PROSUMERISM AND ENERGY COMMUNITIES

Expanding concepts in a global perspective

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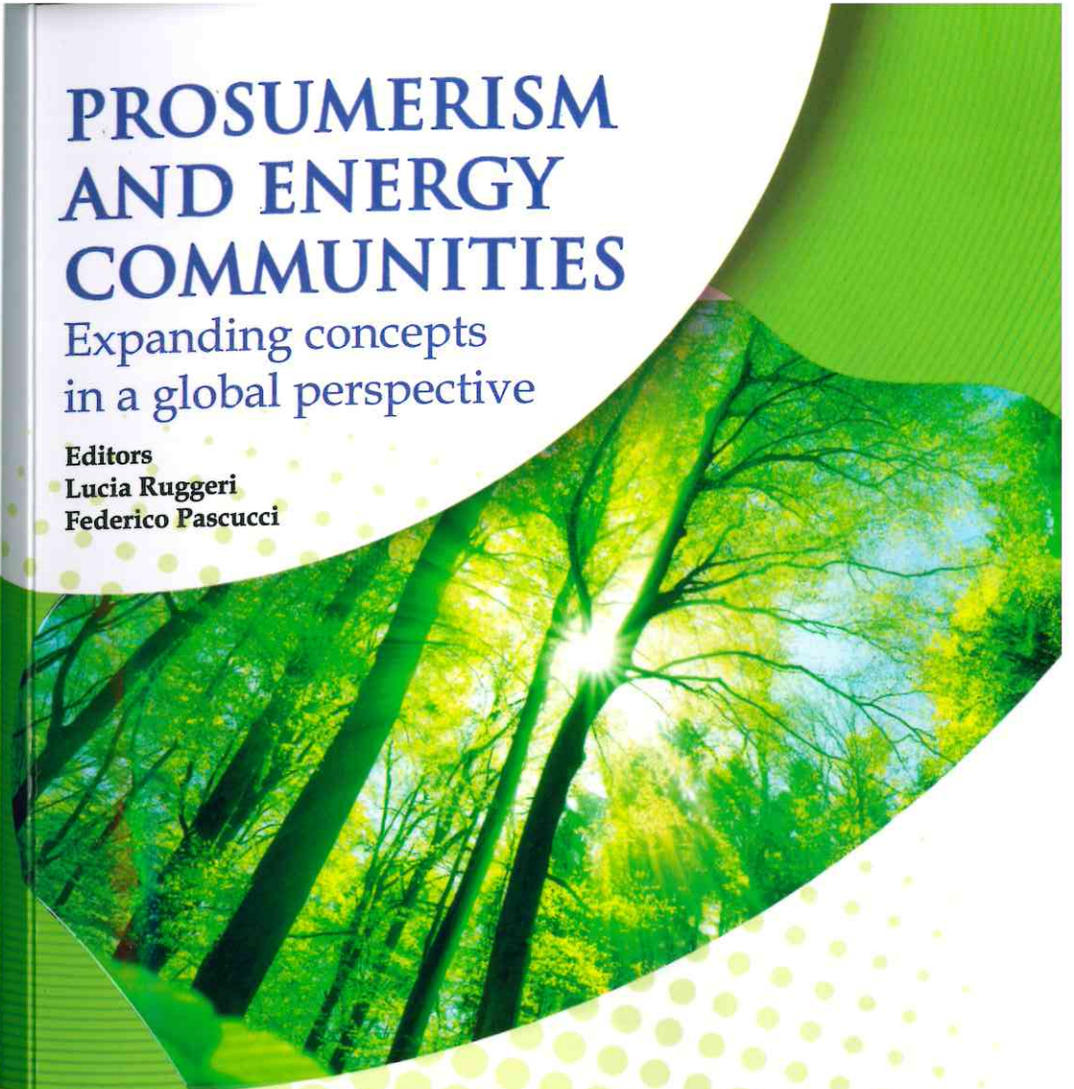
Editors
Lucia Ruggeri
Federico Pascucci



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Lucia Ruggeri and Federico Pascucci

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problem of maintaining transparency and privacy in certain situations; reduced bandwidth and output of blockchain due to high IoT data concurrency; requiring high computing storage requirements and networking resources capability for IoT big data and connectivity on blockchain; there are also certain regulatory challenges of blockchain in IoT viz., keeping privacy - although blockchain through immutability algorithms, promises security solutions, but because there is no governance by law of these block records, keeping privacy of these records becomes difficult before publishing them blockchain, yet another challenge is the execution of smart contract on distributed ledger system. Since it is through codes, the purpose of the contract could be anything (including being illegal).

It is very obvious that the more we automatise the decision-making processes, the more there may be systemic failure and cyber-attacks. In the energy sector, in terms of technical requirements, even from a customer's perspective a lot is required to be done by the market participants. Before even the consumers become prosumers, the technicalities of the system need a transition that could be of the hardware, software or even the protocols.

In terms of policies and regulatory interventions, a more prosumer centric approach is needed to make the energy market more seamless in terms of exchange of data, ensuring network neutrality, governing of user data privacy and security of the system and guaranteeing healthy competition. Just not the making of these interventions, but also making prosumers aware of their rights. One of the most important requirements is to sync the interventions with the market sentiment and the new technology convergences. These interventions should not lag behind or inhibit the working of the market but indeed support the process at the same time protecting rights of all the stakeholders involved.

Lastly, the technologically abled always forget that there are also the technologically unmindful people in the world. In any work, there is a basic forgetting of the fact that there are people who don't know how to use technology at all. In such scenario, adding to the literature of how to make the systems work without transitioning the not abled into abled will let them only believe that it is been done at their cost, no matter how much good the think-tanks want to add through their research to the world. Change is required, no doubt. Technology needs to be used for the good of the world – but 'with everyone, not without!'.

Fundamental Duty to Sustainable Development in the Brazilian Federal Constitution of 1988 and Solar Energy (Sdg 7) as an Energy Policy in the Current Brazilian Conjuncture

Maria Cristina De Cicco and Ari Rogério Ferra Júnior

Abstract: Energy policies are in a moment of transition due to the emergence of the new energy system based on a decentralized model and coming from renewable sources which seeks energy self-sufficiency with energy production by the consumers themselves – prosumers. The Brazilian energy model is still heavily centralized and solar energy, an example of a decentralized model, represents only 1.7% of the national energy matrix. The article is divided into three topics, dealing with fundamental duties; sustainable development, green economy and accessible and clean energy matrix, in line with global goal 7 of the 2030 Agenda; and solar energy as a renewable source in Brazil, demonstrating the challenges that the country faces to diversify its energy matrix, which is still very dependent on the hydraulic matrix.

Keywords: Duties-Rights, Freedom-Responsibility, Sustainable Development, Green Economy, Brazilian's Clean Energy

1 Duties of Solidarity

The question of the sustainability of a universal extension of any type of right, and in particular of social rights both in terms of their effectiveness, and with regard to the abuse of the so-called common goods and the environment is not new. It even seems indisputable that, by an already consolidated position, the right to the environment is placed as a precondition for the enjoyment of fundamental rights, both in the individual and collective dimensions. In fact, in a sense, it is faced with the individual's right to a healthy environment, in another sense, the collective dimension that evokes the interest of the community to control the territory. Therefore, a State that must be competitive, but that, necessarily, is based on social cohesion and on the recovery and preservation of a healthy environment.

The ongoing social and economic crises require not only rigor, and restraint, but also solidarity policies, shifting attention to the tensions that today permeate the issue of solidarity duties, the changes that have occurred in the content of constitutionally established duties and in the expansion of solidarity in time and space. At the same time, the need to protect cultural heritage and the environment, the need for sustainable development also raises questions about the unfolding of solidarity over time, highlighting the links between future generations' rights and present generations' duties.

The 1988 Brazilian Federal Constitution, in addition to a chapter, an *ad hoc* on the environment (Art 225), introduces the concept of environmental protection within

the framework of the constitutional principles of economic activity, providing for it, in Art 170, item VI.[1] In fact, by establishing the parameters of free enterprise, its scope was to ensure a dignified existence for all, indicating, for this purpose, as one of its limits 'the defense of the environment, including through differentiated treatment according to the environmental impact of products and services and its elaboration and delivery processes'. It is an internal limit that even conforms to the content of this freedom, whose disrespect makes it incompatible with the fundamental principles of the order.

In these questions, the correlation between rights and duties presents itself as the road to be followed for a positive approach to the problem because,[2] as the doctrine has shown, without an indispensable nucleus of duties there is absolutely no community. This new paradigm seems to have become the 'duties of man', not in opposition to rights, but to demonstrate that if rights are fundamental, also duties, mainly of solidarity, are non-derogable and equally fundamental. The truth of this statement rests on the necessary existence of two inseparable binomials in any society that defines itself as democratic: duties-rights; freedom-responsibility, with the awareness that in a Democracy the two binomials do not exist separately, and whenever they dissolve or separate, democracy runs the risk of going into crisis.

Indeed, democracy does not live only on rights, although they are its foundation, since if democracy is based on rights, it is consolidated with duties. It is therefore necessary to raise awareness of the importance of duties for the realization of rights, in order to prevent democracy from being at the mercy of individual selfishness.

As will emerge from the text, as public policies are important in terms of the environment and the energy crisis, they alone are not enough to solve the problem, because much depends on individual behaviors which can be seen, thus, as a fundamental driver of sustainability.

The duty concerns all of us and all sectors of society, including the market, and on this point, it is necessary to highlight the change in mentality that has gradually been characterizing the governance of companies, previously reluctant to the rights and interests of stakeholders today sensitive to ethics, which increasingly penetrates into economic relations and gradually changes the perception of the company's role in contemporary society, in addition to directing its action.[3]

2 Sustainable Development through a Green Economy and Sdg 7 (Clean and Affordable Energy)

In addition to the commitment to sustainability duties, whether from the community or public authorities, it is necessary to undertake economic growth with energy policies aimed at clean energy.

[1] Text given by Constitutional Amendment n. 42, of 19 December 2003.

[2] See for an analysis of the problem presented here M.C. De Cicco ed, *The duties in the era of rights between ethics and the market* (Napoli: Editoriale Scientifica, 2020), which addressing the issue of duties in relation to various sectors of law and society presents rich doctrinal and jurisprudential indications.

[3] An example can come from the recent Code of Corporate Governance approved in Italy by the Committee for Corporate Governance on 31 January 2020.

In this sense, to promote a sustainable economy, the United Nations (UN), through the United Nations Environment Program – UNEP launched in 2008 the Green Economy Initiative.[4]

UNEP aims to carry out 'global research and assistance at the national level, serving as a spur to policy makers and support for environmental investments in the context of sustainable development'.[5]

So important is the theme of sustainable development that the UN held in 2012 in Rio de Janeiro (Brazil), the United Nations Conference on Sustainable Development ('Rio+20'),[6] with the 'green economy' as its central theme.

The 'green economy' is fundamental for improving the well-being of humanity, with social equality, and, above all, reduction of environmental risks, and ecological scarcity, terms that are even present in the central axis of UNEP, for which an economy is low carbon, resource efficient and socially inclusive.

Thus, the UNEP report 'Towards a green economy: paths to sustainable development and poverty eradication - a synthesis for policymakers' explains that, in the context of the 'green economy', it is essential that 'the income and employment growth must be driven by public and private investments that reduce carbon emissions and pollution, increase energy and resource efficiency and prevent the loss of biodiversity and ecosystem services'.

The 'green economy' has three dimensions, representing: (i) transition from large-scale use of fossil fuels to renewable energy sources; (ii) economy with knowledge of nature, with the use of biodiversity products and services; and (iii) techniques that are capable of reducing pollutant emissions, such as reusing waste and reducing energy use in production processes.[7]

In this sense, the 2030 Agenda[8] adopted in 2015 by the United Nations provides for the construction of a sustainable society whose development is based on environmental, economic and social balance, which are fundamental for achieving sustainability.

In this way, solidarity is essential for the realization of global goals and the 2030 Agenda, as global society, being transnational, imposes the need for a 'sense of community and also intra and intergenerational responsibility, between States and even interspecies'.[9]

[4] See UNEP, 'Why does green economy matter?' available at http:// www.unep.org/explore-topics/green-economy/why-does-green-economy-matter (last visited 16 June 2021).

[5] See A.R. Ferra Júnior et al, 'Economia verde como ferramenta para a concretização do objetivo n. 7 (energia limpa e acessível) da Agenda 2030 para o desenvolvimento sustentável', in L.G.B. Campello, *Direitos humanos e meio ambiente: os 17 objetivos de desenvolvimento sustentável da Agenda 2030* (São Paulo: IDHG, 2020), 266.

[6] See UN Report 'O futuro que queremos' from the Rio+20 Conference available at http://www.rio20.gov.br (last visited 16 June 2021).

[7] See R. Abramovay, *Muito além da economia verde* (São Paulo: Editora Planeta Sustentável, 2012), 82-85.

[8] See 'Transforming our world: the 2030 Agenda for Sustainable Development' available at https://sdgs.un.org/2030agenda (last visited 16 June 2021).

[9] See L.G.B. Campello and R. De Deus Lima, 'A cooperação internacional solidária no contexto do desenvolvimento sustentável para a efetivação da Agenda 2030', in L.G.B. Campello, n 5 above, 683.

In addition, global society is characterized by – drastic – social and economic differences, imposing, therefore, the 'adoption of a multilateral approach', above all to 'achieving sustainable development on the world stage marked by a growing threat arising from the global environmental crisis and by the great inequality between the realities of countries in the Northern and Southern hemispheres'.[10]

The fundamental economic, social, cultural and environmental rights are recognized as important for the dignity of the human person – individually and collectively – is achieved; therefore, the notion of sustainability must be realized 'from the economic, social and environmental axes'.[11]

In this scenario, another relevant issue to be discussed by the States concerns the awareness and adoption of green policies, aiming at raising awareness of individuals regarding their own responsibilities and on governmental issues, as well as strengthening the institutional and professional capacity of the media to, thus, promote the inspection and information.

Therefore, the realization of accessible and clean energy – which is even a global goal n. 7 of the 2030 Agenda – requires that the States fulfill this objective, diversifying their energy matrix, making it increasingly clean.

Affordable and clean energy can – and should – be seen as a necessary aspect of sustainable growth. There is a demand for a shift between the production of goods and services and its current material energy base to new sources of energy, that is, new forms of energy production, with a public, private and associative focus, which are considered the challenges for the advancement of technological innovations.[12]

In this sense, the importance of the 'green economy', which represents a fundamental aspect for sustainable development, due to the 'use of clean energy and valuation of biodiversity, as it contributes to a better quality of life in nature, reduction of inequalities, conservation of biodiversity and preservation of environmental services'. Furthermore, they also include 'job offer, conscious consumption, recycling, reuse of goods'.[13]

Thus, the 'green economy' can be considered as directly related to the aforementioned global goal n. 7 for the realization of development with respect to the well-being of present and future generations.[14]

In addition to the States, society is also interested in the issue of global energy matrices, whether in the micro or even macro issue, such as Bill Gates, who has recently shown interest in combating the global climate disaster on a worldwide basis.

In this way, public policies, technology and the market must be united in favor of global innovations with a focus on development, and overcoming the dependence on the use of fossil fuels, as 'policy initiatives, such as increased spending on

[10] ibid.

[11] ibid.

[12] R. Abramovay, n 7 above, 81.

[13] A.R. Ferra Júnior et al, n 5 above, 276.

[14] ibid.

research and development, can lead to new technologies and trigger market mechanisms to reach millions of people'.[15]

The market, which holds great monetary power, and, without a doubt, is necessary to face the environmental challenge, which, together with the States and research and development with innovation, and technology, constitute fundamental positions for the advancement and realization of sustainable development.

It is essential, then, that sustainable development in order to be effective imposes the commitment of state and non-state actors as well as demands that public policies, technological progress, and the market are united in favor of the commitment to environmental balance, economic and social.

The transition to the use of an energy matrix based on renewable sources is understood, therefore, as essential for advancing sustainable development. For example, with regard to solar energy, it is already possible to see that the market has been offering solar panels (photovoltaic systems) at lower costs, offering greater demand for the products, which are necessary for photovoltaic energy, and thus lowering costs. The cheaper and increased efficiency of equipment on the market favors competition and encourages the growth of the use of solar energy in homes.[16]

The States themselves (including Brazil) are implementing incentive policies for the use of renewable energy such as tax exemption. This inevitably causes a transition from a centralized energy model to a new decentralized model.

3 Solar Energy as an Energy Policy in Brazil: Challenges

Brazil's energy sources derive from renewable sources, as shown by the website of the Brazilian governments' Ministry of Mines and Energy, the country has 65,2% of hydraulic matrix, 8,8% of wind matrix, 9,1 % originating from biomass and biogas, though, only 1.7% of Brazil's energy results from solar energy,[17] being in an excellent position, as, in relation to renewable energy targets, recent data show that, in Brazilian Energy Balance 2021, the country had extensive use of renewable energy sources, with a good majority coming from the hydraulic matrix, but also using biomass, wind, and photovoltaics.[18]

However, the hydraulic matrix is criticized, because hydroelectric plants' construction imposes the need to flood a large social area, which produces social and environmental damage. Furthermore, another problem caused by hydroelectric plants are the periods when the plants' water reservoirs are low, generally during

[15] See B. Gates, *Como evitar um desastre climático: As soluções que temos e as inovações necessárias* (São Paulo: Companhia das Letras, 2021), 224-225.

[16] See S. Giacomazzi Dantas and F. Mezadre Pompermayer, *Viabilidade econômica de sistemas fotovoltaicos no Brasil e possíveis efeitos no setor elétrico* (Rio de Janeiro: Ipea, 2018), 32-33 available at http://repositorio.ipea.gov.br/bitstream /11058/8400/1/TD_2388.pdf (last visited 16 June 2021).

[17] See *Brasil termina 2021 com maior acréscimo em potência instalada desde 2016* available at http://www.aneel.gov.br/sala-de-imprensa/-/asset_publisher/ zXQREz8EVlZ6/content/id/22877477 (last visited 30 January 2022).

[18] See *Brazilian Energy Balance 2020* available at https://www.epe.gov.br /pt/publicacoes-dados-abertos/publicacoes/balanco-energetico-nacional-2021 (last visited 30 January 2022).

periods of drought. When, then, the government is forced to resort to the use of thermoelectric plants, which generate energy from the burning of fossil fuels to avoid dependence on the hydraulic matrix.

Whenever it is imperative to use thermoelectric plants which are more expensive, and polluting, the reflex is manifested in the electricity bill, since, in these cases, the mechanism of the energy tariff flag system is activated, causing an increase in electricity production costs. Thus, Brazilian citizens are constantly suffering from the unbridled increase in electricity, especially the most vulnerable.

Firstly, it is relevant to remark that Brazil's electricity bill is related with a system of tariff flags,[19] which changes the value of the energy to be transferred to the final consumer. The modalities of the tariff flags are: green, yellow and red. Each modality has a characteristic, namely: (a) green flag, when energy conditions are favorable, the tariff does not increase in value; (b) yellow flag, when energy generation conditions are less favorable, the tariff is increased by R$ 0,01874 for each kilowatt-hour (kWh) consumed; (c1) red flag – level 1, when energy generation conditions are more costly, the tariff is increased by R$ 0,03971 for each kilowatt-hour kWh consumed; and (c2) red flag – level 2, when under even more costly generation conditions, the tariff is increased by R$ 0,09492 for each kilowatt-hour kWh consumed. Flag prices can be changed by the federal government at any time.

The monetary addition may seem irrelevant, or derisory. However, it is relevant, because Brazilian families' household budget is extremely committed to spending on essential services such as gas, water and sewage, and especially electricity, as shown by the 2017-2018 household budget survey (POF) carried out by the Institute Brazilian Geography and Statistics (IBGE). In this sense, when it comes to spending on electricity, the impact on the budget of the poorest families is 42.2%, in the first income bracket.[20]

Therefore, understanding the impact of the tariff increase on the electricity bill of the poorest families in Brazil is essential to acknowledge the importance of electricity consumption and its costs in Brazilian families' budget. In addition, precisely because it is not possible to talk about sustainable development without also facing social inequality.

The problem generated by the water crisis when the reservoirs of hydroelectric plants are low should be faced from a sustainable perspective. That is, it is not advisable to replace a matrix that is considered clean, and renewable, even if not immune from criticism as in the case of the hydraulic matrix by non-renewable sources, such as thermoelectric.

In this sense, solar energy is one of the hypotheses that can – and should – be considered by the government and citizens for the production of electricity. That is,

[19] See *Bandeiras Tarifárias - ANEEL* available at https://www.aneel.gov.br /bandeiras-tarifarias (last visited 30 January 2022).

[20] See IBGE, *Pesquisa de orçamentos familiares 2017-2018: primeiros resultados* (Rio de Janeiro: Coordenação de Trabalho e Rendimento, 2019) available at https://biblioteca.ibge.gov.br/visualizacao/livros/liv101670.pdf (last visited 16 June 2021).

when the use of thermoelectric power plants reaches the most vulnerable population in the country, since it makes the electricity bill more expensive.

Therefore, solar energy production is part of the solution to be adopted as the objective to make the country's electric matrix 100% clean and renewable. Then, solar energy is an example of a renewable source, and should be used as a means to transform electricity's sector, because it is a cheap source that contributes to the decarbonization of energy generation.

Nevertheless, the 2030 Agenda has as global goal n. 7 – accessible and clean energy – foreseeing to expand universal access to renewable energies in the global energy matrix.

The use of solar energy as a national energy source is an objective that must be expanded by the public authorities. Thus, with solar energy development produced through photovoltaic panels the growth of prosumers, and of a model based on decentralized generation which is interconnected with new digital technologies, with distributed generation,[21] for example, is inevitable.

In Brazil, after the National Electric Energy Agency's (ANEEL)[22] Resolution n. 482/2012, Brazilians' consumers are allowed to generate their own electricity through renewable sources or qualified cogeneration, and may even supply the surplus to the distribution network in their locality. It is, according to ANEEL, the micro and mini distributed generation of electric energy,[23] innovations that claim to increase financial savings, socio-environmental awareness and self-sustainability.

In the country, it is ANEEL's competence to regulate the policies and guidelines of the Brazilian federal government for the use and exploitation of electric energy services, including captive and free consumers, independent producers and self-producers, as well as being responsible for generation, transmission, distribution and commercialization of electric energy in the national territory. ANEEL established, furthermore, that shared generation enables several interested parties in a consortium or cooperative, to install a micro or mini distributed generation and use this generated energy to reduce their bills.[24]

However, for citizens to diversify their energy matrix, leaving the dependence on the use of hydroelectric plants for the production of solar energy, for example, it is necessary that the legal framework for solar energy be voted and approved, guaranteeing more freedom, choice, economy, and sustainability for consumers. As mentioned, distributed generation is regulated only by a normative resolution from ANEEL, offering less legal certainty than a federal law regulating the sector would offer.

[21] In Brazil, distributed energy generation is the technical term given to electrical energy generated at or near the place of consumption, which is valid, above all, for cases of renewable energy sources, such as solar energy.

[22] See Resolução n. 482/2012 available at http://www2.aneel.gov.br/cedoc /ren2012482.pdf (last visited 16 June 2021).

[23] See *Geração Distribuída - ANEEL* available at https://www.aneel.gov.br /geracao-distribuida (last visited 16 June 2021).

[24] See *Regulação do Setor Elétrico - ANEEL* available at https://www.aneel.gov.br /regulacao-do-setor-eletrico (last visited 16 June 2021).

From 2012, the federal government offered some subsidies to consumers who chose to install and use solar energy, such as exemption from some charges, to encourage the use of the renewable electric model; since the cost of Brazilian electricity is made up of two factors: (i) tariff referring to the value of electricity and (ii) system infrastructure charges. At the moment, it is discussed whether the 'benefits' that were given to solar energy producers should be reduced, or even eliminated.

Currently, the solar energy producer does not pay to use the distribution grid or the electricity tariff charges. It is the controversial point of dispute between solar energy producers and the federal government.

At this moment, argue the bill n. 5.829/2019 authored by Federal Deputy Silas Câmara and with a report by Federal Deputy Lafayette de Andrada which establishes the legal framework for solar energy.[25]

The legal framework for solar energy is important for the use of this renewable source in Brazil to be regulated, as it would bring legal certainty to consumers and companies that wish to diversify the energy matrix, making use of solar energy.

Anyhow, due to the lack of consensus among federal deputies in the Brazilian Congress, the bill has not yet been voted on and concluded. The themes that generate debate among the congressmen are, basically, that the great monopolies and electric energy entities, blatantly, are in a campaign to stop or even impede the growth of the use of their own generation of electric energy by consumers in the country. This, however, no longer seems to be possible since the need for renewable sources of electricity is a global trend.

Therefore, it is not possible to state which path will be followed by Brazilian legislators in relation to the issue of solar energy and its legal regulation; however, in summary, it is necessary to understand that the Brazilian Congress debates an issue that will undoubtedly influence the future of the national energy matrix. Until then, resolution n. 482 of ANEEL and its provisions for distributed energy generation in the country.

However, there is no way for the country not to invest and encourage the use of renewable energy sources. In this sense, the project 'Energy Systems of the Future: Integrating Variable Sources of Renewable Energy in the Energy Matrix of Brazil', by the Ministry of Mines and Energy (MME) of the Brazilian government, Energy Research Company (EPE) and National System Operator (ONS), in partnership with the Federal Ministry of Economic Cooperation and Development (BMZ) of Germany and the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), within the scope of the Brazil/Germany Cooperation for Sustainable Development, concluded that the inclusion of larger amounts of solar and wind energy in the Brazilian

[25] See Bill n. 5.829/2019 available at https://www.camara.leg.br/proposicoesWeb/fichadetramitacao?idProposicao=2228151 (last visited 16 June 2021).

electricity matrix.[26] As seen, then, the production and generation of solar energy is an alternative to integrate and diversify the Brazilian energy matrix.

Despite the need to diversify the energy matrix, the approval of a legal framework will be essential so that legal security is established in the Brazilian environment. In this way, current and future producers of solar energy will have the freedom, choice, economy and sustainability to understand how the Brazilian energy model of the solar matrix is based.

This inevitably opens another important debate for the Brazilian government, with a focus on energy poverty and social inequality, which is affecting the country and impacting the budget of families with the increase in the cost of the electricity bill, however, they are unable to improve their solar power generation systems due to financial vulnerability.

4 Conclusion

Brazil is a country heavily dependent on the hydraulic matrix which represents 65,2% of its total energy matrix. However, the country has faced challenges as the need to make use of thermoelectric plants to act as aid for energy production is increasingly recurrent.

The problem is that, in the case of the hydraulic matrix, periods of drought affect the level of water reservoirs, putting the energy production model at risk. In this sense, the federal government is haunted by the possibility that the country will once again experience an 'electric blackout'.

Consequently, national policies were developed so that thermoelectric plants were used in periods of drought. However, in a global context in which sustainable development is no longer an alternative, but the rule, there is no way to continue investing in an energy matrix that is not clean and renewable – as are thermoelectric plants.

It is imperative that the country evolve its economic model, based on a model that includes low-carbon production that is resource efficient and socially inclusive. Thus, the energy matrix which is a fundamental point of the national economy must necessarily be accessible, clean and from renewable sources. Therefore, solar energy is an excellent example of a renewable source that can – and should – be used to diversify the national energy matrix. At the moment, the country is facing a major legislative debate on the subject, showing that it is aware of the challenges that are arising and expanding the objective of diversifying the energy matrix as foreseen in global goal n. 7 of 2030 Agenda.

[26] See *Sistemas de Energia do Futuro - Ministério de Minas e Energia* 2021 available at http://antigo.mme.gov.br/web/guest/secretarias/planejamento-e-desenvolvimento-energetico/acoes-e-programas/programas/sistemas-de-energia-do-futuro (last visited 16 June 2021).