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The Disjoint Between Stakeholders' and Voters' Positions on the Political Economy of Energy Policy

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Abstract

The formulation of policies on renewable energy is susceptible to conflicts of interest, which may paralyze the efficiency of the policies in driving sustainable development. A meta-analysis study was adopted to comprehensively explore the interplay between public interests and stakeholders' perceptions in the energy sector. Twenty-three studies will be selected following rigorous inclusion and exclusion criteria. The extracted data were also analyzed using HOMA and MARA. The study elucidated that the public is sensitive to procedural justice, distribution justice, placement, and trust. Conversely, stakeholders are devoted to ensuring energy autonomy and embracing renewable energy as a solution to the climatic issues associated with fossil fuels. If the interests of the two parties are harmonized, feasible policies that will be deemed acceptable by the public will be formulated.

Keywords: Sustainability, Greenhouse gases, Policymakers, Stakeholders, Political economy

1. Introduction

Studies in politics and energy have strived to unravel the economic and environmental benefits of adopting sustainable energy sources. Nonetheless, policy implementation has been impeded by the looming disjoint between the motivation of stakeholders and the voters' position on the policies (Kuzemko, Lawrence & Watson, 2019). In a bid to exhaustively understand the position of shareholders and voters on the political decision-making process pertaining to the adaptation of new policies and technologies, shifts in energy affairs both domestically and on an international scale must be explored. The international political economy is shifting in constitution, implications, characteristics, and scale (Kuzemko, Lawrence & Watson, 2019). The environmental ramifications of energy policies have rendered the matter particularly delicate. Matters on energy have become international issues

because they contribute to global political dilemmas, such as the need to improve energy security, access, and cost while endorsing a decarbonization agenda tailored to curb the environmental problems associated with contemporary reliance on fossil fuels (Kuzemko, Lawrence & Watson, 2019). The urgency of understanding the perception of voters and stakeholders stems from the dangers associated with fuel-based energy sources.

The transformation of the world into a global village has significantly increased the energy demand across all spheres of life. Therefore, the need to meet the surging energy demand has nudged researchers, policymakers, and other stakeholders in the energy sector to consider the adoption of renewable and sustainable energy alternatives (Owusu & Asumadu-Sarkodie, 2016) (p. 2). Policymakers in the energy sector are faced with the dilemma of striving to mitigate the growing energy deficit while ensuring a reduced climatic impact of the endorsed energy sources. The challenge has resulted in a stalemate between stakeholders, a generic term that enshrines powerful players in the energy sector; Non-governmental Organizations, interest groups, local governments, energy-producing companies, and consumers or members of the public. Given that policies must encompass the interests of stakeholders and garner public acceptance, the looming perceptual differences between the two groups have further hampered efforts to adopt new technologies and implement policies that are tailored towards minimizing the climatic effect associated with energy production and bridging the gap between the energy demanded and the quantity supplied.

The political and economic principles surrounding the energy sector have evolved. Historically, the first coal mining for sale occurred in 1750 in Virginia (Owusu & Asumadu-Sarkodie, 2016) (p. 3). At the time, coal became the most preferred energy source because of its high energy yield compared to charcoal and firewood. The growing demand for energy following the surge in the global population resulted in an increased reliance on fossil fuels. Nonetheless, the current environmental concerns stemming from the increasing concentration of greenhouse gases in the atmosphere have nudged policymakers, energy stakeholders, and consumers alike to reconsider their positions.

There is a consensus in the scientific community that the energy sector is the primary contributor to greenhouse gas emissions. When considering measures to curb climate change, greenhouse gas emissions of a particular energy source must be considered (Kirkinen et al., 2008). The findings presented by the European Union suggest that considering the current industrialization level, the temperature rise due to GHG emissions should be limited to 2℃. The aforementioned increase is bound to be achieved at a carbon dioxide concentration of about 450 ppm (Kirkinen et al., 2008). The current carbon dioxide concentration is 380 ppm, and the increase is occurring at a rate of 2 ppm per annum. Therefore, in an attempt to remain below the 450 ppm limit, it is integral that GHG emission reduction strategies are formulated and stringently implemented over the next few decades.

The need for the mitigation of climate change caused by unsustainable reliance on fossil fuels goes beyond climatic reasons and an attempt to prevent the occurrence of natural calamities resulting from climate change. The emission associated with the contemporary rate of burning of fossil fuels accounts for 2.96 to 4.21 million per year of excess mortality rate

(Lelieveld et al., 2019). Other anthropogenic but non-fossil sources of GHG emissions account for 5.55 million deaths annually. Therefore, about 8 million lives can be saved annually on the global spectrum through the formulation and enforcement of policies and technologies that foster the adoption of renewable energy sources and break the current level of fossil energy dependence (Lelieveld et al., 2019). Furthermore, since aerosols negatively affect the hydrologic cycle, mitigating sung anthropogenic sources of GHG emissions will propagate a 10-70% increase in annual rainfall received in some densely populated 'locales in India, and the annual rainfall will increase by about 10-30% in most region of North Africa. The ultimate effect of the change in the annual rainfall is attaining food security and improving the populace's quality of life (Lelieveld et al., 2019). The far-reaching impact of new technologies and policies in energy necessitates this study because the success of such stratagems can only be attained if both stakeholders and the public are on board with the plan.

1.1 Scope and Objectives of the Study

The importance of policies and technologies that foster energy sustainability and address the spiraling GHG emissions issue can never be overstated. Nonetheless, the differences in the interests of the stakeholders and the public tend to strain the decision-making process in policy formulation. In a bid to debunk the complexities of policy formulation and implementation in the energy sector, this study seeks to explore the findings of peer-reviewed studies on the perceptions and motivations of stakeholders in the process of making energy policies and the absorption of new technologies that foster sustainability. Furthermore, this study will strive to explain the disjoint in perception and present feasible recommendations that can be used to bridge the gap between the interests of stakeholders and members of the public. The aim of this study can be divided into three attainable objectives that include:

1. To explore the interests and perceptions of stakeholders on new policies and technologies that propagates energy sustainability.
2. To explore findings that explain why the public may be adamant about embracing new technologies and policies that promote energy sustainability.
3. To determine feasible approaches that can be employed in ensuring the interests of stakeholders are served while mitigating the climatic ramifications of unsustainable energy sources and garnering public acceptance.

The hypotheses that will be tested in this study include the following:

Hypothesis 1

> H_o: The interests of stakeholders often differ from the interests of members of the public, and the two perceptions cannot be harmonized.
>
> H_1: Although the interests of the public and stakeholders in the energy sector are different, the two viewpoints can be harmonized to foster energy sustainability.

Hypothesis 2

> H_o: The public is conservative and hesitant to adopt new policies/technologies

pertinent to energy.

H_1: The public is flexible and ready to adopt reasonable policies/technologies that address the prevailing global warming problem and foster energy sustainability.

Hypothesis 3

H_o: Interests of stakeholders and the public cannot be served concurrently.

H_1: The interests of stakeholders and the public can be served concurrently.

1.2 Background

As the interests of stakeholders and the public on energy evolve, so should the policies and technologies adopted to promote the transition into renewable energy sources. Governments worldwide have begun reviewing energy policies to echo the international commitment to reducing greenhouse gas emissions (Díaz, Adler, & Patt, 2017). It is irrefutable that the transition to sustainable energy sources that yield low GHG emissions and facing out energy sources that pose a massive threat to the climate may create a tense relationship between the public and the system (Díaz, Adler, & Patt, 2017). The importance of having members of the public on board in the pursuit of sustainable energy stems from the fact that consumers can turn into actors when they become small producers of energy in a more decentralized system through initiatives such as the implementation of photovoltaic systems. While fossil fuel was deemed integral in powering economic development, contemporary policies such as the formulation of new market design, the revision of the provisions and stipulations in the German Renewable Energy Act, and the amendment of energy laws, are more inclined towards propagating energy sustainability (Díaz, Adler, & Patt, 2017).

Furthermore, the international political economy in the energy sector has markedly evolved. The changes in the energy international political economy have been motivated by the visibility and the recognition of the damaging implication of reliance on fossil fuels in contemporary economies (Kuzemko, Lawrence & Watson, 2019). Until recently, most studies striving to analyze prevalent issues in the energy sector have tended to do so through the pre-existing IPE theories. Despite the effort by local governments to foster energy sustainability, the international sphere is still reliant on fossil fuels. To be precise, about 32% of the global energy is constituted of oil and its derivative products, 27% is contributed by coal, 10% of the global energy is produced through biomass, and 9% is derived from electricity (Kuzemko, Lawrence & Watson, 2019). Therefore, stakeholders in the energy sector making millions of profits are adamant about introducing or lobbying for policies that foster energy sustainability. Such an initiative would be counterproductive and constrict energy producers' profit potential. For instance, countries such as Saudi Arabia, whose GDP is heavily reliant on the exportation of oil and its oil products, are bound to be reluctant to embrace policies that advocate for the adoption of renewable energy alternatives at an international stage

2. Method

This study will employ a meta-analysis study approach to scrutinize scholarly research on the

subject and draw an informed conclusion and recommendation that can be used to promote energy sustainability. Haidich defines meta-analysis as a formal and quantitative study model in which previous research is analyzed to make informed and valid conclusions (Haidich, 2010). A meta-analysis is more thorough in its analysis of a study subject because biases that may derail the findings of an individual study are avoided, and a holistic view of the findings can be integrated. The heterogeneity in the results can also present a more wholesome picture of the study subject since the results encompassed in a meta-analysis were derived through the use of different study models (Lee, 2018). However, since results derived through meta-analysis can assimilate errors made by parent researchers, it is integral that a more rigorous approach is adopted to improve the credibility, validity, and usability of the results

2.1 Search Strategy

A thorough literature search was conducted on the following databases: Google Scholar, The US National Library of Medicine, and Tandfoline. The search was conducted without any language stringencies. In a bid to warrant success in the literature search, a comprehensive Google search was conducted. Still, the phrase journal articles were added to the search phrase to ensure that other credible sources that may not be in the databases mentioned above could be located and incorporated into the study as long the sources met the inclusion and exclusion criteria. Upon an in-depth consultation with librarians and my fellow scholars, the search strategy employed in this research was divided into the following four broad themes that informed the choice of search phrases:

I. Derivatives of the perception of stakeholders on new energy policies and technologies.

II. Derivatives of the position of the public regarding energy policies/technologies.

III. The disjoint in the viewpoint of stakeholders and consumers/public on new technologies/policies implemented in the energy sector.

The search term was not narrowed to focus on the aforementioned themes in an attempt to prevent the exclusion of studies that would still provide insight into the domestic and international political economies of energy. Furthermore, the choice of unrestrictive search phrases allowed this study to incorporate a vast assortment of insights, guaranteeing a holistic understanding of the subject of study. Also, the fact that different nations and stakeholders may hold positions that conflict, specifying individual stakeholders in the search process allowed for the determination of these disparities in the positions held by stakeholders. To put this assertion into context, it is noteworthy to mention that while the motivation of an energy-producing company may be profit maximization, an NGO devoted to environmental conservation may champion policies that promote the adoption of renewable and sustainable energy sources. This demystified that all actors enshrined under the term stakeholders may have divergent motivations, perceptions, and interests.

2.2 Specific Search Terms Used in the study

I. Stakeholder perceptions towards policies that seek to promote sustainability in energy.

II. Local governments' position on the adoption of renewable energy policies.

III. Factors that dictate the public acceptance of renewable energy policies and technologies.

IV. The difference in perception between stakeholders and consumers on renewable energy policies and technologies.

V. The changing political economy on energy.

VI. Barriers to the adoption of renewable energy policies.

2.3 Eligibility Criteria and Study Selection

To exhaustively address the scope of this study and conduct an informative, systematic review, I will not restrict this study to studies published in economics and political journals because the ramifications of reliance on fossil fuel and anthropogenic activities that propagate an increase in GHG emissions are multifaceted, and the effects extend to the health sector. Consequentially, observational, experimental, energy reports and quasi-experimental studies will be integrated into this study. The study questions in energy and sustainability are broad and have a vast scope; therefore, studies will be included as long as they contribute to the study objectives outlined in the preceding sections

Table 1. Inclusion and Exclusion Criteria

Criteria	Included	Excluded
Abstract Screening		
Study design	Observational, meta-analysis, experiments, and quasi-experimental.	Editorials, letters, books, book chapters, comments, blog posts, and any non-peer-reviewed journal.
Outcomes	Stakeholders in energy, renewable energy sources, policies, and technologies that foster sustainability, consumer perceptions in the energy sector, and documentation of the impact of energy production on the climate.	Studies that did not present results that are relevant to any of the mentioned areas and studies with unclear or ambiguous findings.
Settings	Energy sectors, local government, the federal government, and international policy-making forums.	Unspecified settings.
Year	Studies conducted within the last ten years were included to warrant capturing recent and relevant findings.	Studies that were published more than ten years ago were excluded.
Full-Text Screening		
Study design	Observational, meta-analysis, experiments, and quasi-experimental.	Editorials, letters, books, book chapters, comments, blog posts, and any non-peer-reviewed journal.

Outcomes	Stakeholders in energy, renewable energy sources, policies, and technologies that foster sustainability, consumer perceptions in the energy sector, and documentation of the impact of energy production on the climate.	Studies that did not present results that are relevant to any of the mentioned areas and studies with unclear or ambiguous findings.
Settings	Energy sectors, local government, the federal government, and international policy-making forums.	Unspecified settings.
Participants	Stakeholders, consumers, and/or members of the public.	Actors that do not directly contribute to the energy sector's decision-making and policy formulation process.
Outcomes	Identifies stakeholder perception, change in the political economy of energy, the disparity in the public and stakeholder position on renewable energy, and impediments to public acceptance of policies that champion renewable and sustainable energy sources.	Studies generate results that are irrelevant to any of this study's objectives.
Year	Studies conducted over the last ten years were included to warrant capturing recent and relevant findings.	Studies that were published more than ten years ago were excluded.

To improve the accuracy and comprehensiveness of this study, the abstract and the full-text screening processes will be conducted in different phases to ensure that the selected studies satisfy both criteria. The titles and abstracts will screen to determine relevant articles on which in-depth analysis will be conducted. In cases where the eligibility of an article for the study is in doubt, external librarians were consulted, and guidance was sought from academic peers.

Data were extracted and presented under the first author's last name. All the data was extracted one at a time to maximize productivity and promote the study's comprehensiveness. Any doubt regarding the extracted information was settled by consulting my academic peers.

2.4 Number of Selected Studies

From the extensive search conducted using the search terms and phrases listed in the preceding sections of this paper, on Google Scholar, The US National Library of Medicine, and Tandfoline databases, 63,400 sources were found. Nonetheless, after introducing the 10-year publication inclusion and exclusion parameter, the results dropped to 17,800. After conducting a title screen tailored to establish the relevance of a study to the scope of this study, 480 sources were determined. The sources were further subjected to screening based on the provisions of the inclusion and exclusion criteria. The approach resulted in the identification of 23 studies for analysis.

2.5 Regression Analysis

The study reviewed various research articles that employed regression analysis to explore factors influencing the production level and consumption of renewable energy. Meta-Analytic Regression Analysis (MARA) was used to investigate the various aspects of the previous studies, such as the techniques used to perform the analysis, study designs, approaches, and methods that illustrate the differences in significant relationships among variables. It also focused on other regression models developed in different studies to estimate or predict the dynamics of renewable energy.

3. Results

General Characteristics of Included Studies

Table 2. Characteristics of Included Studies

Researchers	Year of Publication	Methodology	Topic of study	Importance of its findings to this research
Rae et al.	2012	Meta-analysis	Autonomous energy	The study explores how the idea of energy autonomy can propagate the sprouting of sustainable communities across the world.
Gonzalez et al.	2012	Multi-criteria approach	A decision-support system for metropolitan areas.	The study elucidates how sustainable most urban areas are.
Hall et al.	2013	Case study	A study of consumer/public acceptance of windmills	The study contributes to research by providing insight into the public perception of renewable energy.
Solangi et al.	2011	Case study	Formulation of solar energy policies	The paper presents an actual glimpse into the energy policy formulation process and the disparity in perceptions between stakeholders and the public.
Kraus	2016	Systematic review	The implementation of	The study elucidates the position of local

			climate protection policies in the United States	governments toward climate protection.
Arentsen et al.	2014	Desk research	The study explores the position of the public and its influence on the policy-making process.	Public perception on policies pertaining to sustainable energy sources.
Wei et al.	2009	Systematic review	The economic benefits of the adoption of policies that promote reliance on renewable energy	The source is integral as it denotes the interest of the local and federal governments in adopting new technologies/policies on energy.
Kumar et al.	2010	Systematic review	The current status of renewable energy in India.	The study is integral in demystifying the essence of renewable energy in an attempt to address the increasing energy demand.
Fischer et al.	2010	Systematic Review	The effectiveness of energy policies.	The paper explores policies on energy and how the policies intertwine.
Amer et al	2011	Case study	Renewable energy alternatives for developing countries	The paper presents actual examples of the application of policies in promoting the adoption of renewable energy alternatives.
Masini et al.	2010	Experimental	The economic aspect of renewable energy	Stakeholders and investment in renewable energy.
Wolsink	2010	Meta-analysis	Aspects that result in reduced public acceptance of renewable energy policies	The paper is integral in debunking the position of members of the public on the matter.
Devine-Wright	2007	Systematic Review	Public acceptance of renewable	The chapter explores the public's attitude

			energy technologies and policies	towards renewable energy and its eminence in dictating the success of such initiatives.
Ntanos et al.	2018	Experimental	The public's attitude toward renewable energy	The paper explores the position of members of the public on renewable energy and their willingness to pay for such technologies as an alternative to fossil fuels.
Creutzig et al.	2017	Experimental	The importance of solar energy in reducing the environmental effects associated with energy production.	The paper demonstrated how alternative energy could be used to mitigate looming climatic changes stemming from GHG emissions from nonrenewable energy sources.
West et al.	2010	Experimental	Public attitude and energy policy	The paper elucidates how public reluctance to the adoption of renewable energy is inhibiting the expansion of the initiative in the case of the United Kingdom,
Hall et al.	2013	Experimental	Public acceptance of wind power	The paper exclusively explores four themes driving the public's acceptance of renewable energy policy.
Paravantis et al.	2018	Experimental	Social acceptance of renewable energy alternatives	The paper covers the public's reaction to the adoption of renewable energy.
Wesselink et al.	2011	Experimental	Public involvement in the	The study explores why public

			policy formulation process.	participation is on a downward spiral
Huijts et al.	2012	Systematic Review	New Technologies in Energy	The paper explores factors that impact the public's acceptance of new technologies.
Diaz et al.	2017	Case study	Stakeholder perspectives on energy policies	How stakeholders contribute or hamper the implementation of energy policies.
Lennon et al.	2019	Experimental	Role of citizens in the energy transition	The paper debunks the notion of the public being left out of the decision-making process on energy-related matters.
Christenson	2013	Cross-sectional	Renewable energy across the 50 United States and related factors	The paper develops a linear regression model to predict the production levels of renewable energy in the US.
Mehedintu et al.	2018	Cross-sectional	Estimation and forecasts for the share of renewable energy consumption in final energy consumption by 2020 in the European Union	The study determined the estimated renewable energy consumption ratio based on the EU directives and policies.

3.1 The Importance of New Technologies/Policies of Energy on Sustainable Development

The essence of the adoption of new technologies and the formulation of policies that seek to curb GHG emissions and promote sustainable development can never be overstated. The pursuit of sustainable development has been at the epicenter of contemporary policies, plans, and strategies implemented by both national and federal governments (Owusu & Asumadu-Sarkodie, 2016). Amid the efforts to promote sustainable development, it has been integral that the supply of energy is increased to meet the emerging demand. The increase in the supply can be attained by focusing on renewable energy alternatives and disentangling an economy from its dependence on fossil fuels (Owusu & Asumadu-Sarkodie, 2016). Sustainable development is intertwined with renewable energy because this form of energy

can be availed in a plentiful supply without being depleted. As a result, the surging energy demand can be managed without causing long-term and irreparable effects on the earth's surface.

In a bid to understand how sustainable communities can be created across the world, the concept of autonomous energy must be understood. Energy autonomy is the ability of a community to derive sufficient energy from within its geographical borders without the need to source energy from elsewhere (Rae & Bradley, 2012). The concept of energy autonomy can never be genuinely attained in a community dependent on nonrenewable energy sources since such energy is prone to depletion. The shrinkage of the energy reservoirs, coupled with an increase in the demand for energy owing to population growth, is a precursor for an energy crisis (Rae & Bradley, 2012). Sustainable development has been driven by improving the capacity of a nation to meet its reduced carbon emission targets and implement both small-scale and large-scale energy systems (Rae & Bradley, 2012). The concept of energy autonomy is vehemently being advocated for because it can result in a plethora of economic, social, and environmental benefits that can proliferate to usher in sustainable development.

By embracing renewable energy policies and technologies, the energy deficit, which hampers the creation of a sustainable society, will be addressed, and GHG emissions will be markedly reduced (Rae & Bradley, 2012). Although the benefits of these policies may seem straightforward, logistical issues associated with policy implementations and the public's perception have proven to be overarching impediments (Owusu & Asumadu-Sarkodie, 2016). Harmonizing the interests of the local government, NGOs lobbying for an environmentalist approach to addressing the looming energy deficit, energy production companies, and consumers or the public will be integral in attaining policy acceptance and warranting the feasibility of adopted stratagems (Rae & Bradley, 2012). The creation of a sustainable community relies on policymakers' ability not only to formulate sensible policies but also to ensure stakeholders and the public are incorporated in the decision-making process.

Energy autonomy can also be a tool for fostering innovation. Two decades after the RIO conference, the benefits of the provisions of the agreement, especially chapter 28 agenda 21, posit that the local government has an integral role to play in mobilizing, educating, and responding to the public in a move to promote the adoption of renewable energy has proven effective (Arentsen & Bellekom, 2014). The emergence of local energy initiatives has contributed to the sprout of the doing-things-ourselves attitude that has promoted the formation of a sustainable community. Furthermore, the decreasing trust in the big corporation to avail food, energy, control insurance, and marketing has prompted a wave of innovation as people strive to find reliable means to receive essential services (Arentsen & Bellekom, 2014). The idea of the creation of sustainable communities commenced with the concept of ecovillages, an initiative that started in the United Kingdom to foster sustainability and deliver economic benefits (Arentsen & Bellekom, 2014). Although most ecovillages are connected to the national grid, such communities are adopting sustainable and renewable energy sources as a means to attain energy autonomy and an endeavor that would promote innovation.

3.2 Importance of Renewable Energy

The benefits synonymous with the implementation of renewable energy policies are vast. Principally, as the population grows, as has been experienced over the last few decades, the demand for energy increases (Wolsink, 2010). However, given that fossil fuels and other nonrenewable fuel sources can be exhausted, policymakers and other stakeholders in the energy sector have been compelled to seek alternative sources of energy (Wolsink, 2010). It can be inferred from the current robust adoption of renewable energy sources such as wind energy and the construction of hydroelectric plants that stakeholders are turning to renewable energy sources in an attempt to address the power deficit. Other than power, concerns over the increasing concentration of GHG emissions and the rising global temperature have compelled governments to pursue power-yielding processes that emit low carbon dioxide, methane, and other gases that contribute to the greenhouse effect currently being experienced.

The share of renewable energy in the final energy consumption across European Union nations is prioritized and estimated to reach 20% by 2020 (Mehedintu, Sterpu & Soava, 2018). Based on the study by Mehedintu et al., the influence of the EU directive on renewable energy is modeled using regression analysis. The study develops several regression models indicating how the EU policies impact the estimation ratio of renewable energy consumption across Europe. Model 3 in Table 1 depicts that the effect of European's Union directives is likely to increase the estimation ratio of renewable energy consumption by 0.95, which represents about 13.7% of the total energy consumption in 2009 (Mehedintu, Sterpu & Soava, 2018). Model 4 indicates that the same EU directive is likely to increase the estimated ratio of renewable energy consumption by 0.47, which represents approximately 6.8% of 2009's total energy consumption.

Additionally, the coefficients of determination for both models are relatively high, suggesting that the estimated renewable energy consumption ratio is adequately explained by the changes in other factors (Mehedintu, Sterpu & Soava, 2018). For instance, the coefficient of determination for Model 3 and 4 are R-squared=0.95 and R-squared =0.96, which shows that about 95% and 96% of variations in the estimation ratio of renewable energy consumption are explained by changes in the EU policies, respectively (Mehedintu, Sterpu & Soava, 2018). Generally, the effect of EU directives on renewable energy is considered to have a significant effect on the estimation of its consumption ratio with respect to total energy usage.

Table 3. Regression Models (Mehedintu, Sterpu & Soava, 2018)

	Variable	**Coefficient**	**Std. Error**	***t*-Statistic**	**Prob.**
	C	3.529398	0.187586	18.81485	0.0000
(3)	t	0.165022	0.020403	8.088284	0.0000
	D	0.946559	0.277905	3.406049	0.0030
	C	3.876768	0.230553	16.81511	0.0000
(4)	t	0.063077	0.049184	1.282453	0.2160
	t^2	0.005664	0.002531	2.237805	0.0381
	D	0.468926	0.330657	1.418163	0.1732

The study by Christenson to examine renewable energy across the 50 United States and other related factors also used regression analysis as a primary statistical tool (Christenson, 2013). The independent variables under investigation included energy production and consumption, retail electricity prices, Gross State Production, poverty level, total population, republican president vote, belief in God with absolute certainty, and renewable energy potential (Christenson, 2013). The regression model indicated that the retail cost of electricity, gross state production, and advanced degree significantly influence renewable energy production levels, $p<0.05$ (Christenson, 2013). In addition, the model was statistically significant at a 5% level, $F(40,49) = 6.625$, $p=0.00$. The coefficient of determination, R-squared= 0.598, shows that only 59.8% of the variation in the production levels of renewable energy can be explained by the changes in the independent variables (Christenson, 2013). Therefore, findings illustrated that linear regression analysis is a reliable technique in the estimation of renewable energy production across the United States and that its significance depends on the retail cost of electricity, gross state product, and an advanced degree.

The MARA analysis conducted to examine the factors determining the production and usage of renewable energy is summarized in Table 2. The analysis depicts that the GDP, renewable energy weight, nuclear electricity weight, and population density have an effect size of 65.53% on the production of renewable energy for Model 1 (Zaharia et al., 2019). The large effect size is Model 3, followed by Model 2, Model 4, and finally, Model 5. The effect size represents the proportion of variation in renewable energy production that changes in GDP can explain, renewable energy weight, nuclear electricity weight, and population density. Generally, the renewable energy weight is depicted to have a negative effect on the production of renewable energy in most of the regression models; however, other variables have a positive and significant effect on the dependent variable.

Table 4. MARA Analysis (Zaharia et al., 2019)

	Effect Size	**GDP**	**Renewable energy weight**	**Nuclear electricity weight**	**population density**
Model 1	0.6553	0.0521	0.0025	0.004	0.0019
Model 2	0.4874	0.0074	-0.0098	0.0066	0.5513
Model 3	0.55	0.0054	-0.0098	0.0026	0.0016
Model 4	0.4759	0.3898	-0.0026	0.0032	0.0013
Model 5	0.1519	0.3239	-0.0127	0.0025	0.5109

The set atmospheric carbon dioxide concentration deemed acceptable by the European Union is 450 ppm. According to a report released by the organization, the current concentration is 380 ppm (Kirkinen et al., 2008). If the current two ppm per annum carbon dioxide emission persists, the set limit will be reached in three decades, and the global temperature will rise by 2 degrees Celsius (Kirkinen et al., 2008). The need to prevent such extremities has compelled international bodies to set GHG emissions targets. As a result, nations formulate policies and adopt new technologies to promote the adoption of renewable energy production to curb the climatic ramifications of continued reliance on fossil fuels.

The adoption of renewable energy sources has numerous economic benefits. The implementation of renewable energy policies and the subsequent adoption of the approach as a substitute for fossil fuel would result in the creation of 40 million jobs as long as a 30% renewable portfolio standard is attained (Wei, Patadia & Kammen, 2010). It is also noteworthy that energy efficiency, renewable energy, and low carbon emission technologies create more jobs per unit of energy than natural gas and coal (Wei, Patadia & Kammen, 2010). Therefore, the initiative will promote economic and energy sustainability.

3.3 The Perception of Stakeholders

Renewable energy policies formulated and implemented in the 1980s failed to attain the targeted impact due to the failure of policymakers to anticipate public acceptance of such policies (Díaz, Adler, & Patt, 2017). In an attempt to increase public acceptance of energy policies and new technologies tailored to foster sustainability, there arose a need to determine factors that propagate public acceptance of renewable energy policies. The perceived justice dictates public acceptance of renewable energy policies in the outcome, place attachment, distributive fairness associated with the result, and the projected value of the initiative (Díaz, Adler, & Patt, 2017). Environmental issues stemming from the policy's implementation and end-of-pipe solutions often lean towards the cost-benefit dimension and may hamper the acceptance of policy and new technology (Díaz, Adler & Patt, 2017). The participation of stakeholders is motivated by the need to ensure decision-makers encapsulate all integral aspects of renewable energy to warrant the creation of a sustainable energy-autonomous society. Transitioning into a low-carbon economy cannot be attained without stakeholders' involvement in the form of investors (Masini & Menichetti, 2012).

Stakeholders are motivated by the need to conform to the GHG emissions target. Furthermore, the need to deploy renewable energy initiatives has compelled governments across the world to formulate relevant policies (Masini & Menichetti, 2012). The policies are integral for stakeholders because they reduce market uncertainties and provide a stable framework on which the rollout plan for energy sustainability can be based. Stakeholders lobby for comprehensive policies to foster the market's reliability, stability, and predictability, an initiative that increases investment in the energy sector. Principally, the higher the stakeholder's confidence level in the market, the more stakeholders include renewable energy shares in their investment portfolios. Stakeholders presume that by endorsing renewable energy alternatives through policy formulation, the creation of a sustainable society can be realized, and the looming energy deficit will be exhaustively addressed.

The bottom line is that acceptance and goals held by individual stakeholders inform the motivation towards the adoption of new technologies and policies. The underpinning assumption is that goals govern decision-making and how people perceive aspects of a situation (Masini & Menichetti, 2012). In this regard, stakeholders such as local government authorities have objectives such as reducing carbon emissions and ensuring that climatic ramifications stemming from an increase in GHG emissions are handled.

3.4 Acceptance and Acceptability

In a bid to understand what is meant by acceptance and acceptability in the context of this paper, it is integral that the definition of the terms as posited by other researchers is explored (Huijts, Molin & Steg, 2012). Acceptance in the context of this paper implies behavior that demonstrates support for new energy technologies and policies that endorse the adoption of renewable energy sources. Moreover, acceptability is an attitude toward new technologies and policies tailored toward improving the sustainability of energy (Huijts, Molin & Steg, 2012). Acceptability is behavior that supports adopting new technology and policies rather than inhibits or resists adopting new technologies/policies.

3.5 Perceptions of the Public and Policy/New Technology Acceptance

In the recent past, governments have formulated policies tailored to encourage the adoption of new technologies that promote the production of renewable energy. In the context of Australia, the government has formulated a renewable energy target (RET) that aims to ensure that more renewable energy technologies and plants are installed in Australia (Hall, Ashworth, & Devine-Wright, 2013). While disparities in the global production of wind energy are conspicuous, it accounts for 2% of the energy generated in the global spectrum (Hall, Ashworth, & Devine-Wright, 2013). The constitution of wind energy differs across nations; for instance, in Spain, 16% of electricity supplied via the national grid comes from wind energy. The level is even higher in Denmark, where 28% of the national electricity available for members of the public comes from wind energy (Hall, Ashworth, & Devine-Wright, 2013). The differences in the success of wind energy policies across the global spectrum stem from the divergence in policy acceptance across the global spectrum. By inference, it can be deduced that in nations such as Denmark and Spain, public acceptance of wind energy is more than in other conservative nations where reliance on fossil fuels is above par.

In response to social resistance to renewable energy policies and technologies, The United Kingdom and Ireland legislators ratified laws that dictated that a certain minimum distance must be maintained by locating windmills away from any dwelling or residential area that is not associated with the renewable energy project (Fischer & Preonas, 2010). The policies stipulate that the distance between the turbines and the residential area, as outlined by law, can be overlooked if informed consent is obtained from the dwellers of the building in the vicinity of the turbines (Hall, Ashworth, & Devine-Wright, 2013). Although the positions of members of the public are diverse, some consistent codes were noted in the course of the study (Rountree & Baldwin, 2018). Economic reasons were determined as one of the themes that drive public acceptance of policies (Wesselink et al., 2011). The economic facet encompasses environmental and noise concerns, employment and local tourism, and concerns about the essence of the new technology itself.

Aside from economic reasons, trust is the principal determinant of the public's support for new technologies and policies. Across the studies integrated into this meta-analysis, trust has emerged as a recurrent issue (Paravantis et al., 2018). Community representatives and individuals charged with the mandate to implement wind farm development projects cited

that trust was an integral factor of consideration in an attempt to garner support for new technologies and policies (Creutzig et al., 2017). The studies affirm that transparency during the engagement between stakeholders and the public should be upheld to build trust (Krause, 2011). Some individuals in the study conducted by Hall asserted that wind farm developers built their trust through continuous engagement.

The other driver of policy and technology acceptance is distributional justice. Distributional justice, in this context, refers to how the cost and benefits of the initiative were shared by the wind farms. The wider the impact or benefit of the farm to the populace, the more inclined members of the public were towards embracing new technologies and policies that foster sustainability in energy availability (Solangi et al., 2011). A number of participants in the study vehemently criticized the fact that some wind farms benefit the host alone in the commercial sense, and it is essential in the community is not felt across the board. Therefore, the perception of the unjust distribution of benefits and resources informed the decision of most people to resent policies and new technologies associated with renewable energy.

Procedural justice is the other determinant of the public's acceptance of a policy or new technology. The public was adamant about accepting policies without their representatives' input (Lennon, Dunphy, & Sanvicente, 2019). Furthermore, the phase of engagement should warrant open communication tailored towards ensuring that stakeholders and individuals residing near the establishment agree upon a more suitable location and general size of the farm. Familiarity with meeting this engagement threshold causes impediments to the wind farm project implementation; this assumption can be extrapolated to cover all forms of renewable energy plants (Hall, Ashworth, & Devine-Wright, 2013).

The last aspect that dictates the public's attitude towards a renewable energy initiative is the attachment of the populace to the suggested area where the firm is to be located. A change in scenery or the appearance of a location can trigger public resistance toward the construction of turbines or any other renewable energy plant (Hall, Ashworth, & Devine-Wright, 2013). Wholesomely, these considerations must be taken into account to improve the feasibility of renewable energy policies in the global spectrum.

The participation of the public in the decision-making and policy formulation processes is on a downward trajectory (Amer & Daim, 2011). Consequently, harmonizing the climate plan with the public's interests has become difficult, hindering public acceptance and subsequent efficiency of renewable energy policies and new technologies. The decline in public participation in the policy formulation process has been widely associated with the dissatisfactory outcomes of policies endorsed by similar stakeholders in the past (Kumar et al., 2010). Citizens engaged in formulating renewable energy policies that endorsed the construction of wind farms may feel less inclined to engage in a similar endeavor in the future if the benefits of past projects are deemed miniature and insignificant (Ntanos et al., 2007).

4. Discussion

4.1 Divergence in Interests and how they can be Harmonized

The null hypothesis, "the interests of stakeholders often differ from the interests of members of the public and the two perceptions cannot be harmonized," has been rejected. The alternate hypothesis, "although the interests of the public and stakeholders in the energy sector are different, the two viewpoints can be harmonized to foster energy sustainability," has been accepted. Considering the case of wind energy in the global spectrum, it is evident that wind energy contributes about 28% to the national electricity grid in Denmark; the contribution of wind energy in developing countries is underwhelming (Hall, Ashworth, & Devine-Wright, 2013).

The local government and other energy stakeholders pursue renewable energy policies to foster the growth of ecovillages and sustainable communities, address the looming climate change concerns stemming from GHG emissions associated with nonrenewable energy sources, address the energy deficit and the projected increase in the demand for energy in the near future, and create green jobs among other benefits (Hall, Ashworth, & Devine-Wright, 2013). Nonetheless, the public position on renewable energy is determined by the distribution of justice linked with the policy, the trust that renewable energy stakeholders took the interests of the public into account, procedural justice, and the attachment to the location (Sütterlin, & Siegrist, 2017; Stigka, Paravantis & Mihalakakou, 2014; Mallett, 2007; Zogarafakis et al., 2010; Haas et al., 2004; Lim et al., 2019; Haas et al., 2011; Heras-Saizarbitoria, Cilleruelo & Zamanillo, 2011; Oikonomou et al., 2009). Therefore it is integral that the renewable energy policies formulation process encompasses representatives from both facades of the debate to warrant project success and public acceptance of the policies. Numerous studies in this meta-analysis have covered approaches that can be used to optimize policy acceptance and public participation in the policy formulation process or the adoption of new technology.

Trust can be created between stakeholders and the public by employing transparency and disclosing vital information in a wholesome way, seeking the public's consent. The importance of a trust-based relationship between the public and corporations in rolling out the renewable energy plan can never be overstated. The public has little trust in corporations because they presume that most corporations prioritize commercial gains to address the interest of the community that they operate in. Developing public trust in the intentions and the information provided by the wind farm developer, as well as other stakeholders involved, is integral in garnering public support for renewable energy policies. It is worth noting that although building trust is integral in ensuring successful policy implementation, and there is no one-fit-all approach to building trust (Oikonomou et al., 2009; Savvanidou, Zervas, & Tsagarakis, 2010; Musall & Kuik, 2011; Schumacher et al., 2019; Sovacool & Ratan, 2012; Huang & Wu, 2008). Despite the multiplicity of equally effective approaches to building public trust, the most effective approach is the identification of 'local champions' who would be integrated into the policy-making process as representatives of the public. Through the identification of well-established local identities, the public will be certain that their interests

are well represented in the decision-making process. Other than the 'local champion' approach, transparency in the decision-making process can be adopted to prevent notions that secrecy and selective dealings were employed in the policy formulation process. It is cardinal that perceptions of secret dealings and secrecy are addressed because they further erode the trust of the public in the process, the developer, and other external actors involved in the project. In line with this approach of building the public's confidence in the project, technology, or policy, open communication and a participatory approach should be adopted to accord the community an empowering role in the policy formulation process. Ultimately, by inculcating the perception that the project would be equally beneficial to the public and all the stakeholders involved, public acceptance and approval of the initiative are bound to be attained (Hall, Ashworth, & Devine-Wright, 2013).

The other aspect that can be improved upon to bridge the gap between the public and stakeholder interests in the energy sector is distributional justice and the realization of the benefits of the initiative. The current policies, especially in relation to wind energy, have been criticized by a substantial subset of the populace for providing financial benefits exclusively to the turbine hosts rather than ensuring the benefits are perceived by all people in the neighborhood. The unjust distribution of the benefits has far-reaching ramifications on the community since it creates financial winners, individuals that host the turbines, and financial losers, persons that have to put up with the turbines in the vicinity but do not attain any considerable benefits from the initiative (Hall, Ashworth, & Devine-Wright, 2013). Such a scenario leads to public resistance to new energy technologies and policies. The issue can be addressed by formulating a particular compensation scale that allows all people to perceive just the distribution of resources. The value of the compensation can be based on an individual's location from where the turbines are situated.

The gap between stakeholder interests and the public's position can be bridged by ensuring procedural justice is upheld in the formulation of new policies and when planning for the installation of new technology. The underlying assumption is that since some developers may not be familiar with the locale or project site, it would be integral that critical decisions, such as where to install the plants, incorporate local representatives (Hall, Ashworth, & Devine-Wright, 2013). By fostering a sustainable engagement between the public and stakeholders, decisions such as the placement of wind farms or any other renewable energy technology do not aggrieve any one party. Policies formulated with the participation of the public are deemed acceptable, thus, preventing the prevalence of legal and social wrangles during the project's implementation phase.

The last bridging factor is unanimously agreeing upon the site for the installation of the technology. Locating a wind farm in a locale that is sentimentally or economically essential for the public may result in policy/technology resistance. In a bid to ensure that the project/technology installation site aggrieves no one party, the local populace must be involved in the decision-making process.

4.2 The Readiness of the Public in Accepting New Technologies/ Policies

Public support for the global and national climatic agenda varies considerably across the

globe; this explains why the adoption of renewable energy sources is more robust in some countries than others (Liu, Wang & Mol, 2013). For this research, the public's readiness to embrace renewable energy technologies and policies is inferred from the population's willingness to pay for electricity derived from renewable sources. The ability of the public to pay for renewable energy is based on the notion that by doing so, they will be contributing to environmental protection. There is a strong correlation between the perceived advantages of renewable energy and the willingness of the public to invest in and pay for renewable energy (Yun & Lee, 2015; Bertsch et al., 2016; Ntanos et al., 2018; Abdul-Wahab et al., 2009; Ji et al., 2016; Eberhard, Kolker & Leigland, 2014; Liserre, Sauter, & Hung 2010). The willingness to pay for renewable energy also positively correlates with the presence and extent of energy subsidies in a country, the degree of state support, and the literary levels in the population (Liu & Goldstein, 2013; Sawin & Flavin, 2006; Tongsopit, & Greacen, 2012; Goswami, 2004). Therefore, the null hypothesis, "The public is conservative and hesitant to adopt new policies/technologies pertinent to energy," is rejected, and the alternate hypothesis, "the public is flexible and ready to adopt reasonable policies/technologies that address the prevailing global warming problem and foster energy sustainability," policy is accepted.

4.3 The Interests of the Public and Stakeholders Can be Served Concurrently

Recognizing the need to mitigate the impact of energy production and consumption on the environment and the global climate has compelled national and local governments to explore reliable, sustainable, and environmentally friendly energy sources. Also, as the population grows markedly, for example, India needs to explore alternative energy sources to address the energy deficit (Kumar). Although the demand for energy increase can be offset by acquiring more fossil fuels, the environmental and climatic impact associated with fossil fuels will also surge. Therefore, as a means to conform with the GHG emissions target and curb climate change, local authorities, and most national governments, including the Indian governments, have ventured into formulating policies that encourage the adoption of renewable energy sources as a viable alternative to fossil fuels.

The transition to renewable energy serves stakeholders' interests in the energy sector by ensuring that the national GHG emission is reduced and natural calamities associated with climate change are prevented. Sustainable energy sources are established in an attempt to promote energy autonomy. The transition is also essential for the public since it allows them to take part in the realization of the global and national energy sustainability goals and the reduction of emission of greenhouse gases into the atmosphere. However, for effective policies to be formulated, it is integral that policymakers incorporate both stakeholders and the public in the decision-making to ensure the interests of both parties are represented.

4.4 Understanding the Correlation between Stakeholders and the Public on Energy Policies and Strategies

The formulation and implementation of renewable energy policies and the installation of new technologies pertinent to the same are prone to conflicts of interest. As a result, the success of the proposed policies or the new technology is anchored on how well the interests of all actors are represented (Krupa & Burch, 2011). The conflict of interest does not wholly exist

between shareholders and the public; in some instances, different stakeholders may have divergent interests that cause strains in their relationships with other actors (Hall, Ashworth, & Devine-Wright, 2013). However, the policy's optimal performance depends on how well all individual parties' interests are integrated into the final decision.

Principally, stakeholders and the public expect different deliverables from a renewable energy project. To be precise, while the motivation of stakeholders may be profit maximization, addressing the GHG emissions issue, and disentangling a nation from dependence on fossil fuels, the public may want a considerably healthy distance from the installed technology, equal or just distribution of resources, procedural justice in the policy formulation process, and a considerate selection of the technology installation site (Hall, Ashworth, & Devine-Wright, 2013). Although the public may share in the climate and sustainability agenda advanced by stakeholders, most citizens would like their interests addressed because they are the ones that encounter the aftermath of the policy/technology firsthand, living in unfavorable scenery, an economically disadvantaged locale, and coping with the noise pollution (Martin & Rice, 2015; Upham, Shackley & Waterman, 2007; Jami & Walsh, 2014; Upreti & Van der Horst, 2004; Fischlein et al., 2010). As a result, the interests of both parties are equally important. Disregarding the interests of the public in policy formulation may mean that portentous policies may be made. However, the expected outcome may never be realized due to a lack of public acceptance.

5. Conclusion

In contemporary society, policymakers are devoted to attaining developmental sustainability and promoting the creation of a carbon economy. However, formulating policies for such sensitive political economy aspects is prone to conflict of interest. Failure to resolve these looming conflicts often leads to a failed initiative regardless of how portentous the technology or the policy was. In the context of energy, policymakers and governments have acknowledged that the increasing global population would result in an energy deficit. The deficit can be addressed in a sustainable manner through the adoption of new technologies and policies pertaining to renewable energy. However, stakeholders in the energy sector have conflicting interests that may paralyze the success of new technologies and policies if left unaddressed. Therefore, this study has established that the interests of the public and stakeholders can be satisfied concurrently to optimize the efficiency of formulated policies.

The motivation of stakeholders can be profit optimization, conforming to the GHG emissions threshold limit, fostering the development of a sustainable community, and/or promoting energy autonomy. Conversely, although the public can share the stakeholders' position on reducing GHG emissions and promoting energy autonomy, citizens value distributional justice, trust, procedural justice, and place attachment. In light of the divergence in the interests of the two groups, representatives from both facets must be involved in the policy formulation process to warrant the endorsement of policies and technologies that advance the interests of all the involved actors.

In an attempt to ensure the interests of stakeholders are harmonized with factors that promote public policy acceptance, this study recommends that policymakers can either adopt open

communication and transparent discussions that include members of the public to ensure the interests of the public are advanced and public support is garnered. Alternatively, 'local champions' can be chosen to represent the position of the public on renewable energy decisions and policies. Other than open communication, this study recommends a holistic declaration of the intentions of renewable energy developers to build public trust and confidence in the technology/policy. In this study, it has been elucidated that public participation in policy formulation has declined because citizens do not perceive the direct benefits of policies already in place. In this regard, public participation can be encouraged by communicating the goals of the policy/technology succinctly and clearly.

Although a broad array of empirical studies were included in this meta-analysis, the presented findings may not be representative of current trends in stakeholder versus the public relationship because more current studies were not free from public libraries. Also, further clarification on the subject could not be sought because this research was limited to exclusively published studies.

Further understanding of the policy formulation process dynamics in renewable energy can be attained by conducting complementary studies that endeavor to elucidate the differences in stakeholders' interests in the renewable energy sector.

Abbreviations

GHG – Greenhouse gases

RE – Renewable Energy

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