ENERGY JUSTICE AND EDUCATION IN THE CONTEXT OF PROMOTING RENEWABLE ENERGY SOURCES

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ABSTRACT: *Energy justice is the framework to conceptualize the impact of the decision-making process in the field of electricity, used to take into account the social implications of existing ethical values. Renewable technologies are being promoted for their social and environmental benefits, but little effort has been done to determine the extent to which, in contexts and what ways, these technologies can contribute to energy justice. The paper assesses the potential of technologies related to renewable energy sources (RES) integrated in the grid of the operator or outside it, to address energy justice in different global contexts, through a review of existing studies on its principles, dimensions, economic, socio-political and its geographical location. How can education in new technologies for the use of renewable sources contribute to reducing the social impact, promoting and obtaining medium and long-term benefits for all the stakeholders involved? Under specific conditions and circumstances, can renewable electricity technologies interact with or wok to promote energy justice? Considering the importance of energy efficiency and raising students' awareness of renewable energy; specific educational activities should be planned, such as socio-scientific discussions or planned trips to energy-generating institutions. In the light of these objectives, it is necessary to use informal and non-formal educational options as a supplement to formal education activities in renewable energy education.*

KEY WORDS: *Energy justice; Renewable technologies; education.*
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1. CONTEXT

The current energy transition (Healy & Barry, 2018) focuses both on decarbonisation using RES and improvements energy efficiency through technological innovations, and on achieving a smart and just transition for people, taking into account that there are areas of energy poverty. Socio-technological innovations in the energy transition need to be examined together with energy justice (Sareen & Haarstad, 2018).

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However, technologies in RES are often expensive to implement, which could exclude people who cannot afford to buy them, and the need to reduce overall energy consumption conflicts with the need to address energy poverty, in other words to protect the poorest in society. Basic energy services can ensure the minimum level of well-being, but subsidy vulnerable energy can lead to increased energy consumption and emissions.

To achieve the goals of energy and climate around the world, emphasis is placed on the development of solar energy. There are benefits to the development of solar energy from a legal and economic perspective that are still underexplored, and how to achieve this energy by enforcing the new legislation can provide certainty for new investments.

One of the obstacles to the expected development of the renewable energy market is the shortage of qualified human resources. There is a mismatch between the system supply and industry demand for renewable energy, an acute shortage of specialists in developing countries. Deepening knowledge in the field of RE and law can be the solution to solving the problems of energy justice.

More education on energy and sustainability is needed to reduce the impact of the energy sector on the environment and is the time for people to start transferring their education in the energy policy-making process.

2. INTRODUCTION

It is known that the global economy runs on oil and is powered by electricity, regardless of whether it is a residential, commercial, industrial sector, providing the three services: lighting, heating and cooling. Hydrocarbons (coal) and nuclear resources are still used to produce electricity, but at high environmental and socio-political costs for the extraction, transport and combustion of fossil fuels, with problems created in the entire global energy system. (Delina, 2016). According to the authors Benjamin Sovacool, Roman Sidortsov and Benjamin Jones, there are five major aspects, geographical, economic, socio-political, technological and temporary energy supply, in which to discuss ideas about energy and justice. The authors introduce their two principles of energyjustice:

1. *a prohibitive principle*, which states that "*energy systems must bedesigned and constructed in such a way that they do not undulyinterfere with the ability of people to acquire those basic goodsto which they are justly entitled*," and

2. on *affirmative principle*, which states that "*if any of the basic goodsto which people are justly entitled can only be secured by meansof energy services, then in that case there is also a derivativeentitlement to the energy services*"[1]

Justice is not a discipline perse, rather it is a multifaceted conceptthat people define and interpret according to their own context andexperience. For some justice is about the law, for others it is aboutcorrecting a wrong, irrespective of the law. For some justice prevents an injustice taking place, and for others justice is synonymouswith fairness. There are however, (Heffron & McCauley, 2017)

[1]The prohibitive principle becomes a requirement to *"minimise harmthrough the design and operation of energy systems"* and the affirmative principle becomes a requirement *"to help those in need ofenergy services".* Stated this way these two principles line up wellwith two important themes of justice: to avoid a future injustice (orremedy an existing injustice); and to distribute resources accordingto need.

The main forms of justice at the heart of energy justice are:

• *procedural justice*, where the focus is on the legal process and the necessary legal steps (for example, are all the steps followed for an environmental impact statement?)

• *distributive justice*, with reference to the distribution of benefits in the energy sector, but also of the negative consequences;

• *recognition of justice*, with reference to the recognition of rights for different groups in society (for example, the rights of indigenous communities);

• *restorative justice*, any injustice caused by the energy sector, should be corrected, such as restoring energy sites to former use (waste management policy and decommissioning must be planned and paid for).

• *justice of cosmopolitanism*, which comes from the belief that we are all citizens of this world (have we considered the effects from a global perspective, beyond our borders?).

As an energy source, electricity can be accessed, adjusted odemand and easily used (Sovacool, 2014). The intensive use, has limited the reserves of fossil fuels, which are easily accessible and economically competitive and are non-renewable. Thus, it is essential to look for alternatives to continue electricity production in order to meet future energy requirements. While the hydropower source has served as an accessible and reliable renewable source since the beginning of electrification, other renewable energy resources (RES), in particular solar and wind energy, have emerged as economically viable options to meet current and future energy needs, with a significantly lower environment, social and political impact. According to (BNEF, 2016) , investments in electricity based on renewable resources (RE) have been made at an unprecedented rate.

The proliferation of new renewable energy (RE) technologies change supply chains and energy infrastructure, and RE projects are changing the social and political structures of the nations, regions and communities in which they are implemented.

A sustainable energy future requires for energy systems to be guided by principles of justice, which requires the inclusion of justice objectives in the planning and development of REs and an understanding how RE projects can adhere to principles of energy justice.

To what extent does the literature on global re development address considerations related to energy justice?

According to (RENI, 2020) the first targeted forms of renewable resources are solar, wind, biomass (waste) and hydro that can be scaled up or down to answer electricity demands without substantial changes in technology or to operationalize the use and can provide energy to the transport sector with the necessary technological and infrastructural development. We will make a systematic evaluation of the existing existing research, analyzed in terms of the dimensions and principles of energy justice. In the following sections, we first introduce the conceptual framework on energy justice used in analysis. Then, taking note of the development of RE in both highly centralized and electrically dispersed contexts, we review the literature and analyze it in terms of geographical, temporal, technological, economic and socio-political dimensions and based on the affirmative and prohibitive principles of energy justice.

3. DEFINITION AND BRIEF DESCRIPTION

Sovacool & Dworkin define the energy justice "*a global energy system that fairly disseminates both the benefits and costs of energy services and one that has representative and impartial decision-making*". In the equitable dissemination of benefits and costs, future generations should also be represented so that they do not bear the burdens resulting from current energy consumption. Energy justice promises to be a means of overcoming the neglect of moral issues in energy systems design, use and decommissioning. According to (Mille, Iles, Jones, 2013) energy justice seeks to address "*equitable access to energy, equitable distribution of costs and benefits and the right to participate in choosing whether and how energy systems will change*" and has evolved from the ecological and climatic justice literature (Hall, 2013).

According to (Jenkins, 2017), "Energy Justice" first appeared as a political term in the early 2000s, although the notions of equality, equity and justice specific to energy systems already existed. Subsequently, an extensive literature on energy justice has been developed, such as local (household and community), national and international (Sovacool, 2019), (Malakar, 2019), (Jenkins, 2018) applications, including nuclear energy (McCauley, 2018), energy regulation (Maher, 2019) and the spatiality of Energy Justice (Bouzarovski, 2019), energy justice "*aims to provide all people, across all areas, with safe, affordable and sustainable energy*."(McCauley, 2013).

Not only this term of energy justice seeks to promote equity and rights in energy systems, but also the term "energy democracy" seen as a normative objective of decarbonization and transformation of energy, as a descriptive term, of civic energy (Szulecki, 2017), by energy equity (Smith, 2018). Other terms refer to "energy poverty", "energy vulnerability", but "energy justice" can be positioned as a general goal, with many approaches to issues (Jenkins, 2020).

4. KEY ELEMENTS

There are many ways in which energy justice is terrorized. What missing is how we can use the principles and apply them in practice, to evaluate research that appears on the evolution of renewable energy (RE). According to (Sovacool, 2014), it is established that: (1) energy justice can be explained using two principles, affirmative and prohibitive; and (2) energy injustices can be classified as often taking place in overlapping geographical, temporal, technological, economic and socio-political dimensions.

The prohibitive principle states that "*energy systems must be designed and constructed in such a way that they do not unduly interfere with people's ability to purchase those basic goods to which they are entitled*," and the affirmative principle states that "*if any of the the basic goods to which people have the right can only be guaranteed through energy services, then, in this case, there is also a derivative right to energy services*" (Sovacool, 2014). Because energy services help people attain essential access to goods and other services, a fair energy system should provide everyone with access to energy sources (affirmative principle), and the ills and benefits of an energy system do not unduly affect anyone, in such a way that they do not have access to other goods (prohibitive principle).

Energy justice has emerged as a useful objective for understanding and guiding energy decision-making, to understand the trade-offs involved in energy policy making, as expressed through competing demands of energy security, energy equity and environmental sustainability, jointly as the "energy trilemma" (World Energy Council, 2015). What are the principles underlying the Energy Justice objective and the means to achieve it? One approach focuses on “procedural justice”, “distributional justice” and “justice as recognition pillars” (McCauley, 2013), which bases its conceptualization on justice theorists and empirical work. Through these tenets, do they assume empirical and normative roles, with questions such as “what is happening” and “what should be” (Jenkins, 2016)? For example, the ownership of renewable energy sources can be explored using the tenet framework to examine "how Energy Justice is negotiated and challenged with a focus on distributive and procedural justice issues".

Energy justice can act as (1) a conceptual tool that integrates different justice issues, (2) an analytical tool for researchers to understand how values are integrated into energy systems or to solve energy problems, and (3) a tool decision-making for energy planners and consumers who want to become more informed about energy challenges (Sovacool, 2015).

This is the framework used in renewable energy projects to operationalize energy justice in assessing RE developments. Prohibitory and affirmative principles are used to frame justice simply as equity and equality of distribution of burdens and benefits, and then we explore how existing RE scholarships address these principles through five dimensions - geographical, temporal, technological, economic and socio-political. We propose that a just energy system is one that also does not endanger critical species for ecological systems to survive, which is important in itself and extremely useful in supporting human life.

The geographical dimension focuses the spatial allocation of energy services, the costs and benefits associated with them. Uneven energy development can lead to changes in ecological and environmental conditions in the area, affecting local communities until they move to another area.

The temporal dimension of energy justice refers to how RE systems can lead to a reduced or negligible impact on future generations and on the ways and means essential for maintaining the quality of life. The temporal dimension explores issues related to energy justice between generations and also between species, in which energy injustices will affect future generations, which will be affected by climate change, degraded landscapes, biodiversity loss, air pollution and associated health implications in the future. , generated by current energy consumption.

The technological dimension explores deficiencies in terms of their security, efficiency, reliability and vulnerability to external security threats. Do the technical components of the energy system itself have the capacity to reconcile with these principles?

The economic dimension of energy justice refers to the social distribution of energy services, the costs and benefits associated with them. Energy services should be distributed so that people in social groups can have access to sufficient energy, accessible to cover at least basic requirements, at reasonable costs. Therefore, a just energy system

addresses both principles taking into account RE projects that do not generate negative economic effects or cause an imbalance to different economic entity.

The socio-political dimension of the energy system is dependent on to the economic dimension. A socio-politically just energy system would uphold the principles of human rights, democracy and the political process without any dysfunctional link between energy producers and government and a just energy system should ensure that no social group are marginalized or given access to energy based solely on their social status.

5. METHODOLOGY

According to (Jenkins, 2016), when addressing an injustice in the sense of energy justice, first identify what is the concern (distributive justice), then identify who it affected (justice as recognition) and finally identify strategies for remediation (procedural justice). Thus, distributive justice deals with the sharing of energy services, benefits and harms between present and future generations. Justice as recognition is perceived as a concern for who is or who is not affected by changes in energy decisions, for fair representation and respect for the views of all individuals and groups affected by changes in energy systems, after which procedural justice investigates the mechanisms by which those decisions occur and stresses the need for equitable access to information, access to decision-making processes and access to legal proceedings for damages (Sovacool, 2015). It is an approach, but according to (Honneth, 2004), recognition and procedural justice form a precondition for distributive justice.

According to (Wong, 2016), (Day, 2016) competing conceptual approaches embed insights from actor network theory, assemblages, and capabilities approaches. Currently, the conceptual framework and methodological approaches to energy justice are diverse and include a high prevalence of conceptual contributions, qualitative and secondary studies, such as policy documents.

6. STRENTHS AND CHALLENGES

(McCauley and Heffron, 2018) consider notions of restoring justice that may include past damages that have already occurred, existing crimes against individuals, the environment and the climate, and unforeseen harms that will come throughout the post-carbon transition. In contrast, Heffron introduces the "*concept of things*" to the "*future time*", which pays specific attention to future generations and ensures that they are treated as equally important to the present populations.

What may seem like a gain in social justice today (for example, large-scale state support for wind farms and photovoltaic plants) can become a social injustice tomorrow when it is implemented incorrectly or unfairly (for example, wind farms in the Dobrogea area of Romania that can affect Natura 2000 or photovoltaic parks that can change the destination of agricultural land, with medium and long term effects (over 20 years).

In the works (McCauley, et al, 2019), (Lacey-Barnacle, et al, 2020), Energy Justice includes an explicit request for systems-wide applications at the level of entire systems, from resource mining through to waste, taking into account the lifecycles of installations for a global account for energy's social, economic and environmental impact.

(Sovacool, et.al, 2019) performed an analysis on the transition to nuclear energy (France), smart meters (England), electric vehicles (Norway) and photovoltaic solar panels (Germany), taking into account how each of these transitions may impact wider communities. Energy justice can also be apply to social systems, as a mechanism that can expose exclusionary and / or inclusionary technological and social niches before they develop, leading to a new and socially just innovation.

The use of Energy Justice in practice has rarely been analyzed and there is little reflection on how Energy Justice becomes a deliverable policy outcome (a few exceptions, including work on the ENGAGER network on how energy access is legally protected in various global jurisdictions (Heffron, McCauley, 2017). It is suggested to achieve a dominant influence of economic and industrial on energy policy, based on cost-benefit models as a tool for decision making.

At present, according to (Bombaerts, 2019), (Kohler, et.al., 2019) the predominant foundation of energy justice research is only Western philosophy and human-centered approaches and in many cases, energy justice studies have focused on a descriptive account of the triumvirate of principles.

7. RENEWABLE ENERGY (RE) THROUGH THE PRISM OF ENERGY JUSTICE (EJ)

What are the results in terms of the relevance of renewable energies for the geographical, technological, temporal, economic and socio-political dimensions of energy justice? The present review was compiled based on a systematic search of literature, books, reports of governmental or international organizations reporting empirical research findings on the impact of renewable energu technology.

Energy and access to energy (electrification and energy services) are the basic requirement of development, influencing quality of life indicators. Energy poverty can lead to health and education problems, being the focus of many international organizations. Large-scale RE installations are not always the optimal solution for rural areas and developing regions. The use RE powered mini-grids by smaller, decentralized RE grids can increase access to energy (Schelly, 2016).

Large-scale RE can have a limited scope in alleviating justice issues related to energy poverty in rural and remote communities. There is a lack of information around RE projects in the context of the geographical dimension of justice through the objective of the prohibitive principle. Promoting RE technologies can provide drinking water in deficit areas, can improve education and health in rural areas even in developed countries.

The transition to renewable energy is justified in the face of climate change from greenhouse gas emissions, pollution, the reduction of fossil fuels over time and how the impact on other species is essential for current and future generations ability to purchase basic goods.

Applying the prohibitive and affirmative principles of RE justice involved reviewing the existing literature and examining the designs and structures of RE systems that may unjustifiably interfere with future generations ability to purchase essential goods and access to energy services.

The impact of RE capacities or restrictions on the provision of essential generations, services and goods cannot be accurately determined at present time, only part of the temporal impact can be predicted. The current energy system, which uses fossil fuels, can have a negative impact as a result of GHG emissions and depleted natural resources leading to intergenerational injustices. However, the proliferation of RE to meet future energy requirements will have GHG emissions in production, installation, operation and will differ in terms of materials used in production and construction, technology, location and climatic conditions, but such emissions are lower in comparison with fossil fuels.

The large-scale integration of RE will lead to a growing demand for minerals (gold, copper, aluminum, lithium) for the manufacture of photovoltaic cells, inverters and storage systems on Lithium-Ion batteries, which in turn by extraction are energy consuming, with an effect on the availability and accessibility of these resources for other purposes in the future (Harmsen, 2013), (Yeenneti, et al., 2016), (Kaipeng, 2021), (Mazzocchi, et al., 2021).

Some energy projects require significant water resources, such as in the process of electriolysis, for cleaning the surfaces of photovoltaic panels or for cooling in concentrated solar systems, and climate change will severely affect water resources in many parts of the world (Yang, Yang, & Xia, 2021).

Research suggests that the evolution of RE technologies may have a mixed impact on biodiversity (Gasparatos, Ahmed, & Voigt, 2021). Wind farms have negative effects on birds, the bat population. Some studies have assessed the impact of the movement of other species from their habitats due to the purchase of land for wind farms, photovoltaics, raising concerns about their widespread development. Habitat change / loss is the most common factor of ecosystem change and biodiversity loss due to the expansion of renewable energy (Gasparatos, Doll, & Olang, 2015).

Habitat change/loss is the most prevalent driver of ecosystem change and biodiversity loss due to renewable energy expansion. A major policy challenge falls within the purview of managing biodiversity conservation in lands privately owned by individuals or companies. Some scholars argue that with the appropriate incentives and policies (e.g. zoning), biodiversity conservation in privately-owned bioenergy landscapes could improve (Truax, et al., 2015). However, the lack of clear land tenure and land acquisition laws for bioenergy production has been a major policy challenge for the conservation of biodiversity, especially in developing countries. According to (Gasparatos & Willis, Biodiversity in the Green Economy, 2015), it is crucial to establish the hidden "green-economic" trade-offs of renewable energy expansion to better understand both the role of biodiversity in a green economy and the economic costs and benefits which its preservation can produce.

Specific impacts of utility scale solar developments mostly depend on project location, solar technology used, size of the plant, and proximity to existing roads and transmission energy lines. During construction, inherent biological soil crusts are turned over, soil becomes vulnerable to erosion, and water infiltration chnages can negatively affect flora and fauna. Solar power plants can significantly change the landscape which directly affects habitat quality and migration routes, and can cause habitat loss and fragmentation.

An important policy should address performance and recovery obligations, which must be addressed with the development of renewable energy plant. Thus, a company

assumes responsibility for covering the costs associated with decommissioning and recovery at the end of the project.

The recovery of solar and wind power plants has received little attention so far, so it is necessary to address a large knowledge gap to develop best practices for restoring the disturbed ecosystem.

In the case of hydro, any change in river flow can impact aquatic ecosystems, and the size of dams and their impact on the local ecosystem are the main factors for considering the dimensions of justice in the development of hydro systems (Khanal, Xi, & Othman, 2021). Smaller hydropower projects can be operated without large dams and with lower negative environmental impact, but research is needed (Wang, Wang, Cao, Huang, & Zhang, 2021).

To explore the affirmative principle of energy justice in the temporal dimension, we analyzed how RE can meet the essential electricity requirements of future production. Researchers estimate that the large-scale deployment of wind, hydro, solar, biomass and geothermal technologies needed to meet future global energy demand is economically and technologically possible, but would require a social and political boost. (Sayed, et al., 2021).

Reviewing current research on whether RE projects help or mitigate the prohibitive principle of energy justice in the time dimension, it is found that RE has the potential to drastically reduce the negative impact that conventional energy systems face. Thus, photovoltaic power plants can be built on agricultural land where plants adapted to shade can be grown. The water basin of a hydroelectric power plant can be covered with photovoltaic panels, ensuring a cooling of their surface (Dai, et al., 2019).

With regard to the affirmative principle lens, renewable energy projects increase access to energy based on the nature of the use of renewable resources.

The economic dimension of justice in the field of RE, in the evaluation of projects whether or not it respects the prohibitive and affirmative principle, is found in the level of "energy poverty", which occurs when people can not support your daily work socially and materially in the cause of the lack of energy (high energy price, lack of access to the electricity grid or a combination of these two factors) (Sareen, et al., 2020).

There are studies showing that the production of energy in RE is not always profitable, leading to higher energy prices and no access for economically marginalized people (Sardianou & Genoud, 2013), (Liobikienė & Dagiliūtė, 2021). On the other hand, others rejected the idea that promoting RE would lead to higher electricity prices (Mirza, Richter, Egber, & Scheffer, 2019) or would require greater policy involvement for a balance between supply and demand (Kolb , Dilig, Plankenbuhler, & Karl, 2020).

Much attention is needed to develop the social, political and economic contexts in which technologies are embedded in order to develop only RE systems from an economic point of view. Some authors approach the prohibitive principle by taking into account the impact of RE prices. The potential of RE to increase access to energy services depends on the political, technological and geographical elements involved in development, and the potential of RE to increase the economic accessibility of energy services depends largely on the existing economic and political contexts shaping the organization of energy systems and resulting prices.

The transition from high energy density fossil fuels to low energy density RE technologies requires significant land areas, which can lead to land rights disputes (Chilombo, Fisher, & Horst, 2019). Transfers of land ownership to large and foreign investors for large-scale development of photovoltaic projects may not bring benefits, and the distribution of benefits from the development of RE only on the policy of ownership and access to land may lead to economic and social marginalization. (Levenda, Behrsin, & Disano, 2021). Local community-based RE projects can help facilitate fair energy transitions, local benefit distribution, stricter protection of local natural resources, with stakeholder support (Cousse, 2021), (Bommel & Hoffken, 2021). In conclusion, large-scale RE projects can lead to socio-political injustices, especially with regard to land rights, and smaller-scale development, such as community energy projects, can continue the prohibitive principle through land use disputes.

We have to admit, too much energy can cause environmental problems (more waste, overconsumption, pollution), while lack of energy, due to lack of energy services, can maintain the level of poverty. An education on the alternative of promoting RES, advanced technologies for the conversion of raw materials into energy (electricity, heat), the rational use of energy and the development of smart grids, are elements that lead to a paradigm shift in thinking and approach, the world's energy dilemmas.

The conceptual framework of energy justice involves priority issues or how the dangers, costs and externalities of the energy system are disseminated to society as a whole, but also benefits or how access to modern energy systems and services (smart grids) is distributed throughout society. Last but not least, the conceptual framework of energy sustainability involves procedures or tools for energy decisions to comply with the planning process and for consumers to make more informed energy choices.

8. STRENTHS AND CHALLENGES

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9. THE ROLE OF LOW AND THE PRACTICE OF JUSTICE IN THE DEVELOPMENT OF SOLAR ENERGY

According to (Zillman, et al., 2018) the law can play a vital role in allowing the development of a new solar energy and lead to an energy transition. Few countries have so far made progress in legislation to promote the solar source. Developed countries have a committed to supporting the development of low-carbon energy (contained in the 2015 Paris Agreement) and indeed a responsibility, given that they represent a large amount of global carbon dioxide emissions.

10. REFORMULATION OF ENERGY LAW IN THE CONTEXT OF PROMOTING SOLAR ENERGY

When a country aims to meet its 2030 climate and energy goals, it must adopt new laws on how to successfully implement its energy transition. There is no single solution to this challenging task, as countries have control over their own individual energy resources. Countries usually have different geographies, cultures and socio-economic characteristics. The three layers of law - international, national and local law - have roles to play in this development (Heffron & Talus, 2016)

There must be a guiding set of principles that must be followed for the development and application of the new energy law in order to ensure justice in the energy sector. Such guidelines can be an engine for transformation.

For example, one of the most established environmental principles can be taken into account, namely the "polluter pays" principle. In this context, the principles of energy law can "*act as a guide for policy makers, academics, lawyers, judges and arbitrators when judging, applying, drafting or formulating documents, laws, regulations, decisions, etc. on energy law* " (Heffron, et al., 2018)

Renewable energy, such as solar energy, can provide a more feasible option that can supply both urban and rural areas in many developing countries. In the long term, it is more sustainable, protects the environment, benefits human health and can maintain to security and access to energy. Although they may seem more expensive from a short-term perspective, renewable energy projects should be able to raise finance and also go

through rapid environmental impact assessment (EIA) processes (thus reducing costs). general construction and project financing).

11. LEGAL CERTAINTY

The long-term perspective of the principles of energy law, as highlighted above, cannot be underestimated. These principles, combined with long-term ambitions for the energy sector, can provide legal certainty. In turn, such "certainty" can lead to a reduction in the risk profile of an infrastructure project and also to a reduction in borrowing costs.

When the renewable energy sector in developing countries is provided greater legal certainty, it can actually grow. As a result, investments may flow, and the overall cost of financing will tend to fall further over time. In this way, an accessible and efficient energy transition becomes feasible.

In general, policymakers need to ensure that investors see a long-term vision in their country, enabled by supporting legislation that provides legal certainty about government objectives. Although this can be generally difficult to achieve, it has the advantage of providing a platform to ensure investor confidence, as investors can then invest in new energy infrastructure projects due to risk reduction. Indeed, a new energy law based on the above guiding principles can provide the necessary clarity and certainty for investors and the public, which are two of the most important factors in a country's energy sector.

The general, legal certainty must be ensured throughout the life cycle of an energy project. In this way, it can be ensured that all stakeholders in the energy sector can benefit, including marginalized communities or indigenous communities - however, there is research on the dynamics of resource extraction power that states that gradually a stakeholder can start to benefit more. (Zeuner, 2018)

12. JUSTICE OF FLEXIBILITY

The generation of solar energy is very intermittent and therefore can only be controlled to a limited extent. In addition, we note that costs for network integration and management will generally tend to increase as the share of solar energy increases, as a decentralized solar system usually requires additional transportation services with appropriate system costs (Baker, et al., 2013).

One option for increasing the value of renewable energy sources, for example, solar energy, is energy flexibility (Fridgen, et al., 2020); that is, the ability of an energy system to better balance patterns of electricity consumption and fluctuation (Fridgen, et al., 2021)

Flexibility justice is concerned with the functioning of the energy sector and aims to ensure that the market is open to existing and new stakeholders who (can) provide flexibility, for example, industry, households, storage facilities, etc. (Heffron, et al., 2021) a form of applied justice that aims to provide energy justice. It encourages new entrants to the energy market (ie stakeholders). This meaning of "stakeholders" is broadly defined and includes new entrants in terms of technology, ownership, market access, finance and protection.

In developing a low-carbon economy or a zero-carbon society, markets must therefore change and ensure that they keep pace with technological developments. Flexibility justice aims at a flexible energy system in which the market is open to players and in which the energy system can, as a result, use the advantages of available technologies accordingly. The justice of flexibility would ensure that a country is able to benefit quickly, efficiently and cost-effectively from the wider use of new technological applications, such as solar energy, by balancing the increasingly varied demand and supply of energy.

13. INTEREST IN RENEWABLE ENERGY EDUCATION

It is a common consensus that renewable energy education should be incorporated into schools, universities and other academic institutions at different levels (Kandpal & Broman, 2014) . Providing education on renewable energy, especially at an early age, is a necessity in adopting this issue as a lifestyle. Children, who will be the decision-makers, policy makers and other competent authorities in the field of renewable energy in the future, would accept renewable energy as a way of life and will be the users of these new energy technologies (Keramitsoglou, 2016).

Considering the importance of energy efficiency and raising students' awareness of renewable energy; specific educational activities should be planned, such as socio-scientific discussions or planned trips to energy-generating institutions. In the light of these objectives, it is necessary to use informal and non-formal educational options as a supplement to formal education activities in renewable energy education.

In many countries, the lack of programs and textbooks for renewable energy education suggests that new educational alternatives are needed. In addition to formal educational contexts, the participation of teachers and students in extracurricular environmental education programs can provide significant contributions, which otherwise cannot be achieved through formal education (Kandpal & Garg, 1999).

14. CONCLUSIONS

Ethical issues of justice are essential for understanding energy choices and energy impact. Social and economic systems are based on energy systems, and electricity from renewable sources can create new opportunities, but also endangers existing stabilized systems. However, these ethical considerations fail to provide a systematic lens for conceptualising and assessing the justice components of energy systems in terms of decision-making, access and impact; these being the sphere of competence of energy justice.

The review of existing work on the development of renewable energy technology illustrates that energy injustices spanning temporal, socio-political, geographical, economic, and technological dimensions are all evident in the context of the development and use of renewable energy sources.

Many of the implications of RE technology development justice are related to technology choices, including choices about scale, location, and ownership organization. In general, the development of REs involving distributed technologies, rather than

centralized ones, are located to avoid ecologically or culturally significant landscapes and are designed with community involvement is more likely to have positive implications for energy justice.

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