

PUBLIC POLICIES FOR UNIVERSAL ACCESS TO ENERGY: THE CASE OF THE “RENDA DO SOL” PROGRAM, CEARÁ, BRAZIL

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ABSTRACT: This study aims to highlight the recent pursuit of a transition to a diversified and sustainable energy matrix within the universal access to electricity policy adopted in the state of Ceará, through the “Renda do Sol” Program. The methodology includes a documentary review of academic and governmental sources, as well as consultations of legislation related to the policies of universalizing the production, access, distribution, and use of electricity. The results revealed ongoing challenges in implementing a sustainable and inclusive energy matrix. The “Renda do Sol” program aligns with five of the 17 Sustainable Development Goals (SDGs), demonstrating a commitment to promoting sustainable and equitable development in a context of energy poverty in rural communities in Ceará.

KEYWORDS: Energy Poverty; Sustainable Development; Renewable Energy; Microgeneration; Public Policy.

1. INTRODUCTION

The strategic choice of growth through industrialization emerged as a central focus for economic development, made possible only by the increasing use of non-renewable energy sources. Thus, over the decades following the Second World War, material progress began to be measured by energy consumption, and energy became essential for economic and daily activities, establishing itself as a fundamental right to be guaranteed to all citizens. This has led to the pursuit of new techniques to be used in the transition of the energy matrix (BRASIL, 2008; CAVALCANTE, 2013).

However, the quest for this energy diversification faces technological, social, political, and economic challenges, and its progress has been gradual and modest, requiring the global energy sector, including Brazil's, to undergo technical, economic, and geopolitical transformations in favor of social and environmental development (LAMURA, 2022; LEÃO et al., 2022). In addition to these important aspects, the energy transition process reveals regional inequalities that limit the process of regional and local economic development, leading to the generation of new injustices,

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including the intensification of poverty (BOUZAROVSKI; TIRADO HERRERO, 2017; LAMURA, 2022).

The concept of poverty has evolved to a multidimensional perspective, going beyond mere income deprivation to encompass elements related to limitations in capabilities, adaptation to adverse conditions, and deprivation of basic human needs (CAETANO; CASTRO, 2021; OLIVEIRA; NANDY; VEDOVATO, 2023). Amartya Sen, one of the

leading scholars on development, has significantly contributed to connecting underdevelopment to the deprivation of basic human capabilities, such as health, education, sanitation, and nutrition, arguing that true development involves expanding people's real freedoms (SEN, 2000; HOLANDA, 2006). Thus, poverty is now understood as a complex and multifaceted condition characterized by deprivation of basic capabilities and a lack of conditions to meet essential needs. This leads to the analysis of poverty in multiple dimensions, such as energy poverty (DO AMARAL; CAMPOS; LIMA, 2015). In the late 20th and early 21st centuries, the concept of energy poverty — characterized by its complexity, dynamism, and lack of a unanimous definition in the literature — gained visibility and began to be used to describe the situation in which people were unable to pay for basic energy services (MAZZONE et al., 2021; BOUZAROVSKI; PETROVA, 2015; DA SILVA; BELLINI; PAVANELLI, 2023). This theoretical ambiguity of energy poverty complicates the measurement of indicators to assess the level of poverty in certain locations or regions and, consequently, the development of public policies aimed at mitigating it (POVEDA; LOSEKANN; DA SILVA, 2021).

Therefore, it can be said that poverty in Brazil manifests itself in the inequality of access to the electricity grid and energy sources for cooking, due to the inability to pay for basic services and energy costs (POVEDA; LOSEKANN; DA SILVA, 2021). Access to electricity is crucial for achieving development in all its facets (regional, local, and rural), as it is part of the process of building citizenship and ending social exclusion, in line with the Sustainable Development Goals (SDGs) (CAVALCANTE, 2013; BEZERRA; BIAGUE, 2017).

In Brazil and Ceará, in particular, the dimension of poverty manifests itself in the inequality of access to the electricity grid and energy sources for cooking, resulting from the inability to afford basic energy services (POVEDA; LOSEKANN; DA SILVA, 2021).

Access to electricity is fundamental for development in its various dimensions — regional, local, and rural — as it integrates the process of building citizenship and combating social exclusion. At the same time, it contributes to achieving the Sustainable Development Goals (SDGs), such as eradicating poverty and hunger (SDG 1) and improving individual and collective well-being (CAVALCANTE, 2013; BEZERRA; BIAGUE, 2017).

In light of this conceptual framework, the sunlight of the Brazilian semi-arid region — historically known as an adversary, bringing drought and difficulties for various rural communities and regional development — is increasingly recognized for its potential to boost sustainable development through the generation of clean and renewable energy.

The state of Ceará, known as the “Land of Light” — for historical and geographical reasons

— due to its location with high solar radiation incidence throughout the year, is a strategic point for implementing solar energy generation and consumption projects. Taking advantage of this natural characteristic, the state has developed public policies focused on energy sustainability in the early 2020s, such as the “Renda do Sol” Program, which promotes microgeneration of solar energy in rural communities, aiming to contribute to reducing energy poverty, mitigating climate injustice, and promoting social inclusion for a more sustainable future (SCOTTI; PEREIRA, 2022; CEARÁ, 2023).

Thus, this manuscript aims to highlight the recent pursuit of a transition to a diversified and sustainable energy matrix within the universal access to electricity policy adopted in the state of Ceará, through the “Renda do Sol” Program. For this purpose, the legal concepts and objectives of the “Renda do Sol” Program are presented, which can promote balanced and inclusive development in accordance with the Sustainable Development Goals (SDGs).

2. A LOOK AT THE “RENDA DO SOL” PROGRAM

Distributed energy generation, especially from renewable sources, has been widely recognized as an essential element for achieving sustainability and energy inclusion goals. In Brazil, legislation related to distributed generation, notably Law No. 14,300/2022 (BRASIL, 2022) and ANEEL resolutions (2024), establishes a legal framework that supports the implementation of projects promoting energy autonomy and sustainable development (BAPTISTA; SILVA; FONSECA, 2023).

The recognition of distributed energy generation as an economic activity accessible to individuals highlights its transformative social potential. By enabling rural and low-income communities to produce their own energy, access to clean and renewable energy is expanded, fostering the creation of a more resilient energy system that is less dependent on large centralized infrastructures. This decentralized approach is particularly beneficial in remote or less developed regions where access to the traditional electricity grid may be limited or nonexistent.

In this context, Decree No. 35,498, published on June 15, 2023 (CEARÁ, 2023), formalized the State of Ceará’s commitment to the creation and implementation of the “Renda do Sol” Program. Since the first government decree, the State has demonstrated its commitment to reducing poverty and promoting sustainable development by generating income through solar energy. The formalization was necessary to demonstrate the seriousness of the commitment to international financial organizations.

The program’s priority beneficiaries include low-income families registered in the Unified Registry for Social Programs, as well as participants in social and economic development programs at the federal, state, or municipal level, as well as rural settlements, indigenous communities, and areas prone to desertification.

To implement the program, an intersectoral group was formed to draft the corresponding bill. The program’s guidelines aim to ensure an additional source of income for the low-income rural population, raise the standard of living, and combat poverty, with a focus on health, education,

culture, well-being, and the environment.

Additionally, the program seeks to stimulate private investment in photovoltaic systems, establish Ceará as a national leader in clean energy, support productive projects of associations or cooperatives, facilitate access to financing for consumer-generators in the program, and encourage the participation of the private sector and civil society. The necessary resources to fund the program will come from municipal, state, and federal public funds, the private sector, and operations with financial institutions.

The decree also provided for the implementation of two pilot projects in selected communities by April 2024, aiming to generate local income through solar energy. The outcome of the intersectoral group's work was the drafting of the project that later became Complementary Law No. 314, dated September 7, 2023, which established the "Renda do Sol" Program as a permanent public policy. The program focuses on promoting the use of solar energy as a means of generating income (CEARÁ, 2023b).

The program sets up a series of structures and measures to facilitate the micro and mini-distributed generation of solar energy, directing benefits primarily to low-income populations in both urban and rural areas. The approach not only seeks to increase the adoption of renewable energies but also aims to reduce poverty and promote sustainable social and economic development.

Key aspects include the establishment of electricity credits for consumer-generators, the creation of funds and incentive and financing programs for energy efficiency and the installation of photovoltaic plants, the encouragement of private sector and civil society participation in the program's implementation, and the inclusion of various funding sources, including public, private, and cooperative, to support the necessary infrastructure development and the construction of photovoltaic plants.

The "Renda do Sol" Program defines strategic objectives aimed at integrating socioeconomic development with environmental sustainability through the use of solar energy. First, the program aims to ensure that low-income communities, both urban and rural, benefit from the micro and mini-distributed generation of solar energy, providing not only access to energy but also promoting energy inclusion.

Additionally, the program seeks to raise the standard of living for less privileged populations, significantly contributing to the fight against poverty. This objective encompasses the improvement of fundamental aspects such as health, education, culture, well-being, and community engagement, always with a perspective of sustainability and environmental protection. It is important to highlight that the promotion of infrastructure investments for the installation of photovoltaic systems, with a special focus on rural areas susceptible to desertification, aligns economic development with environmental conservation.

The program also stands out for promoting the consolidation of the state of Ceará as a national reference in distributed solar energy generation. This goal is achieved through support for the entire chain of products and services related to photovoltaic energy, thereby expanding

income generation and fostering sustainable economic development. Moreover, Complementary Law No. 314 emphasizes the importance of establishing partnerships between the public sector and civil society (CEARÁ, 2023), broadening the reach and effectiveness of the program in reducing energy poverty and promoting more inclusive and sustainable development. The “Renda do Sol” project is a significant example of how the state can encourage the transition to a greener economy while addressing critical social issues, promoting economic inclusion, and reducing social inequalities through access to renewable energy technologies.

In its Article 6, Complementary Law No. 314 describes the investment funds and financial mechanisms intended for the implementation of the “Renda do Sol” Program (CEARÁ, 2023b), detailing a variety of financing sources and support aimed at promoting energy efficiency and economic and social development through renewable energy. Later, Article 12 defines the criteria for selecting the beneficiaries of the “Renda do Sol” Program, focusing on vulnerable groups to maximize the program’s social and economic impact (CEARÁ, 2023b).

The priorities include low-income families registered in the Federal Government’s Single Registry for Social Programs, both in urban and rural areas, and families already benefiting from government socioeconomic development programs. Priority is also given to vulnerable groups, such as residents of rural settlements, indigenous communities, quilombolas, and other traditional communities, as well as families in areas prone to desertification. Special emphasis is placed on female-headed households, recognizing the specific challenges faced by these family units.

In political discussions at all levels—federal, state, and municipal—a recurring theme in the search for a new energy matrix based on renewable sources is solar energy. It is known that sunlight has enough energy potential to meet society’s consumption, provided it is captured and converted into electricity through photovoltaic (PV) cells and concentrated solar power (CSP). This reveals its potential to meet a significant portion of global energy demand (LAMARCA JÚNIOR, 2012).

According to Lamarca Júnior (2012), from the perspective of economic, social, and environmental sustainability, the use of solar energy and other renewable sources offers possibilities for developing a clean energy sector, in addition to promoting capital expansion, creating new jobs, and distributing income—fundamental aspects for poverty reduction and social inclusion.

It is in this context, and based on the understanding of the sustainable and social dimension, and the need for a permanent policy to continue the extinct “Luz para Todos,” that in 2023 and early 2024, the government of the state of Ceará adopted a new public policy strategy to mitigate rural and energy poverty in Ceará’s municipalities, calling it the “Renda do Sol” Program, which will be made viable through income generation by distributed solar energy microgeneration (CEARÁ, 2023).

The program, coordinated by the State of Ceará’s Department of Infrastructure (SEINFRA), is composed of projects and actions structured into five groups that follow a sustainable development model aligned with the state’s vocations (CEARÁ, 2020; CEARÁ, 2024). These groups focus on planning and management, infrastructure and microgeneration, human capital qualification, financing, and legislation.

Thus, the central idea of the “Renda do Sol” Program is to allow low-income families in the state, especially those living in the hinterlands, to produce and sell energy from sunlight, primarily to the state of Ceará and municipalities (CEARÁ, 2024). This reinforces the importance of solar energy in a scenario where vulnerable populations— indigenous people, quilombolas, extractivists, and family farmers—will be able to generate energy with a lower environmental impact, both for their consumption and for sale (LAMARCA JÚNIOR, 2012).

According to preliminary studies, for the “Renda do Sol” Program to be effective, it will be necessary to train 100,000 young people in schools to work with renewable energies. Furthermore, access to financing must be facilitated so that families can install their own solar power plants (CEARÁ, 2024).

The Ceará “Renda do Sol” Program aligns with discussions in the literature, which point out the lack of investment in human capital, especially in the education of rural farmers, as one of the main causes of poverty that hinders rural and local development (SCHULTZ, 1973; SOUZA; GROSSI, 2004).

Thus, by training and qualifying the youth of the communities, the program expands the capacity to develop the necessary skills to use the information and adapt to the risks and uncertainties that this new scenario may bring (SCHULTZ, 1973), maximizing the new opportunities that will arise in the communities.

3. “RENDA DO SOL”: SOLAR ENERGY FOR SUSTAINABLE DEVELOPMENT

Given this theoretical framework, the “Renda do Sol” Program stands out as a robust initiative focused on sustainable energy transition, with direct and measurable impacts on the Sustainable Development Goals (SDGs). Among these, five can be mentioned: SDG 1 (No Poverty), SDG 7 (Affordable and Clean Energy), SDG 10 (Reduced Inequalities), SDG 11 (Sustainable Cities and Communities), and SDG 16 (Peace, Justice, and Strong Institutions).

Table 1 highlights the main aspects of the “Renda do Sol” Program and its relationship with the SDGs. Regarding SDG 1, which aims to eradicate poverty, the program tends to promote income generation through the microgeneration of solar energy, directly benefiting low-income families. Additionally, it seeks to improve energy security by offering credit and financial assistance, encouraging entrepreneurship and economic inclusion, especially in rural areas, which contributes to the economic advancement of vulnerable populations and poverty reduction.

Table 1 – Ceará: Sustainable Development Goals within the “Renda do Sol” Program

SDG	Aspects
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No Poverty (SDG 1)	<ul style="list-style-type: none"> - Income generation through distributed solar energy microgeneration; - Poverty reduction; - Credit for local entrepreneurship; - Economic inclusion.
Affordable and Clean Energy (SDG 7)	<p>Ensure access to low-impact solar energy for rural and urban communities in Ceará;</p> <p>Clean and modern energy for consumption and sale.</p>
Reduced Inequalities (SDG 10)	<p>Mitigate inequalities in municipalities (vulnerable communities such as indigenous, quilombola, and traditional peoples) within Ceará's planning regions;</p> <p>Balanced and environmentally sustainable development.</p>
Sustainable Cities and Communities (SDG 11)	<p>Favorable environment for sustainable productive and economic activities.</p>
Peace, Justice, and Strong Institutions (SDG 16)	<p>Creation of an Intersectoral Governance Committee and a Project Management Unit;</p> <p>Efficient governance and transparency.</p>

Source: Authors' elaboration (2024).

The second SDG is number 7, which aims to ensure universal access to affordable, reliable, sustainable, and modern energy. Thus, the “Renda do Sol” program seeks to ensure that low-income communities, both urban and rural, have access to distributed solar energy microgeneration and minigeneration. This aligns with the goal of providing accessible and modern energy for all. Meanwhile, SDG 10, which aims to reduce inequality within and between municipalities in Ceará, focuses on vulnerable communities such as rural settlements and areas prone to desertification. This approach promotes more balanced and inclusive development, aligning with the goal of reducing inequalities.

The fourth SDG is number 11, sustainable cities and communities, which aims to foster the creation of a favorable environment for the development of more sustainable productive and economic activities. Additionally, the program encourages educational actions with an environmental focus. Finally, SDG 16, which aims to promote peace, justice, and strong institutions, makes it clear that the “Renda do Sol” project establishes an Intersectoral Governance Committee and a Project Management Unit to oversee and implement the planned actions. This institutional arrangement fosters efficient governance and transparency, which are essential for the effectiveness of institutions.

Thus, by establishing the program as a permanent public policy, it exemplifies a significant advance in regulatory innovation. This legal framework not only promotes sustainability but also

ensures social inclusion, aligning with the principle of socio- environmental justice. The project also encourages active participation from civil society and the private sector, as it aims to promote cooperation among different social actors, contributing to the construction of a more just and peaceful society.

By studying the “Renda do Sol” program of the state of Ceará and understanding it as a permanent public policy program, there is a significant advance in regulatory innovation, promoting sustainability and ensuring social inclusion, even aligning with the principle of socio-environmental justice. “Renda do Sol” therefore encourages the participation of civil society and the private sector, promoting cooperation among different social actors and contributing to a more just, peaceful, and sustainable society with reduced regional inequalities. Additionally, the program moves towards a cleaner energy transition with greater social justice and environmental sustainability.

FINAL CONSIDERATIONS

The objective of this manuscript was achieved by demonstrating the efforts of the state government of Ceará to promote a cleaner and more sustainable energy transition through the “Renda do Sol” program. This program, especially focused on rural communities, aims to broaden access to electricity in a more universalized way and empower communities through the generation and sale of solar energy, which promotes social inclusion and sustainable economic development.

A significant result of the legal framework and the goals of the “Renda do Sol” program is its intrinsic connection with five of the 17 Sustainable Development Goals (SDGs). The program aims to foster active participation from society, the private sector, and the state, encouraging cooperation among various local actors to promote a more sustainable, just, and equitable society.

However, it should be noted that the success of the program will depend on the integration of public policies, investments in education and infrastructure, and a continuous commitment to social and environmental justice. For the next steps, new studies should focus on monitoring and evaluating this policy, especially observing the impacts on the lives of the population that will be initially served by the program.

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