

ENVIRONMENTAL FISCAL POLICY FOR SUSTAINABLE AND EFFICIENT RENEWABLE ENERGY

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Abstract

The article is focused on the appropriate factors for the effective implementation of fiscal policy instruments that lead to more efficient and competitive models for the production of renewable energy. These models became an efficiency tool for value creation and delivery for the customers as part of the transition management for sustainable development. The analysis is based on in-depth case studies in Bulgaria and Belgium and compares the polycentric approaches for governance.

Key words: policy instruments, renewable energy, success factors, governance

JEL: H3, H4, O3

Introduction

The concept of "circular economy" has been firstly raised by the two British environmental economists Pearce & Turner (1990). After an in-depth analysis of the relationship between economic and natural systems, they raised the notion of "circular economy" as ultimate landscape of the economics in XXIst century. Now more than ever, the concept of circular economy has gained the attention of the policymakers and academia (Geissdoerfer, Savaget, Bocken, & Hultink, 2017) especially after the publication of the European Circular Economy Package (ECEP European Commission, 2015) and the Chinese Circular Economy Promotion Law (Kirchherr, Reike, & Hekkert, 2017). As we are moving from rhetoric to implementation (Su, B., Heshmati, A., Geng, Y., & Yu, X. (2013), it was presented a new sustainable development strategy by the central government, aiming at providing a more efficient level, especially in the use of energy. The "double dividend hypothesis", based on the assumption that green taxes on one hand lead to lower pollutions (Porter & Van Der Linde, 1995, p. 116), and on the other hand, allow a decrease of the other taxes (on income, on social contribution, etc.) is not disputable anymore (Andersen, Ekins, 2009, p. 2). We shall provide empirical evidence in support of the stronger version of Porter's hypothesis, as stricter regulations provide better business performance (Ambec,

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Cohen, Elgie, & Lanoie, 2011, p. 16). The statistical data confirms the reality of this double benefit. The economic policy tools cover a wide range of measures to create a favorable framework for economic growth, sustainable development and poverty reduction (Cambridge Econometrics, 2014, p. 7). It is generally accepted that economic, social and environmental goals need to be combined to meet the needs of both present and future generations (Gechev., et.al., 2012). As rightly noted (Cropper and Oates, 1992), the formation of economic policy in accordance with environmental objectives is an extremely important condition for achieving sustainable economic and social development (Global Sustainable Investment Alliance, p. 21, 2014). Eco-fiscal policy aims at stimulating economic growth by increasing the efficiency of resource consumption and thus contributes to their conservation, while reducing emissions and waste levels. Various systems of fiscal incentives, such as taxes, fines, fees, subsidies can help the adequate use of natural resources, promote technological innovation and increase market competitiveness (Marikina, 2018, p. 133), with the underlying burden falling on the regulatory mechanisms of the state (Gechev, 2012) in order to make progress on the development of the green economy. The social dimension of eco-fiscal policy considers the distribution and redistribution of income caused by financial losses. These losses caused by environmental degradation can be prevented or mitigated, and revenues can be used to improve social security.

The structure of this paper is as follows: Firstly, we begin with a discussion of the literature review of the relation of eco-fiscal policy instruments for sustainable development renewable for renewable energy development and a review of the methodology we used for this paper. Secondly, we analyzed the theoretical background of the Eco-fiscal policy measures for the development of renewable energy and promotion of sustainable development. Thirdly, based on our research, we discuss the implemented measures in Bulgaria and Belgium through the lenses of the how we govern the commons (Ostrom, 1990). Finally, we justified several success factors for efficient and sustainable renewable energy as well as for the effective use of policy instruments.

Literature review: Research objective & Methodology

This study analyses the implementation of eco-fiscal reform, which is associated with a "double-effect" that stimulates both environmental quality and employment. The research objective of this paper is to offer an understanding on which are the key success factors for effective use of the policy instruments that contribute to more efficient and sustainable production of renewable energy equipment, respectively renewable energy electricity. This is possible if the burden of taxation is shifted according to the OECD "polluter pays" principle, adopted more than 40 years ago. More recently, the principle has been set out in the Rio Declaration, Directive

2004/35/ EU, examining the degree to which the environmental principle is integrated with the efficiency and fairness of taxation. This paper discusses different policy instruments for efficient and sustainable renewable energy (International Monetary Fund, 2013, p. 24). Green and competitive sustainable business models became an efficiency tool (Osterwalder, Pigneur & Tucci, 2005) for value creation and delivery for the customers as part of the transition management for sustainable development (European Report on Development, 2015, p. 296), Loorbach, 2010; Gladwin, Kenelly & Krause, 1995). Nevertheless, resource dependency theory (Pfeffer and Salancik, 1978) and network relationships (Hillman et al. 2009) are seen as very important features for building successful governance in terms of sustainable entrepreneurship for renewable energy business models, a research gap remains in finding a polycentric model of governance (Ostrom, 1990) in terms of different models of governmental intervention for building a long-term renewable energy model.

Our aim is to find out which are the successful factors for the effective implementation of policy instruments (fiscal and economic ones) that lead to more efficient and sustainable renewable energy model.

1.1. Case study approach: To achieve this aim, we compared how the policy instruments are implemented in Bulgaria and in Belgium, and we conducted an explorative research in Belgium and in Bulgaria (Yin, 2003).

The research design of this paper is adopted in order to discover how RE cooperatives are escaping the barriers to the uptake of RE sector, and compare their renewable energy business model (REBM) to the traditional one in the energy sector. Originated from the Theory of Reasoned Action (Fishbein and Ajzen, 1975), the Technology Acceptance Model (TAM) is used to identify the constructs of the barriers to RE adoption that the cooperatives are facing. Our exploratory research will contribute on the fact that cooperatives effectively add value to the uptake of RE with community-based eco-fiscal tools that are creating the promotional factors required for a resilient energy sector. The findings would contribute to the literature about the governance for environmental sustainability. This study is limited to the renewable energy (coming from Wind and Sun), PV Firms and Wind producers located in Belgium & Bulgaria, recognized as successful BMs by third parties (community, banks, municipalities...), comparison analysis of the cooperatives case studies vs traditional model and nationally or internationally active. We would like to bridge the knowledge gap as we bring empirical evidence from case studies for bridging the policymaking gap in the renewable energy sector, especially in the way how the REBM is being governed towards a circular economy. The relevance of the topic is related to the fact that we bring new facts and empirical evidence that under certain conditions government regulations may strengthen the competitive mechanism and may create suitable conditions for competitive advantages for the companies that apply environmentally friendly

technologies or produce such technologies. Moreover, the contribution statement is that: On the verge of positive and negative arguments, there is an argument known for pushing forward economic development, namely that competition is the main advantage of the market economy. Our explorative case study research was guided by the following research questions: **Q1:** How regulative market and non-market instruments change (modify) the competitive mechanism in the photovoltaic and wind energy sector at a regional (EU) and national level (Belgium and Bulgaria)? and

Q2: What is the impact of sustainable development principles on the competitive strength of the selected companies producing photovoltaic and wind equipment and electricity, based on solar and wind energy?

The data collection included semi-structured interviews to find a solution for our research problem, and we provided our interviewers with the possibility to bring their personal arguments, facts and solutions concerning our study (Brewerton and Millward, 2001; Yin, 2003; Miles, & Huberman, 1994).

Theoretical background: Eco-fiscal policy measures for the development of renewable energy

Eco-fiscal policy provides a critical set of tools for building an inclusive, green economy in support of sustainable development (Bach, S., Kohlhaas, Meyer, Praetorius, & Welsch, 2002). It generates internal public resources and promotes more efficient public spending. It also creates fiscal space for priority investment and supports broader fiscal reform. By pricing environmental externalities, green fiscal policies can also use additional resources, including ones from the private sector. They can redirect consumption to environmentally friendly and socially inclusive activities. Fiscal reforms, incl. efforts to strengthen the tax administration, reduce taxation, attract revenue from natural resources or subsidies for reforms, and they can mobilize significant domestic public resources.

The goal pursued by the central government in developing the mechanisms of eco-fiscal policy is related to reducing the negative impact on the environment and the effect of pollution (Ivanova, 2012). Maintaining the mechanisms for the functioning of the labor market and the structure of production prove to be crucial. In this regard, Atkinson and Stiglitz (1980) argue that fiscal policy is considered optimal if for each taxable good the cost of raising the tax rate for that particular good is equal to the marginal revenue generated by the tax increase. Our primary focus in this article are how companies that specialize in high-tech production and implementation of photovoltaic and wind equipment may acquire additional competitive potential and may realize a double dividend: pollution free production of electricity and sufficient profitability. This fact is closely related to

efficiency and in particular to the concept of internalizing external costs, i.e. their transformation from external and unaccounted for by the pollutant into internal, making its production/consumption more expensive.

The contribution of Arthur Pigou (1920), who believed that taxation could correct the discrepancy between marginal private and marginal public spending should be noted here. Pigou’s proposal for a corrective tax contains one of the possible tools for the realization of the "polluter pays". In this regard, public finance professionals are looking for answers to a number of questions related to the effectiveness of the instruments of eco-fiscal instruments, namely how to implement them properly so as not to lose the price and non-price advantages over competitors. In this context, we will look at the tools and conditions under which the results of the win-win scenario for the economy can be obtained.

Table 1: Eco-fiscal policy tools – Critical review

Eco-fiscal policy tools	Critical Review
Bilateral negotiations	According to Coase (1960), when private property rights for a clean environment are clearly defined and enforceable, the polluter and the sufferer of negative consequences can achieve Pareto efficiency through bilateral negotiations. This offers compensation for the use of the right to pollution. In practice, these market transactions are difficult to implement due to market imperfections (Mishan, 1971).
Environmental standards:	In the absence of clearly defined private property rights for a clean environment, the state should use fiscal policy mechanisms to achieve Pareto efficiency. The most common form of government intervention is the direct control approach based on environmental standards. Environmental standards impose a quantitative limit (or quotas) on pollutants, which can, for example, be expressed in terms of concentration in the emitted gas. Ideally, standards should be set so that companies provide optimal amounts of output and pollution. This requires the pollution monitoring regulator to have detailed information on company costs and the benefits of reducing emissions.
Eco-taxes:	The third approach to environmental policy is market-based. Pigou (1924) proposed the use of taxes imposed on pollution during production in order to bring private marginal costs in line with social marginal production costs. In theory, the optimal Pigou tax is equal to the sum of the marginal damage to the environment (at an optimal level of pollution). This approach is in line with the "polluter pays" principle. Compared to eco-standards, taxes are a cheaper method of achieving pollution reduction (Baumol and Oates, 1988). On the other hand, eco-taxes encourage companies to constantly look for technologies to reduce pollution. Governments face different opportunities to use eco-tax revenues: reducing public deficits, increasing spending on traditional public goods, financing specific environmental projects, or reducing taxes on labor or capital.

Eco-fiscal policy tools	Critical Review
<p>Commercial pollution permits:</p>	<p>The fourth approach was developed in the 1960s and involves the creation of pollution permits (Dales, 1968). The idea is based on the issuance of pollution permits by a regulatory body, which sets a quantitative limit on total pollution in a given area and issues permits for this account. The allocation of permits to individual companies may be based on criteria such as historical issues, current issues or a tender process. Commercial pollution permits: The fourth approach was developed in the 1960s and involves the creation of pollution permits (Dales, 1968). The idea is based on the issuance of pollution permits by a regulatory body, which sets a quantitative limit on total pollution in a given area and issues permits for this account. The allocation of permits to individual companies may be based on criteria such as historical issues, current issues or a tender process. Firms can trade these permits freely on the open permit market. In this case, Pigou's eco-taxes and commercial pollution permits are equivalent tools aimed at achieving the desired level of emission reductions (Buchanan and Tullock, 1975). The influence of the state can be significant because it can strongly influence the price of these permits. This is done through market influence (buying and selling) on the permit market. The role of the state can be stimulating in the sale of pollution permits under more lenient conditions (lower prices) in order to involve more "polluters" from the real sector. In addition to companies and the government, non-profit organizations can also participate in the purchase and sale of pollution permits. Such are, for example, green lobby groups to stimulate the reduction of pollution.</p>
<p>Subsidies</p>	<p>As part of the market instrument used to develop the renewable energy sector from scratch, subsidies turned to be ones used in the RED I Directive for "building the muscles" of the sector, especially in the wind and solar energy sector. Following a market based research (Wall, Grafakos, Gianolli & Stavropoulos, 2017, p.58) fiscal instruments like feed-in-tariffs, directly subsidizing the sector as the renewable energy is being bought preferentially from the central government, have attracted more foreign direct investments in the sector, as the research is done in 137 countries, based on econometric data.</p>

Figure: Drawn by Neda Muzho

In 2018 total revenues from environmental taxes in the EU amounted to € 324.6 billion. This revenue is 2.4 % of the EU GDP and 6.0 % of total EU government revenue from taxes and social contributions (Eurostat, 2020). Moreover, it should be outlined that almost 77.7 % of the eco-taxes in the EU come from energy taxes, as it remains the main source of eco-taxes in all member states. The share of environmental tax revenue share in the total budget revenue from taxes and social contributions has slightly decreased since 2002. The data shows that corporations and households pay nearly equal environmental taxes,

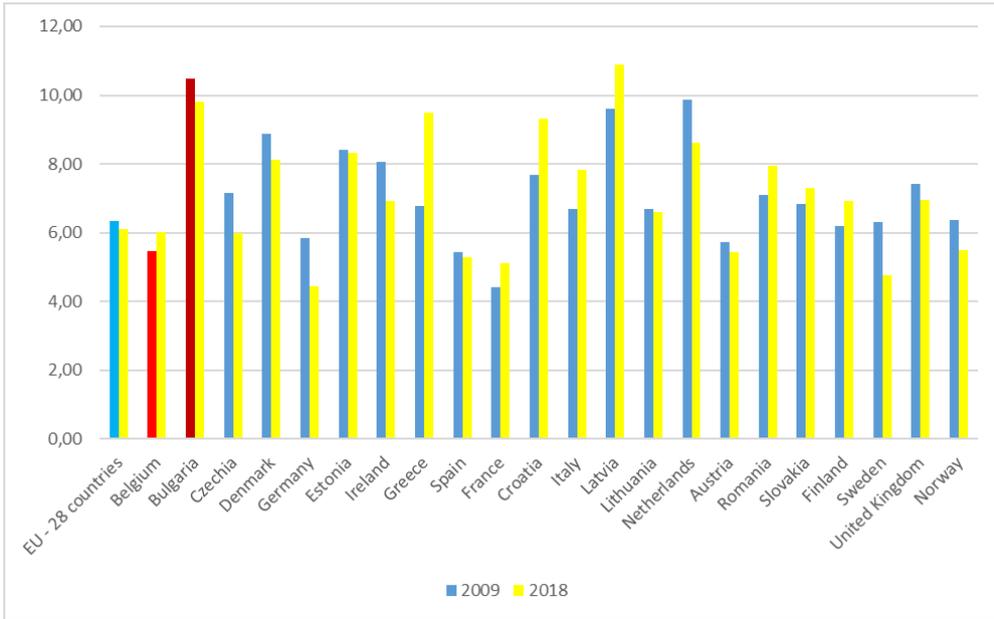
respectively 49.1% and 48.1 %. The decline of the share of eco-taxes is caused by few key factors, namely: (a) higher efficiency of corporative energy consumption; (b) higher energy efficiency of household consumption; (c) lower energy input per unit of GDP; (d) an increase of less polluting or even non-polluting energy sources, like the renewable energy.

Table 2: Eco-taxes in the EU (€ mln) as share of the GDP

	Eur Million		% of Total		% of GDP		% of Total Revenue	
	2002	2018	2002	2018	2002	2018	2002	2018
Total Environmental Taxes	217 654	324 637	100.0	100.0	2.6	2.4	6.6	6.0
Energy Taxes	167 281	252 110	76.9	77.7	2.0	1.9	5.1	4.7
Transport Taxes	42 441	61 878	19.1	19.5	0.5	.05	1.3	1.1
Taxes on pollution and resources	7 932	10 649	3.6	3.3	0.1	0.1	0.2	0.2

Source: Eurostat 2nd June, 2020 / Drawn by Neda Muzho

Revenues from fiscal reforms can be used to reduce taxes that distort the growth of labor or capital accumulation, which should increase employment incentives. The results of such a tax change are known as a "double dividend" due to the potential positive effects on employment and the environment. According to a study by Anderson and Ekins (2009), eco-fiscal reform stimulates the sustainable development and has contributed to an employment growth of 0.5% in Denmark and Sweden and about 0.2% in Germany. Revenues can be "recycled" to mitigate adverse impacts on vulnerable groups such as low-income households. Targeted support mechanisms, such as tax exemptions, remittances or social safety nets, will not only increase the social and political acceptability of tax reforms, but will also help reduce inequalities and support social protection. By revising prices (through the internalization of external costs), green fiscal policies may change the behavior of producers and consumers towards environmentally friendly activities.



Source: Eurostat: <https://appsso.eurostat.ec.europa.eu/nui/submitViewTableAction.do>

Figure: Drawn by Neda Muzho

Figure 1: Total Environmental taxes as percentage of total revenues from taxes and social contributions (excluding imputed social contributions)

Results

With regard to the multiple case study approach we have used semi-structured interviews, conducted by Neda Muzho in Belgium and Bulgaria for the period March – November, 2019. Following the in-depth interviews, we found enough data richness, depth and quality, sufficient to create a theory on dealing with these confrontations (Eisenhardt, 1989). Also, it will compensate for the associated shortcomings of limited representativeness and generalization (Eisenhardt, 1989; Strauss and Corbin, 1994; Yin, 2003). With regard to the data collection and data richness, we have used the following sources of evidence:



Source: Empirical research in Belgium and Bulgaria / Drawn by Neda Muzho

Figure 2: Sources of evidence used for the research

In line with the analytical strategy of Yin (2003) for data analysis we have organized our findings in the following sections: 1) Presentation and discussion of the results for eco-fiscal measures used in Belgium and Bulgaria, and 2) Presentation and discussion of the results from case study approach in Belgium and Bulgaria.

1) Presentation and discussion of the results for eco-fiscal measures used in Belgium and Bulgaria

Belgium: With regard to the economic context in the country, Belgium is a federal state and the decision-making power is shared between a Federal Government and three Regional governments (Flanders, Wallonia and Brussels – capital region). In order for reaching not only the goals of Europe 2020 and Europe 2030, the most common energy model is the cooperative form. This model is the most appropriate in the conditions of high renewable energy barriers. Moreover, the establishment of the community-based model is backed up by the well-established structures for regional cooperation and coordination on energy production (Belgium’s Integrated National Energy and Climate Plan, 2018). The main objective is to reach 32 % of RE share in the energy sector and 3% in R&D for better competitiveness by 2020.

Table 3: Policy measures that were implemented in Belgium for renewable energy (PV and wind energy)

Region	Eco-fiscal policy measures	Critical review	Successful projects
Brussels	<p>1) Federal system of green certificates</p> <p>2) Regional support schemes</p> <p>2.1) investment assistance for companies</p> <p>2.2) Net-metering scheme</p>	<p>The installations in the capital region include also renewable energy sources installations (RES). In my personal opinion it should be taken into account that small installations and cooperative installations turned to be the most successful ones. New generation of municipality Cooperation tools with regard to the city area and using the roofs should be presented.</p>	<p>Rent my roof projects financed by the green certificates efficiency tools</p> <p>Solar Skins: The perfect match for greener cities</p>
Flanders	<p>1) Quota system</p> <p>2) Ecological Premium</p> <p>3) Net-metering scheme</p>	<p>Cooperative business models helped improving the management of the commons (wind and sun energy) after the promotion of the deployment of renewable energy in the region of Flanders. The most important role for the development of successful energy models goes to the local authorities. The voice of the citizens in building cost-effective and technologically acceptable renewable energy models is given to the community.</p>	<p><i>Cooperative entrepreneurship and citizen participation create opportunities for local municipalities, not just because of financial reasons : Ecopower Cooperative</i></p>
Wallonia	<p>1) Federal system of green certificates</p> <p>2) Regional support schemes</p> <p>2.1) investment assistance for companies</p> <p>2.2) Net-metering scheme</p>	<p>In the Wallonia region priority is given to several policies, as in Brussels –capital region. Local authorities stimulate the development of renewable energy installations. It should be also mentioned that in Wallonia it is bolded the promotion of investments in the R&D sector for further development of the sector. It should be stressed that the Walloon government has also developed a program ensuring that the local authorities have a leading and exemplary role in the promotion of the policy measures in the renewable energy sector.</p>	<p>The geographical position of Wallonia is a key success factor! The creation of the cluster for competitiveness in the renewable energy sector: "Sustainable energy in Wallonia" is seen as a best practice for further development of the sector. It was created in 2008, gathering more than 90 members (SMEs, Universities, R&D centers and NPO's), with 16 000 members and € 5 bln since its foundation.</p>

Source: Drawn by Neda Muzho

Bulgaria is one of the twelve countries that fulfilled the EU requirement for at least 20% share of the renewable energy. However, it was an uneasy achievement.

The implementation of the feed-in-tariff policy measures recommended by Directive RED 1 (Directive 2009/28/EC) led to price escalation on electricity prices for both households and companies. However, the price escalation was relatively limited thanks to the heavy subsidies by the government in the form of preferential prices, long-term contracts, as well as priority guaranteed purchase contract. The producers of electricity based on renewables were able to generate sufficient profitability thanks to the direct and indirect subsidies and the favorable wholesale prices. Unfortunately, these preferences have changed substantially during the last few years leading to serious problems especially for the small and mid-sized companies. The reason for this negative trend is the very contradictive governmental policy and the deepening conflict of interest among corporative lobbies and their impact on the governmental decisions concerning the development of this economic sector. Thus, the lower "green investment" return makes the buy-back period much longer and definitely riskier due to the unsustainable regulation with price and non-price instruments.

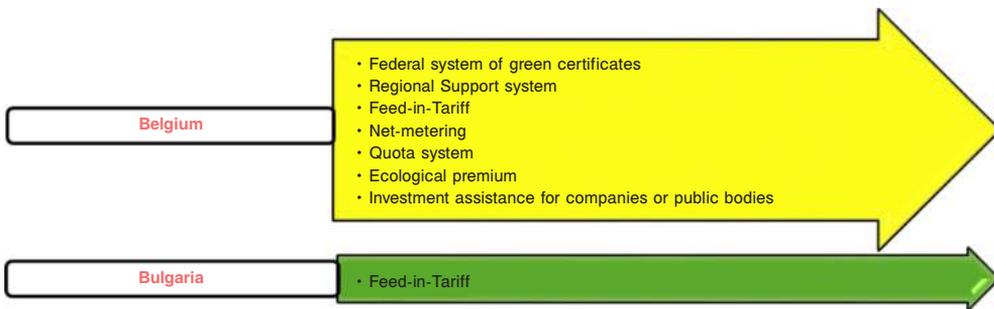
Table 4: Policy measures that were implemented in Bulgaria for renewable energy (PV and wind energy)

Region	Eco-fiscal policy measures	Critical review	Successful projects
Bulgaria	Direct subsidies – Feed-in-tariffs	With regard to the deployment and further development of the renewable energy the First law on renewable energy in Bulgaria, entered into force on 03.05.2011. The afore-mentioned law introduced the requirements of Directive 2009/28/ EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealed Directives 2001/77 / EC and 2003/30 / EC (OJ L 140/16, 5 June 2009). The promotion of the renewable energy was done through the feed-in-tariff, which is a renewable energy law that obliges energy suppliers to buy electricity produced from renewable resources at a fixed price, usually over a fixed period-even from householders. Except for the very "generous" period in financing the renewable energy projects, the period was characterized as chaotic and unsteady due to the poor coordination between the institutions responsible for managing and supporting the development of renewable energy. Although Bulgaria reached the scope of 20.5 share of renewables in the energy sector, the transition process was cost-ineffective, followed by a regulatory and political risk.	Samsung Bulgaria AES Bulgaria

Source: Drawn by Neda Muzho

2) Presentation and discussion of the results from the case study approach in Belgium and Bulgaria

One of the most important policy instruments which are used to enhance the competitiveness of renewable energy business models, is the secured and straightforward permitting system. This system was needed to pave the way towards sustainability and to reshape the oligopolistic market on electricity. It supposes a bold and stable subsidy framework, equal market access for all companies, regardless of their volume of production and further improvement of the infrastructure of the energy sector.



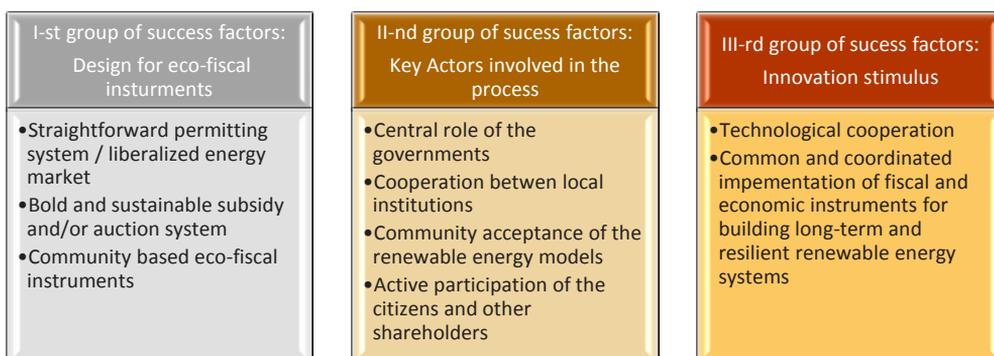
Source: Results from and empirical research in Belgium and Bulgaria / Drawn By Neda Muzho

Figure 3: Policy instruments for sustainable renewable energy

Most important policy instruments used for the deployment and the further growth of the renewable energy sector (Wind and PV) are the community-based ones and successful RE projects are typically managed by cooperative ventures rather than money making corporations (Subbarao and Lloyd, 2011). It was revealed that on top of the most important policy instruments aiming at stronger competitiveness of the renewable energy business models, is the provision of a long-term planning and public-choice approach (Copper, Oates, 1992, p. 687; Buchanan & Tullock. 1975, p. 146). As extracted from the empirical research, it was pointed out that *"No Silver Bullets in the Renewable Energy Sector. The consumer pays the price of the experiments in the RE sector"* – Energy consultant, Brussels. Moreover, it should be also pointed out that *"A bold and stable subsidy framework, (excluding the feed-in-tariff system due to high regulatory and political risk), and level playing field or preferential conditions for grid access and ancillary services remain"* – Energy Consultant. The comment of advisers at Energy Directorate in Brussels was: *"It is very important to consider public policy instruments for technological innovation, as the key enabler is to accept the creation of "sandbox" (fintech innovations) on both regulatory and technical side"*.

Conclusion

The new business models in the energy sector incorporate both environmental and market principles. Our study confirms the statement of Jan Jonker (2012) that under appropriate regulations financial driven transactions and observing environmental standards can be mutually supportive.



Source: Results from an empirical research in Belgium and Bulgaria / Drawn by Neda Muzho

Figure 4: Success factors for effective and sustainable renewable energy business models

By our perspective, four of the most important success factors for efficient use of the eco-policy instruments for promotion and development of renewable energy are: (1) straightforward permitting system; (2) bold and sustained subsidy framework; (3) community based eco-fiscal instruments, and (4) technological innovation (the creation of financial innovation for further development). If adequately applied, these four elements would enable the creation of a competitive and resilient renewable energy sector. The best practices in the RE sector come from Sweden, Denmark and Norway. The above-mentioned countries are clear leaders as they've created a successful common resource management model (Ostrom, 1990) and presented the feed-in-auction as the ultimate policy measure for further development. We would also like to stress the fact that the government plays a key role in this model allowing smooth transformation towards an environmentally-friendly market economy. This transformation is based on a system of market and non-market regulations including fiscal, monetary and commercial tools (foreign trade regulations; export incentives; technical, health and environmental standards, and administrative procedures for import and export). Still, a strong control on all levels (Bozhikin, Dentchev, Gechev, 2017, p. II) is needed in order to apply the right stimulus for further development of the innovation policy. The importance of the renewable energy sector is increasing in the world economy and leads to substantial modification of the

business conditions and the further development of circular economy for energy production and consumption. Bulgaria has to improve its market competitiveness and the fulfillment of this crucially important objective depends to a great extent on the development of a dynamic and financially sustainable sector of renewable energy.

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