Regulatory Impacts on Innovative Energy Models: A Case Study on Subscription-Based Solar Energy Solutions in Brazil

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Abstract

The Solar Energy Subscription model has emerged as an attractive solution for expanding access to renewable energy in Brazil, aligning with the country's goals of decarbonizing its energy matrix. Law No. 14,300/2022, regulated by Normative Resolution No. 1,059/2023, introduced notable advances for distributed microgeneration and minigeneration. However, it also presented challenges for certain business models due to the progressive implementation of B-Line tariffs. This study investigates the impact of this legislation on the financial viability of Shared Generation projects, using data from 36 electricity distribution utilities across the country. The results indicate that incremental B-Line tariffs have altered the national attractiveness scenario, particularly to the disadvantage of states with more extensive and less developed distribution networks, such as those in the North and Northeast regions. On average, Solar Energy Subscription projects experienced a 34% reduction in revenue. However, in regions with higher compensable tariffs, the model remains financially viable, as demonstrated by the competitive prices offered by certain distributors. The analysis highlights the relationship between B-Line tariffs and the total TUSD value as a key factor affecting compensable tariffs, ultimately reducing profitability and attractiveness. This situation restricts investment in renewable energy and limits access for consumers who are unable to install their own systems, either due to physical or financial constraints.

Keywords: Regulation, Renewables, Viability, Decentralization, Innovation, Brazilian Electricity Sector.

1. Introduction

In recent decades, escalating concerns regarding climate change and the imperative to curtail greenhouse gas emissions have propelled a global transition towards cleaner, more resilient, and sustainable energy sources (Wu et al., 2018). Governments, international organizations, and the private sector have mobilized efforts to promote renewable energy sources such as solar, wind, and biomass, acknowledging their environmental benefits as well as their contributions to energy security, employment creation, and regional development (Xu et al., 2019). Within this framework, public policies and regulatory structures are regarded as essential instruments for fostering innovative and decentralized energy models (Ogunrinde et al., 2018).

In Brazil, a nation endowed with substantial potential for renewable energy generation, particularly in the solar and wind domains, debates on the energy transition have garnered increasing attention in recent years. Specific regulations concerning distributed generation and other innovative electricity production modalities have been enacted to democratize access to sustainable energy and to encourage active consumer participation in the national electrical grid (da Silva and Rato, 2024). Nevertheless, recent amendments to the regulatory framework have raised concerns regarding their impact on the financial viability of renewable energy systems, especially for smaller consumers and those situated in regions distant from primary consumption centers (de Oliveira Pinto Coelho et al., 2021).

The enactment of Law No. 14,300/2022, regulated by Brazilian Electricity Regulatory Agency (ANEEL) Normative Resolution No. 1,059/2023, establishes Brazil’s Legal Framework for Distributed Generation (DG) (DOU, 2022). While this legislation offers enhanced legal certainty and officially recognizes modalities such as shared and remote generation, it also introduces new financial challenges for investors. Among these, the gradual implementation of the B-Line component, a distribution system charge that diminishes the portion of the tariff eligible for energy compensation, stands out as particularly significant. This regulatory modification directly influences the financial performance of solar subscription projects, especially those operating within the Shared Generation modality.

Given the rapid expansion of distributed photovoltaic generation and the strategic importance of subscription-based

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models in expanding access to renewable energy, the present study examines the economic repercussions of Law No. 14,300/2022 and its subsequent regulation (REN No. 1,059/2023) on the feasibility of solar subscription projects within Brazil. Official tariff data from 36 electricity distribution companies are analyzed under two regulatory scenarios: the pre-legislation period, characterized by full tariff compensation, and the post-legislation period, reflecting the gradual application of B-Line charges. The analysis aims to elucidate how these regulatory changes reconfigure the geographical attractiveness of projects and to quantify their implications on subscription pricing and potential investor returns.

2. Methodology

The methodology employed in this study involves the acquisition and scrutiny of data from the Approval Resolutions of 36 electricity distribution concessionaires in Brazil. Initially, a comparative analysis will be conducted between two distinct tariff scenarios, aiming to evaluate the impact of the new regulation on the financial strategies of distributed generation projects, particularly within the framework of subscription-based solar energy solutions. In the initial scenario, corresponding to the period antecedent to the enactment of Law 14, 300/2022, the compensable tariff was entirely applicable, indicating that no charges were associated with the pertinent segment known as B-Line. This absence of charges allowed for a broader margin of compensation for the energy generated. The subsequent scenario, reflecting the implementation of Law 14, 300/2022, and Normative Resolution 1,059/2023, introduced a progressive surcharge on B-Line, which consequently directly influences the structure of the compensable tariff.

In accordance with Law No. 14,300/2022, micro and mini-distributed generation systems connected from January 7, 2023, onward are subject to the transition regime of the Electric Energy Compensation System (SCEE), wherein certain tariff components are no longer fully compensated. Notably, the component known as B-Line warrants special attention, as it corresponds to the portion of the TUSD (Distribution System Usage Tariff) allocated to remunerate the distribution activities of the local concessionaire. This segment is not eligible for compensation for energy injected into the grid; consequently, when calculating the effective tariff of energy credits, it is essential to exclude the B-Line value from the TUSD.

2.1. The Solar Energy Subscription Model

The Solar Energy Subscription model is established in Brazil as a shared-generation configuration whereby consumers are billed for energy generated by an off-site photovoltaic (PV) system. The corresponding energy credits are offset against their monthly electricity consumption via the national net metering mechanism regulated by ANEEL. This model facilitates access to renewable energy without necessitating individual installations, thereby broadening participation among consumers constrained by physical or financial limitations. Under this structure, subscribers enter into agreements with project developers responsible for the installation, operation, and maintenance of the PV plant. The subscription fee is determined based on the allocated energy share, local tariff, and applicable compensation rules.

2.2. Data Collection

The methodological approach of this study is structured to quantitatively assess the economic impacts of Law No. 14,300/2022 and ANEEL Normative Resolution No. 1,059/2023 on the financial viability of Solar Energy Subscription projects under the Shared Generation modality. The analysis is based exclusively on official regulatory data from Brazil's electricity sector. Primary data are acquired from Homologatory Resolutions issued by ANEEL for 36 electricity distribution companies functioning nationwide. These resolutions supply the official tariff components employed in the calculation of TUSD and the Energy Tariff (TE). The 36 distribution concessionaires analyzed in this study are listed in Table 1, organized by the state in which their concession areas are located, along with the homologatory resolution that specifies the tariff applied by each distributor.

Table 1: List of Brazilian States and Their Corresponding Electricity Distribution Utilities.

#	State	Electricity Distribution Utilities	ANEEL Homologatory Resolution Number
1	Acre	Energisa Acre	ANEEL Homologatory Resolution No. 3300/2023
2	Alagoas	Equatorial AL	ANEEL Homologatory Resolution No. 3326/2024

3	Amapá	CEA	ANEEL Homologatory Resolution No. 3313/2024
4	Amazonas	AME	ANEEL Homologatory Resolution No. 3333/2024
5	Bahia	Neoenergia Coelba	ANEEL Homologatory Resolution No. 3320/2024
6	Ceará	Enel CE	ANEEL Homologatory Resolution No. 3319/2024
7	Espírito Santo	EDP Espirito Santo	ANEEL Homologatory Resolution No. 3370/2024
8	Goiás	Enel GO	ANEEL Homologatory Resolution No. 3279/2023
9	Maranhão	Equatorial MA	ANEEL Homologatory Resolution No. 3376/2024
10	Minas Gerais	CEMIG	ANEEL Homologatory Resolution No. 3202/2023
11	Mato Grosso	Energisa MT	ANEEL Homologatory Resolution No. 3315/2024
12	Mato Grosso do Sul	Energisa MS	ANEEL Homologatory Resolution No. 3316/2024
13	Pará	Equatorial PA	ANEEL Homologatory Resolution No. 3371/2024
14	Paraíba	Energisa PB	ANEEL Homologatory Resolution No. 3378/2024
15	Pernambuco	Neoenergia Pernambuco	ANEEL Homologatory Resolution No. 3325/2024
16	Piauí	Equatorial PI	ANEEL Homologatory Resolution No. 3292/2023
17	Paraná	COPEL	ANEEL Homologatory Resolution No. 3336/2024
18	Rio de Janeiro	Light, Enel RJ	ANEEL Homologatory Resolution No. 3310/2024 – Light ANEEL Homologatory Resolution No. 3312/2024 – Enel RJ
19	Rio Grande do Norte	Neoenergia COSERN	ANEEL Homologatory Resolution No. 3317/2024
20	Rondônia	Energisa RO	ANEEL Homologatory Resolution No. 3301/2023
21	Roraima	Roraima Energia	ANEEL Homologatory Resolution No. 3309/2024
22	Rio Grande do Sul	CEEE, RGE, RGE SUL	ANEEL Homologatory Resolution No. 3283/2023 – CEEE Equatorial ANEEL Homologatory Resolution No. 3372/2024 – RGE ANEEL Homologatory Resolution No. 3372/2024 – RGE Sul
23	Santa Catarina	CELESC	ANEEL Homologatory Resolution No. 3244/2023
24	São Paulo	ENERGISA Sul-Sudeste, ELEKTRO, CPFL PAULISTA, EDP SP, CPFL PIRATININGA, ENEL SP	ANEEL Homologatory Resolution No. 3341/2024 – Energisa Sul-Sudeste ANEEL Homologatory Resolution No. 3253/2023 – Elektro ANEEL Homologatory Resolution No. 3314/2024 – CPFL Paulista ANEEL Homologatory Resolution No. 3277/2023 – CPFL Piratininga ANEEL Homologatory Resolution No. 3278/2023 – EDP SP ANEEL Homologatory Resolution No. 3339/2024 – Enel SP
25	Sergipe	Energisa SE,	ANEEL Homologatory Resolution No. 3318/2024
26	Tocantins	Energisa TO	ANEEL Homologatory Resolution No. 3340/2024

To standardize comparisons across utilities, residential consumers classified under Group B (low-voltage supply) are considered, as this category is regarded as representative of the typical customer profile for solar subscription programs. For each distribution utility, key variables are identified and recorded, including the compensable and non-compensable components of TUSD and TE, the B-Line values corresponding to distribution system remuneration, depreciation, and operation and maintenance costs, the regional average tariffs applicable for the year 2024, and the tax rates for ICMS (18%) and PIS/COFINS (5%), which are standardized to eliminate state-level variations. ICMS refers to the Tax on the Circulation of Goods and Services (*Imposto sobre Circulação de Mercadorias e Serviços*), a state-level value-added tax applied to the sale and movement of goods, communication, and electricity in Brazil. PIS/COFINS correspond to two federal social contribution taxes, the Social Integration Program (*Programa de Integração Social*) and the Contribution for Social Security Financing (*Contribuição para o Financiamento da Seguridade Social*), levied on companies' gross revenues to fund social security and welfare programs.

The collection of the B-Line tariff component is implemented gradually over the years, following a progressive schedule established by current regulations. In 2023, a percentage of 15% is applied to the corresponding value, increasing to 30% in 2024 and 45% in 2025. In subsequent years, the collection continues to increase, reaching 60%

in 2026, 75% in 2027 and, finally, 90% in 2028. This results in a phased transition that allows for the progressive adaptation of consumers and distributors to the new tariff model.

2.3. Methodological Assumptions

Several assumptions are established to ensure methodological consistency and to isolate the effects of regulatory changes. The exchange rate applied is R$5.22 per USD, as specified by the EPE (2024). In both scenarios, a fixed discount of 10% is established as the basis for the compensable portion of the energy tariff applied to the end consumer. This discount is employed to determine the value of the Solar Energy Subscription Fee, which represents the revenue generated by the projects. Electricity demand is assumed to remain constant for each representative consumer, defined as 1,000 kWh per month for a three-phase connection, with seasonal variations excluded. The minimum energy consumption (kWh) billed by the energy distributor is considered to be 100 kWh per month. Uniform taxation is adopted, disregarding state-level exemptions from ICMS on distributed-generation credits, in order to maintain comparability across regions. Regional variations in solar irradiance are not modeled, as the analysis focuses exclusively on the tariff and compensation structures rather than technical generation performance. Finally, full utilization of generated energy credits within each billing cycle is assumed, ensuring maximum compensation under both regulatory scenarios.

2.4. Pricing Model for Subscription Energy

A financial model has been developed to facilitate the comparison between two regulatory frameworks. The initial framework corresponds to the pre-Law No. 14,300 scenario, wherein full compensation for all tariff components is implemented through a 1:1 credit offset mechanism. Conversely, the second framework represents the post-Law No. 14,300 scenario, characterized by the gradual inclusion of B-Line charges in the non-compensable segment, in accordance with the transition schedule established by ANEEL (15% in 2023, 30% in 2024, 45% in 2025, 60% in 2026, 75% in 2027, and 90% in 2028).

The calculation of the electricity tariff paid by residential consumers is determined according to eq. 1. This equation considers the sum of the portions related to TE and TUSD, in addition to incorporating applicable taxes such as ICMS, PIS, and COFINS. These taxes are adjusted to the final tariff value, reflecting the impact of tax charges on the total cost of energy consumed.

$$T = \frac{TUSD}{(1-ICMS)*(1-PIS.COFINS)} + \frac{TE}{(1-ICMS)*(1-PIS.COFINS)} \qquad \text{(eq. 1)}$$

Where,

T = Total tariff (final consumer price)

TUSD = Tariff for the Use of the Distribution System

TE = Energy Tariff

ICMS = ICMS tax (State Value-Added Tax on goods and services)

PIS = PIS contribution (Federal social contribution)

COFINS = COFINS contribution (Federal social contribution)

The energy tariff for consumers participating in subscription-based solar schemes is calculated in accordance with eq. 2, where the B-Line component is subtracted from the TUSD to account for the partial exemption from distribution system charges.

$$T = \frac{TUSD \quad - \quad B-Line}{(1-ICMS)*(1-PIS.COFINS)} + \frac{TE}{(1-ICMS)*(1-PIS.COFINS)} \qquad \text{(eq. 2)}$$

Where, $B\text{-}Line$ is the portion of the TUSD allocated to remunerate the distribution activity of the local concessionaire.

The Final Cost of Energy (CE) for consumers under each scenario is calculated using eq. 3 and eq. 4.

$$EC = C_{min} * R + C_{Subs} * R_{Subs} + C_{Subs} * T \qquad \text{(eq. 3)}$$

$$R_{Subs} = R * (1 - D) - T \quad \text{(eq. 4)}$$

Where,

EC = Final Cost of Energy.

C_{min}= Minimum energy consumption (kWh) billed by the distribution utility.

C_{Subs}= Energy consumption (kWh) compensated through the subscription-based model.

R = Energy rate charged by the distribution utility.

R_{Subs}= Energy rate applied under the subscription-based model.

T = Total tariff (final consumer price).

D = Discount rate (10%) applied to the energy tariff.

The resulting subscription price (R_{Subs}) is recalculated to maintain the consumer's nominal discount of 10%, while accommodating the regulatory increase. This adjustment quantifies the revenue loss incurred by the energy provider due to the implementation of B-Line.

3. Results and Discussion

The results obtained for the period from 2022 to 2028 are presented based on the calculation of the subscription energy tariff in each Brazilian state, considering data from distribution concessionaires and the progressive application of the B-Line according to the percentages defined by Law No. 14,300/2022. For each distributor, the values of compensable and non-compensable energy are estimated in both reference years, allowing for a comparison of tariff variation over the period. The resulting tariffs are expressed in dollar per megawatt-hour (USD/MWh) and organized by federative unit, highlighting significant regional differences in tariff composition and the magnitude of the reduction in the value of subscription energy.

The progression of the B-Line component from 2022 to 2028 is delineated in Table 2. The data for 2024, representing 30% of the total B-Line charge, serve as a reference point for projecting the corresponding values for 2022 and 2028, utilizing 0% and 90% percentages, respectively. This projection facilitates the analysis of the temporal effect associated with the gradual integration of the B-Line into the non-compensable segment of the tariff. It is noted that states with higher average B-Line values in 2024, such as Pará, Tocantins, and Acre, are inclined to exhibit greater potential impacts on the diminution of the reimbursable tariff segment by 2028, when the charge reaches full implementation.

Table 2: Evolution of B-Line component charges by state (USD/MWh).

State	B-Line (2022)	B-Line (2024)	B-Line (2028)
	USD/MWh	USD/MWh	USD/MWh
Acre	0.00	67.62	202.86
Alagoas	0.00	57.09	171.27
Amazonas	0.00	33.14	99.42
Amapá	0.00	53.83	161.49
Bahia	0.00	61.69	185.07
Ceará	0.00	51.92	155.76
Distrito Federal	0.00	22.80	68.40
Espírito Santo	0.00	36.02	108.06
Goiás	0.00	50.00	150.00
Maranhão	0.00	51.15	153.45
Minas Gerais	0.00	47.51	142.53
Mato Grosso do Sul	0.00	60.54	181.62
Mato Grosso	0.00	57.66	172.98
Pará	0.00	73.95	221.85

Paraíba	0.00	40.61	121.83
Pernambuco	0.00	43.10	129.30
Paraná	0.00	29.31	87.93
Rio de Janeiro	0.00	51.34	154.02
Rio Grande do Norte	0.00	47.32	141.96
Rondônia	0.00	55.56	166.68
Roraima	0.00	36.02	108.06
Rio Grande do Sul	0.00	40.42	121.26
Santa Catarina	0.00	22.61	67.83
Sergipe	0.00	55.17	165.51
São Paulo	0.00	36.02	108.06
Tocantins	0.00	73.95	221.85

The average subscription energy tariffs for 2022 and 2028, along with their respective percentage variations, are delineated in Table 3. The data are systematically organized by state and distribution utility, representing the aggregated mean values calculated for each concession area. The comparison underscores the progressive diminution in the recoverable energy value attributable to the inclusion of the B-Line charge within the non-compensable segment of the tariff. Notable regional disparities are evident, with reductions ranging approximately from 20% to 45%, contingent upon the network characteristics and cost structures. These findings furnish the empirical foundation for subsequent analyses of economic impacts across Brazil's distribution regions.

Table 3: Average Subscription Energy Tariff by State and Utility, 2022–2028.

State	**Distribution utility**	**2022**	**2028**	**Percentage Variation in Subscription Energy Tariff**
		USD/MWh	**USD/MWh**	**%**
Acre	ELETROACRE	138.31	77.39	-44%
Alagoas	EQUATORIAL AL	144.06	92.72	-36%
Amazonas	AME	143.10	113.22	-21%
Amapá	CEA	120.50	72.03	-40%
Bahia	NEOENERGIA COELBA	136.97	81.42	-41%
Ceará	ENEL CE	120.50	73.95	-39%
Espírito Santo	EDP ESPIRITO SANTO	114.37	81.80	-28%
Goiás	ENEL GO	118.58	73.75	-38%
Maranhão	EQUATORIAL MA	120.11	73.95	-38%
Minas Gerais	CEMIG	133.52	90.80	-32%
Mato Grosso do Sul	ENERGISA MS	145.21	90.80	-37%
Mato Grosso	ENERGISA MT	141.57	89.66	-37%
Pará	EQUATORIAL PA	156.13	89.46	-43%
Paraíba	ENERGISA PB	100.57	63.98	-36%
Pernambuco	NEOENERGIA PERNAMBUCO	124.33	85.44	-31%
Piauí	EQUATORIAL PI	142.53	84.10	-41%
Paraná	COPEL	105.17	78.74	-25%
Rio de Janeiro	LIGHT	140.61	106.51	-24%
Rio de Janeiro	ENEL RJ	152.49	93.68	-39%
Rio Grande do Norte	NEOENERGIA COSERN	124.33	81.80	-34%

Rondônia	CERON	118.39	68.58	-42%
Roraima	RORAIMA ENERGIA	96.93	64.56	-33%
Rio Grande do Sul	CEEE	107.47	79.12	-26%
Rio Grande do Sul	RGE	120.31	84.29	-30%
Rio Grande do Sul	RGE SUL	120.11	75.29	-37%
Santa Catarina	CELESC	95.59	75.29	-21%
Sergipe	ENERGISA SE	111.11	68.01	-39%
Sergipe	SULGIPE	144.06	92.72	-36%
São Paulo	ENERGISA Sul	104.02	77.39	-26%
São Paulo	ELEKTRO	125.86	91.38	-27%
São Paulo	CPFL PAULISTA	117.24	84.87	-28%
São Paulo	EDP SP	116.48	84.29	-28%
São Paulo	CPFL PIRATININGA	113.03	80.84	-28%
São Paulo	CPFL SANTA CRUZ	111.88	78.54	-30%
São Paulo	ENEL SP	106.32	70.88	-33%
Tocantins	ENERGISA TO	137.36	70.88	-48%
Distrito Federal	CEB	127.97	107.28	-16%

The gradual implementation of Law No. 14,300/2022 and its regulation through ANEEL Normative Resolution No. 1,059/2023 has resulted in discernible and regionally diverse effects on the economic viability of Solar Energy Subscription projects in Brazil. Prior to the enactment of the new regulatory framework, all tariff components were fully remunerable under the Electric Energy Compensation System (SCEE). Generators were able to offset each kilowatt-hour injected into the grid against consumption at a 1:1 ratio, ensuring predictable revenue streams and consistent discounts for consumers. However, subsequent to the enactment of the law, the gradual inclusion of the B-Line charge into the non-compensable segment of the tariff modifies this balance. As remuneration for distribution services is progressively excluded from the compensation mechanism, rising from 15% in 2023 to 90% by 2028, the proportion of the tariff eligible for compensation diminishes. As a result, operators are compelled to absorb an increasing share of the costs to sustain consumer discounts, thereby directly constricting project revenue and profitability.

The national average decrease in subscription energy tariffs from 2022 to 2028 is 34%, which confirms that the gradual integration of B-Line substantially diminishes the revenue potential of subscription generation systems. Nonetheless, the extent of this impact varies considerably across concession areas owing to structural and geographical considerations. The North and Northeast regions are the most impacted. Distributors such as Energisa Tocantins, Equatorial Pará, and Energisa Sergipe exhibit the most significant reductions in revenue, nearing 50%. This trend primarily arises due to the elevated values of B-Line, which constitute approximately 65% or more of the Distribution System Usage Tariff. These states possess expansive and less efficient networks, characterized by low consumer density and increased operational and maintenance costs. Consequently, the B-Line component, directly indicative of the cost associated with distribution infrastructure, becomes disproportionately burdensome in these regions. In contrast, the Southeast and South regions demonstrate comparatively smaller revenue reductions, ranging from 20% to 30%. Concessionaires such as Celesc, Cemig, and CPFL Paulista operate on denser and better-maintained networks, with B-Line proportions between 30% and 50%. This efficiency alleviates the financial impact of the new regulatory charges, thereby enabling projects to remain economically viable even under diminished compensation rates. This heterogeneity emphasizes a key finding: the financial feasibility of distributed solar generation in Brazil is now considerably linked to network efficiency and geographic context, rather than solely to energy tariff levels.

The geographic distribution of results indicates a clear reconfiguration of investment attractiveness for shared-generation projects. Prior to Law 14,300, feasibility was primarily contingent upon the TE; regions with higher TE offered greater return potential. Post-reform, however, network-related costs (B-Line) have become the predominant determinant of financial performance. This development implies that areas with elevated infrastructure costs, particularly in the North and Northeast, are now less appealing to investors, despite being regions with the greatest potential social benefits from renewable energy expansion. Meanwhile, states in the South and Southeast,

characterized by lower operational costs and more efficient grids, continue to be favorable for new investments, potentially resulting in a geographic concentration of projects.

The decrease in the compensable portion of the tariff significantly narrows the revenue base for Solar Subscription operators. To maintain the consumer discount, typically around 10%, companies are compelled to reduce their sale price per kilowatt-hour, thereby diminishing their profit margins. For instance, in concession regions such as LIGHT (Rio de Janeiro) and CPFL Paulista (São Paulo), this adjustment results in a gross revenue decline of approximately 6–8% relative to pre-legislation conditions. In concession regions with higher B-Line shares, such as Energisa TO and Equatorial PA, the revenue reduction is considerably more substantial, rendering the business model less sustainable without implementing price revisions or operational restructuring. These observations underscore that while the new regulatory framework enhances legal security for distributed generation, it also engenders uneven economic impacts contingent upon the structural characteristics of each distribution network.

The results demonstrate that the gradual implementation of the B-Line charge has unequal regional consequences. From a policy standpoint, this finding raises concerns regarding the equity of access to benefits derived from distributed generation, especially in the less-developed regions of Brazil. To prevent the exacerbation of these disparities, regulatory authorities might consider establishing compensatory mechanisms or regional differentiation in the application of distribution charges. Such measures would support the continued expansion of distributed-generation projects in areas with higher B-Line values, thereby aligning regulation with Brazil's broader objectives of energy democratization and decentralized clean-energy development.

4. Conclusions

The economic impacts of Law No. 14,300/2022 and ANEEL Normative Resolution No. 1,059/2023 on the Solar Energy Subscription model in Brazil are quantitatively evaluated. Utilizing data from 36 electricity distribution entities, the analysis illustrates that the gradual integration of the B-Line charge into the non-compensable segment of the tariff considerably diminishes the financial viability of shared-generation initiatives. Results indicate an average 34% decline in subscription tariffs between 2022 and 2028, with wide regional disparities. In the Northern and Northeastern regions, where networks are more extensive and less efficient, the B-Line share exceeds 65% of the distribution tariff, leading to reductions above 40%. In contrast, Southern and Southeastern regions, characterized by denser and more efficient grids, show smaller decreases of 20–30%, maintaining higher investment attractiveness. The implementation of Law No. 14,300/2022 demonstrates an uneven economic impact across the nation, disproportionately affecting regions characterized by weaker infrastructure and elevated operational costs. As a result, this reform alters the spatial distribution of project viability, focusing opportunities in areas with lower distribution expenses and enhanced network performance.

From a policy perspective, these findings highlight the significance of implementing adaptive regulatory instruments that balance cost recovery for utilities with the financial sustainability of distributed-generation projects. Regionalized compensation mechanisms, restrictions on B-Line applications, and targeted incentives for high-cost networks could help mitigate disparities and foster a more equitable energy transition. Although the law enhances legal certainty and investor confidence, its economic implications require continuous monitoring. The sustainability of the Solar Energy Subscription model depends on the capacity of regulators and market agents to adjust pricing structures and incentive mechanisms to the evolving tariff environment. Law No. 14,300/2022 signifies a significant regulatory milestone within Brazil's distributed-generation framework. Nonetheless, it imposes new economic constraints. The progressive B-Line charge emerges as a critical factor influencing project feasibility and regional equity. To facilitate widespread access to solar energy nationwide, policy adjustments will be necessary to harmonize efficiency, fairness, and investment stability in Brazil's ongoing renewable energy transition.

For future research, it is recommended to compare the economic feasibility of Subscription Solar Energy models with residential self-consumption photovoltaic systems across multiple regions. The analysis of consumer adoption behavior and willingness to participate in shared-generation schemes should encompass diverse socioeconomic profiles. Simulations of alternative regulatory scenarios, including limitations on B-Line application or the implementation of regionalized compensation factors, are suggested to evaluate project attractiveness under varying policy conditions. The interaction between emerging financing mechanisms, such as green bonds and carbon credit markets, and the viability of subscription solar projects should be examined to identify new investment opportunities. Sensitivity analyses of energy tariffs, grid costs, and operational efficiencies are advised to quantify their impact on project profitability. Finally, comparative studies with international subscription solar frameworks are encouraged to establish best practices and regulatory lessons applicable to the Brazilian context.

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