the feed-in tariff because it does not support the free market. The authors concluded that the deployment level is less in the UK than in Germany.

## 2.2 Competitive Bidding

A competitive bidding mechanism is the most supportive policy for the government and the end customers because it decreases the costs through market-based pricing, enhancing the least-cost technology (Abdmouleh, Alammari and Gastli, 2015). Due to competitive price stipulations, the low energy price may act against motivating investors, thereby negatively affecting the industry. Therefore, a tax credit may be a more favourable incentive, as it can motivate the producers to generate power more effectively. A competitive bidding mechanism is the best policy that encourages end-users and the authorities since it promotes the least-cost technology and decreases transaction costs through market-based pricing (Abdmouleh, Alammari and Gastli, 2015). On the other hand, this scheme might encounter the risk of unsustainable price bids. This implies that the low energy price would discourage investment, which might be a wrong indicator for the industry.

Competitive bidding systems and feed-in tariffs are used in the European regions to promote RES improvement at various levels. Different measures are employed to study the effect of these approaches. Among them are:

- i. Capacity to inspire renewable electricity production.
- ii. Incentives to diminish prices and costs.
- iii. The summation of the net cost for society.
- iv. Inspiration for innovation.

## 2.3 Subsidies

An International Energy Agency (2012) report indicates that energy subsidies are assessed to rise from \$88 billion in 2011 to approximately \$240 billion in 2035 (International Energy Agency, 2012). The conventional energy system has benefited from huge subsidies multiples times that of the aggregate sum received by RES-producing firms. Another fact is that fossil-product utilisation was assessed at \$523 billion in 2011. It gained almost six hundred per cent more than the financial support given to sustainable energy power (Abolhosseini and Heshmati, 2014). This implies that the support rendered to traditional fuel sources outweighs those given to sustainable power sources (Abolhosseini and Heshmati, 2014). Subsidies remain essential for supporting wind energy plans in countries like Sweden (Mourelatou and Birmingham, 2001).

### 3.0 PROMOTING RENEWABLE ENERGY SYSTEMS

Promoters of RES considered that innovation, policy, and designed plans could aid in fastening the energy transition in unprecedented manners. In other words, they can facilitate the attainment of energy transition quicker than it would have been possible to do fewer decades ago. This infers that specialised learning and advancement can bring about new systems and technologies with exponential development potential.

Among the major factors that promote RES is the gross deficiency in energy availability. It is estimated that almost five hundred million people have limited or no access to energy power (Painuly, 2001). This prompts the need to produce locally renewable electric technologies (off-grid applications) instead of keeping them connected to the electricity grid.

Other interventions of different governments help in stimulating RES. Ćetković, Buzogány, and Schreurs (2016) state that starting from 2011, various governments designed different programmes design to ensure the reduction of their dependency on petroleum products by 2050, and some have set objectives to be met - between 10-30 per cent of energy utilisation, is to be sourced through the sustainable energy sources by 2020. A study confirmed a need for government intervention in the energy market in terms of both regulations and policy incentives in instrument design to boost RETs formation (Abdo and Ackrill, 2021).

Therefore, sustainable energy technologies continued to emerge and steadily advance, thus creating the possibility that the global transition to a clean, eco-friendly, dependable, and financially achievable energy system - is becoming more promising. IRENA (2011) indicates that the outcome of a substantive degree of research and development, the diminished price of traditional energy, investment in RES, and impending new empowering administrative structures are evidence of increased attention toward renewable energy development.

Sustainable energy cost-effectiveness and the energy produced by their sources keep on expanding. Nonetheless, Heshmati and Abolhosseini (2017) stated that gains from sustainable power sources rely upon exhaustible energy prices in the energy market. In this way, building up the sustainable power market depends on the value of essential fuel sources.

Distortions and market imperfections combined with adverse monetary, administrative, and institutional environments suggest that the intervention of the authority is necessary to advance renewable energy production (Painuly, 2001). The role of governments in the technological transfer is also important for renewables. Another reason RES is gaining more attention is the natural global distribution of renewable energy assets. For instance, Australia is more fortunate than many other countries in its thermal fuel reserves. Thus, renewable technologies offer autonomy from petroleum derivative imports and price fluctuations. Painuly (2001) claims that innovations like small-scale hydropower, wind and solar probably will not be financially viable. However, these technologies are ideal for rural settlements to make their development, and that makes them worthwhile.

Dincer (2000) noticed that regardless of various difficulties, the research and development on the advancement of the RETs had been extended in the following:

- i. Mixing various energies (e.g., biomass, geothermal, hydropower) and new technologies (e.g., ocean thermal and solar).
- ii. Improving the assortment and change efficiencies.
- iii. Boosting dependability and applicability.
- iv. Reducing costs.

#### 4.0 CONCLUSION

The role of public finance in public finance has revolutionised with emphasis on using fiscal and monetary measures in promoting the growth of renewable energy production and utilisation and combating ecological degradation while ensuring energy security is guaranteed. Policyholders utilised a combination of fiscal measures in optimising the green objectives in public finance.

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