SUBNATIONAL CLIMATE FUND

Legal and Market Study of Solar Energy Commercial & Industrial Market in Brazil

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I. Regulatory Framework

i. Regulatory bodies in the Brazilian electricity sector

The regulatory bodies active in the Brazilian electricity sector will be mentioned throughout this study. The Figure below illustrates how they operate, summarizing their main roles and acronyms.

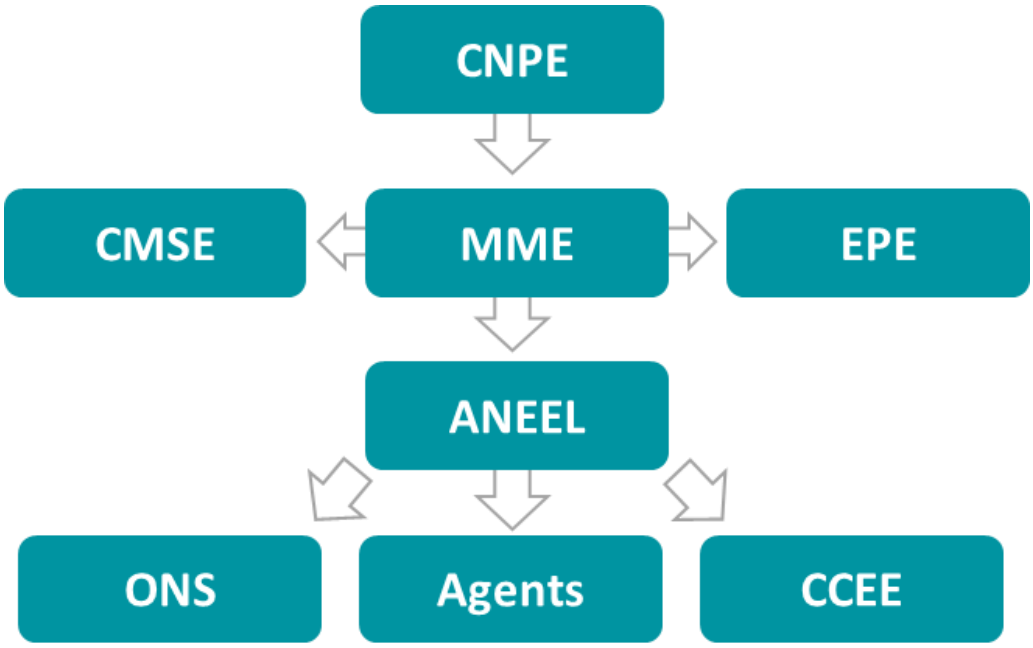

Figure 1: Regulatory bodies in the Brazilian power sector

CNPE – National Council for Energy Policy
It approves energy policy in conjunction with other public policies to ensure energy supply stability.

MME – Ministry of Mines and Energy
It formulates and implements policies for the energy sector, according to the guidelines of CNPE.

CMSE – Power Monitoring Committee
It monitors the service conditions and gives recommendations for preventive measures to ensure the security of energy supply.

EPE – Energy Research Company
It provides services in the form of studies and research to support the sector's expansion plan.

ANEEL – Brazilian Electricity Regulatory Agency

It oversees the regulation and supervision of the generation, transmission, distribution and sale of electricity in the country, ensuring quality of services, universal service and regulating consumer power tariffs[1]. ANEEL plays a very important role in the DG segment in Brazil.

ONS – Operator of the National Electricity System
It is responsible for the coordination and control of generation and transmission in the interconnected system (National Grid - SIN).

CCEE – Electricity Commercialization Chamber (Clearinghouse)
It's responsible for the determination of spot prices, accounting of electricity amounts sold, financial settlement of all market contracts, conducting auctions to buy and sell energy on the regulated market, as delegated by ANEEL, and managing the contracts signed in the regulated market auctions.

Agents
Power generation companies, transmission companies, distribution companies and consumers.

ii. Power contracting environments in Brazil

According to the CCEE, 65.5% of Brazil's power is negotiated in the regulated market (ACR), where power is traded via government-organized auctions and contracts are for long term supply to "captive" consumers (power distribution companies – equivalent to the US utility, but active in power distribution) at fixed (inflation indexed) prices. The remaining 34.5% of the power is negotiated in the free market (ACL), where power producers and consumers negotiate contracts and prices through bilateral power purchase agreements (PPAs)[2]. Both the ACR and ACL are regulated by the ANEEL, and all contracts in both markets are registered monthly at the CCEE.

In the regulated auctions, the clients of the energy generation companies are the power distribution companies. In the free market, the clients are the power distribution companies, other energy generators, power trading companies and final consumers.

[1] The management of the tariffs is done by ANEEL, whose purpose is to guarantee the quality and continuity of service to consumers and to maintain the economic-financial balance of the concessions. Since 1998, its first year of operation, it has applied the procedures for periodic review and annual adjustment to the electricity tariffs of the country's distributors, according to the performance and characteristics of each area of operation.
[2] CCEE's website. Available at: https://www.ccee.org.br/pt/web/guest/-/mercado-livre-de-energia-bate-recorde-de-migracao-de-unidades-consumidoras-em-2021

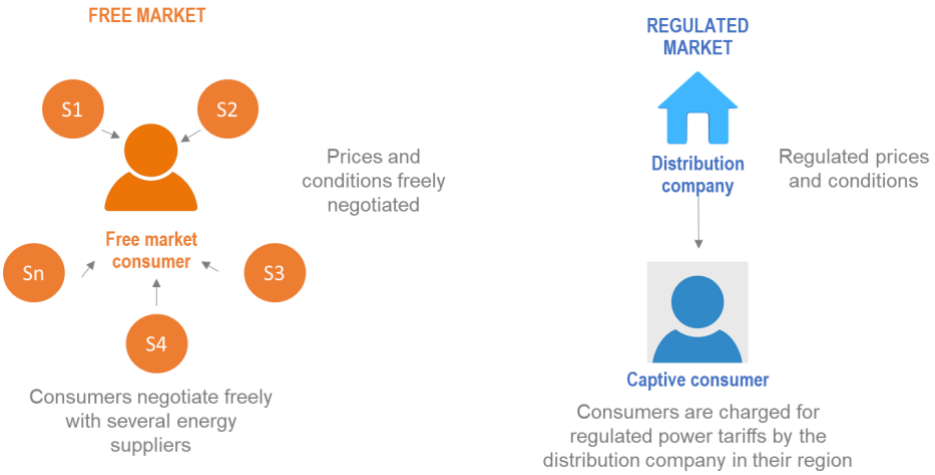

Figure 2: The free and regulated power markets

According to ABRACEEL, the Brazilian Energy Commercialization Association, since 2003, the free market enabled an average 29% savings in energy prices in comparison with the regulated market[3].

Just as an example: prices in the regulated solar and wind auction in 2021 were R$140/MWh (starting price, indexed yearly by inflation, for 20 years – contract between the generator and the distribution company, which will then include a margin, subsides and distribution and transmission costs and sell this energy to its clients at a higher price). At the same time, free market PPA prices for solar projects were being negotiated for approximately R$160/MWh[4] (for 15 to 20 years) between generators and final consumers directly (no intermediation by the utility), or between generators and trading companies or trading arms of utilities, which then sell to final consumers. C&I clients large enough to be able to migrate to the free market may be free consumers (as explained in the "Free market consumers" section below), and smaller clients are limited to the regulated market.

Both regulated and free market PPAs (utility-scale or "free market distributed generation") in the free market are take or pay type of contracts. Net-metering distributed generation PPAs are structured as either fixed lease prices adjusted for inflation for example, or lease + O&M + performance contracts.

The regulated market

In Brazil most utility-scale projects are still contracted through electricity auctions, and by end 2021 some 18.5 GW of wind projects and 5.3 GWac of solar PV projects have been contracted in these auctions since 2004 for wind and 2014 for solar – solar was only included in the auctions in 2014.

There have been 25 auctions (including PROINFA, Brazil's feed-in-tariff program in 2004) in which wind projects have won contracts and 10 auctions in which solar PV projects have been awarded PPAs.

The auctions are promoted by ANEEL and executed by CCEE, contracts are signed between energy generators and power distribution companies, and CCEE acts as a clearing house where all contracts are registered.

[3] ABRACEEL, free energy market guidelines. Available at: https://abraceel.com.br/wp-content/uploads/2019/05/ABRACEEL_process_230519.pdf

[4] CELA annually conducts a benchmark study with sellers of renewable energy that have PPAs signed in the free market. This figure is from our latest report published in March 2022, where we interviewed investors with 91 PPAs signed in the free market.

	Wind		Solar	
Auction	**MW**	**Price R$/MWh**	**MW**	**Price R$/MWh**
PROINFA 2004	1,298.6	190		
LER 2009	1,820.2	257		
LER 2010	548.2	206		
LFA 2010	1,293.4	225		
LER 2011	592.8	157		
A-3 2011	1,026.3	157		
A-5 2011	822.1	162		
LER 2013	1,108.6	155		
A-3 2013	763.7	172		
A-5 2013	1,415.3	163		
A-3 2014	471.1	172		
LER 2014	740.6	186	890	215
A-5 2014	927.2	177		
LFA 2015	90	219	834	302
A-3 2015	518.2	218		
LER 2015	551.3	239	929	297
A-4 2017	69.3	115	574	146
A-6 2017	1,452.6	105		
A-4 2018	114.4	71	807	118
A-6 2018	1,136.3	94		
A-4 2019	95.2	89	203.7	67
A-6 2019	1,040	99	530	84
A-3 2021	251.7	136	169.3	123
A-4 2021	167.8	151	100	136.3
A-5 2021	161.3	160	236.4	167
A-4 2022	183	179	166	178

Table 1: Wind and Solar PV auction results; prices are of the day of the auction; solar results only on auctions where it was allowed to participate; A-3 is for delivery 3 years after the auction; A-4 for delivery 4 years after the auction; A-5 is for delivery 5 years after the auction; LER is reserve auctions (for balancing supply and demand); LFA are alternative energy auctions. Source: CCEE.

Every year, distribution companies estimate their regulated clients' demand for the upcoming years, and regulated auctions are organized to supply this demand. When an auction takes place, the amount of energy that will be contracted is not disclosed, so there is more competition among the generators. The auctions are reverse auctions, whereby the Ministry of Mines and Energy's EPE publishes the ceiling price and generators bid down to get awarded these PPAs.

Prices are in R$ per MWh, which will then be adjusted for inflation (IPCA index) every year. Contracts for PV and wind projects are for 20 years and are backed by the CCEE (clearing house). Here is the link to a 2019 renewable energy PPA in the regulated market for wind (36 pages)[5], which includes all the commercial terms, etc. And here

[5] ANEEL webisite. Available at; https://www2.aneel.gov.br/aplicacoes/editais_geracao/documentos/ANEXO_2_CCEAR_A-6_2019_EOL.pdf

is the link to the call to the same auction (51 pages)[6], which explains how it works, how to register, the bind bonds and guarantees, etc.

Each regulated auction has its own set of rules and contract obligations, although in general those rules tend to change very little for auctions of the same type. The most common auction for solar PV and wind projects currently is the new energy auctions. Below are the key commercial terms of the new energy auction A-6 of 2019, that took place in October 2019.

Key commercial terms of 2019 A-6 auction:

- **Contract tenor:** 20 years
- **Energy delivery distribution through the year:** the project is responsible to deliver energy according to the energy need of the buyer during the year (*sazonalização*)
- **Energy delivery distribution through the day:** the project will deliver the energy according to its own generation profile though the hours of each day (*modulação*)
- **Sale of energy in the free market:** the project can sell energy in the free market in the amount of its *Garantia Física* that is not dedicated to the auction PPA
- **Financial exposition:** the project is responsible for positive and negative financial exposition in the spot market caused by the variation of energy generation
- **PPA price:** the price is indicated in R$/MWh and is updated annually by inflation index (IPCA)
- **Payment:** payment for each month of energy is made in 3 installments with 3 different payment dates, 2 in the following month and 1 in the second following month of generation
- **Termination:** if either the buyer or the seller gives cause for the termination of the contract it will have to pay a fine equivalent to 30% of the value of the energy contracted until the end of the contract, limited to 3 years of the contracted amount

Guarantees of 2019 A-6 auction:

In order to be able to participate in the energy auctions, projects must provide certain guarantees, such as:

- **Bid bond:** 1% of the project indicated CAPEX (if the project does not have the *Outorga* – an authorization to build the power plant) or R$ 2.000 for every 0.1MWavg (if the project already has the *Outorga*). The bid bond can be provided by cash collateral, letter of credit, guarantee insurance or government bonds, and it must be presented to CCEE.
- **Performance bond:** 5% of the project indicated CAPEX. The Performance bond can be provided by cash collateral, letter of credit, guarantee insurance or government bonds, and it must be presented to CCEE. The Performance bond will be released once the project reaches its commercial operational date.

Financial guarantees for energy commercialization in general – <u>relevant for both the regulated and the free market</u>:

In addition to the auctions requested guarantees, CCEE also requires a financial guarantee from projects based on declared generation deviations. This guarantee applies for projects with PPAs in the free market as well.

The amount of the guarantee is based on an average deviation of the past month of generation (which is sold in the regulated or free market) and it is valued based on the current spot market price. If the generation is lower

[6] ANEEL webisite. Available at; https://www2.aneel.gov.br/aplicacoes/editais_geracao/documentos/EDITAL_Leil%C3%A3o_A-6-de-2019-ingl%C3%AAs.pdf

than expected, the project must deposit the amount in a CCEE account as guarantee for the payment of unproduced energy.

Free market consumers: "free" and "special" consumers

As explained earlier in this report, C&I clients can be either regulated (buy energy from the distribution companies in the regulated market) or free (buy energy from energy generators or trading companies).

Free consumers must have a minimum of 500 kW (or 0.5 MW) contracted demand to be able to contract energy from any energy source. Its characterization has been first defined by Decree Law 5.163 / 2004[7], and has been updated by Portaria 465 / 2019[8].

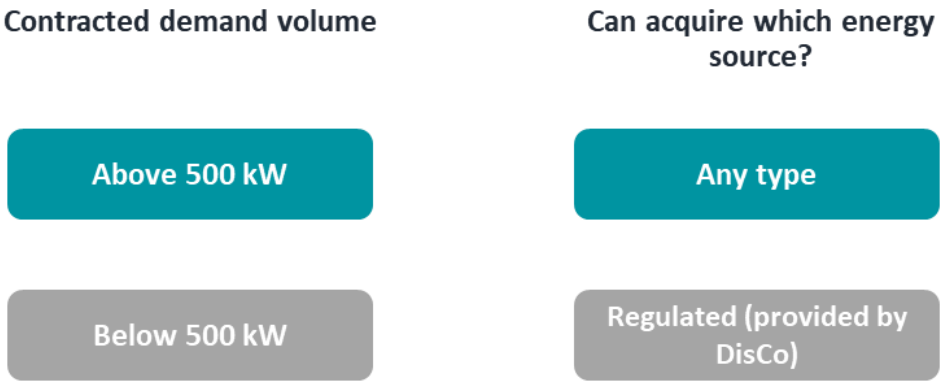

Figure 3: Free market consumers and energy sources

The industrial segment represents 35.7% of the country's total power consumption (regulated + free market) with 169,625 GWh in 2018, and the commercial segment represents 18.7% with 88,631 GWh in 2018[9].

	2014	2015	2016	2017	2018	Δ% (2018/2017)	Part. % (2018)	
Brasil	**474.823**	**465.708**	**461.780**	**467.161**	**474.820**	**1,6**	**100**	**Brazil**
Residencial	132.302	131.190	132.872	134.368	137.615	2,4	29,0	Residential
Industrial	179.106	169.289	165.314	167.398	169.625	1,3	35,7	Industrial
Comercial	89.840	90.768	87.873	88.292	88.631	0,4	18,7	Commercial
Rural	25.671	25.899	27.266	28.136	29.168	3,7	6,1	Rural
Poder público	15.355	15.196	15.096	15.052	15.076	0,2	3,2	Public sector
Iluminação pública	14.043	15.333	15.035	15.443	15.690	1,6	3,3	Public lighting
Serviço público	15.242	14.730	14.969	15.196	15.778	3,8	3,3	Public service
Consumo próprio	3.265	3.304	3.355	3.277	3.238	-1,2	0,7	Own use

Table 2: Power consumption by end-user sector (GWh). Source: EPE, 2019.

Of the total industrial segment consumption, 54% is located in the Southeast region, 19% is in the South region, 13% in the Northeast region, 8% in the North region and 5% in the Midwest region. In addition, approximately 80% of all energy consumed by industry in Brazil is acquired in the free market.

[7] Available at: http://www.planalto.gov.br/ccivil_03/_Ato2004-2006/2004/Decreto/D5163.htm
[8] Available at: https://www.in.gov.br/en/web/dou/-/portaria-n-465-de-12-de-dezembro-de-2019.-233554889
[9] EPE website. Available at: http://www.epe.gov.br/sites-pt/publicacoes-dados-abertos/publicacoes/PublicacoesArquivos/publicacao-160/topico-168/Anu%C3%A1rio_2019_WEB.pdf

Industrial consumption by region and state (GWh)

	2014	2015	2016	2017	2018	Δ% (2018/2017)	Part. % (2018)	
Brasil	**179.106**	**169.289**	**165.314**	**167.398**	**169.625**	**1,3**	**100**	**Brazil**
Norte	**14.830**	**14.886**	**15.041**	**15.204**	**13.209**	**-13,1**	**8**	**North**
Rondônia	553	450	414	424	450	6,3	3	Rondônia
Acre	37	39	40	38	35	-7,7	0	Acre
Amazonas	1.787	1.670	1.552	1.595	1.643	3,0	12	Amazonas
Roraima	20	23	26	24	25	5,0	0	Roraima
Pará	12.085	12.349	12.672	12.766	10.622	-16,8	80	Pará
Amapá	39	37	47	62	88	42,0	1	Amapá
Tocantins	309	317	290	296	345	16,6	3	Tocantins
Nordeste	**26.991**	**23.838**	**22.677**	**22.370**	**22.330**	**-0,2**	**13**	**Northeast**
Maranhão	3.501	1.593	1.115	1.151	1.297	12,7	6	Maranhão
Piauí	289	271	237	209	200	-4,3	1	Piauí
Ceará	2.456	2.407	2.698	2.383	2.321	-2,6	10	Ceará
Rio Grande do Norte	1.323	1.289	1.249	1.216	1.207	-0,7	5	Rio Grande do Norte
Paraíba	1.475	1.465	1.460	1.446	1.451	0,3	6	Paraíba
Alagoas	2.128	2.056	2.041	1.971	1.667	-15,4	7	Pernambuco
Pernambuco	3.539	3.801	3.848	3.733	3.657	-2,0	16	Alagoas
Sergipe	1.596	1.504	1.400	1.296	1.247	-3,7	6	Sergipe
Bahia	10.684	9.451	8.628	8.965	9.281	3,5	42	Bahia
Sudeste	**95.445**	**90.742**	**88.020**	**88.828**	**92.229**	**3,8**	**54**	**Southeast**
São Paulo	52.254	48.893	46.508	47.485	48.753	2,7	53	São Paulo
Minas Gerais	29.268	28.150	29.284	29.242	30.999	6,0	34	Minas Gerais
Espírito Santo	5.118	4.901	3.830	3.891	4.144	6,5	4	Espírito Santo
Rio de Janeiro	8.805	8.798	8.399	8.210	8.334	1,5	9	Rio de Janeiro
Sul	**32.569**	**31.222**	**30.910**	**32.258**	**32.785**	**1,6**	**19**	**South**
Paraná	12.108	11.868	11.953	12.402	12.725	2,6	39	Paraná
Santa Catarina	9.986	9.467	9.466	9.992	10.252	2,6	31	Santa Catarina
Rio Grande do Sul	10.475	9.887	9.491	9.865	9.808	-0,6	30	Rio Grande do Sul
Centro-Oeste	**9.271**	**8.602**	**8.666**	**8.737**	**9.072**	**3,8**	**5**	**Midwest**
Mato Grosso do Sul	1.236	1.155	1.083	1.144	1.252	9,4	14	Mato Grosso do Sul
Mato Grosso	2.222	2.048	1.912	1.998	2.087	4,5	23	Mato Grosso
Goiás	5.007	4.666	5.057	5.068	5.222	3,0	58	Goiás
Distrito Federal	805	733	613	527	512	-2,8	6	Distrito Federal

Table 3: Industrial consumption by region and state (GWh). Source: EPE 2019.

Free market prices

Free market prices vary significantly depending on the seller, on the buyer, on the project characteristics, project location, energy delivery type (generation curve, flat), etc.

Figure 4 represents the average trading price for conventional and incentivized energy based on week 17 of 2022, based on DCIDE's information[10].

[10] DCIDE`s website. Available at: https://dcide.com.br/

27-04-2022 / **Semana 17**

Índices Curva Forward	Índice R$/MWh	Variação Semanal	Variação Mensal	Variação Anual
Convencional Trimestre[1]	77,58	-0,56%	0,99%	-74,58%
Convencional Longo Prazo[2]	176,57	-1,14%	-3,62%	-1,04%
Incentivada 50% Trimestre[1]	122,22	-1,27%	-1,25%	-65,48%
Incentivada 50% Longo Prazo[2]	214,26	-0,97%	-3,08%	-0,93%
FCF da semana (SE ponderado)[3]	55,70	0,00%	0,00%	-63,97%

1 Reflete o preço de referência da energia, na respectiva fonte, de Maio/2022 a Julho/2022 (trimestre móvel)
2 Reflete o preço médio de referência de energia, na respectiva fonte, de 2023 a 2026 (longo prazo).
3 Preços semanais da função de custo futuro do modelo DECOMP.
Fonte: Pesquisa de preços Dcide 25-04-2022.

Figure 4: Prices of conventional and incentivized electricity on week 17 of 2022 - his involves a pool of prices from agents that are more active in CCEE (so actual PPAs) - price references are monitored weekly for up to 5 years forward.

In addition to the PPA prices, projects are also subject to spot market prices, which are called PLD (*Preço de Liquidação das Diferenças*) in Brazil. The PLD prices are calculated based on the supply and demand of power in each submarket and are impacted significantly by the amount of water in the reservoirs of hydro power plants.

On Figure 5, we can observe the PLD prices for each submarket, noticing that all submarkets are operating with a low price as a consequence of a high amount of water in the reservoir of hydro power plants.

SE/CO	S	NE	N
55,70	55,70	55,70	55,70

Figure 5: Spot prices per submarket, in R$/MWh

Energy sources: incentivized vs conventional

Incentivized energy (as defined below) can benefit from certain incentives, such as TUSD/TUST discounts (reduction between 50% and 100% in the tariff for the use of the distribution and transmission system which make up the cost of energy transportation), as will be more detailed in the "Current renewable energy incentives" section – see Figure 6 and Table 4. The discount percentage depends on the date of registration of the project with ANEEL and also on the type of the energy source, as detailed below. This is an incentive for the consumption of renewable energy in Brazil that is available for projects that obtained its *Outorga* or that were awarded in Regulated Auctions up to March 2022.

To be qualified as incentivized energy a project must:

- Come from renewable energy sources (solar, wind, biomass and small hydro) or from qualified cogeneration;
- Have certain size limits – see Figure 6 and Table 4;
- Have certain authorization (*Outorga*) or auction dates – see Figure 6 and Table 4.

Conventional energy does not benefit from these incentives on TUSD/TUST and are usually from non-renewable energy sources. They are usually from large hydroelectric plants as well as thermoelectric plants. Conventional energy does not have any additional benefits or capacity payment different from renewable sources.

As illustrated in the Figure below, for solar and wind projects that obtained its *Outorga* or that were awarded in Regulated Auctions up to March 2022:

- If from an auction prior to 2016 or with Outorga prior to 2016: up to 30 MW are considered incentivized (have discounts on TUSD/TUST);
- If from an auction prior to 2016 or with Outorga prior to 2016: between 30MW and 50MW are considered conventional (do not have discounts on TUSD/TUST);
- If from an auction prior to 2016 or with Outorga prior to 2016: larger than 50MW are considered conventional (do not have discounts on TUSD/TUST);
- If from an auction later than 2016 or with Outorga after 2016: up to 300MW are considered incentivized (have discounts on TUSD/TUST);
- If from an auction later than 2016 or with Outorga after 2016: larger than 300MW are considered conventional (do not have discounts on TUSD/TUST).

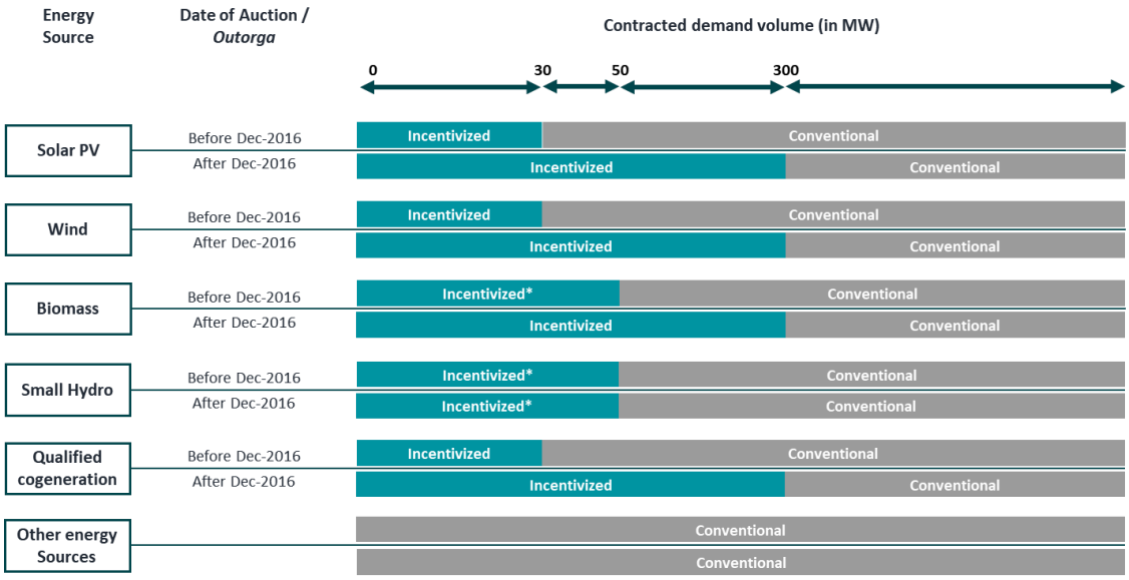

*Figure 6: Incentivized vs Conventional Energy for projects that obtained its Outorga or that were awarded in Regulated Auctions up to March 2022. *Discount is lower for projects with more than 30 MW of contracted demand.*

Free market energy suppliers

Energy can be sold to consumers in the free market by commercialization agents, importers, self-producers, generators and even by other free consumers, as long as they are registered as agents with the CCEE.

Energy can also be acquired/sold from/to commercialization agents that do not own generation plants – known as trading companies. These agents (trading companies) acquire energy from different energy suppliers, creating a portfolio of products to be offered to energy buyers.

To be able to operate, trading companies, which are regulated by ANEEL's Resolução Normativa nº. 678 / 2015, must have a social capital of at least R$ 1 million, and also prove their capacity to carry out their activities[11]. They may or may not own generation assets.

[11] ANEEL, REN 678/2015. Available at: http://www2.aneel.gov.br/cedoc/ren2015678.pdf

iii. Regulation and PPA characteristics for Independent Power Producers (PIE – Produtor Independente de Energia) and Self-Production (APE – Autoprodutor de Energia)

Renewable energy generators can sell energy to consumers, including those that are sized more than captive load (0.5 MW) and are looking to sell excess power. All generators and all sellers must be registered as agents in the CCEE to be able to buy and sell energy, in both the regulated and in the free market.

Since 1996 with the update of the regulatory framework of the energy sector in Brazil through Laws 2,003/1996 and 9,427/1996[12], Brazil has had the characterization of the energy self-producer (APE) and independent power producer (PIE), securing their access to the transmission and distribution grids. The main difference between the two figures is the destination of the generation: while the APE should use the energy mainly for self-consumption, the PIE targets energy commercialization to third parties.

There are 586 registered APE agents and 1,773 PIE agents registered in the country today[13]. Practically all the APE agents are the consumers themselves that generate their own energy, without the participation of a third-party power generation investor.

The origin of the regulation for energy commercialization for both PIE and APE is mainly the same from 1998, when Law 9,648/98[14] was sanctioned.

The regulation characterizes both forms of energy production as the following:

- PIE: Independent Power Producer, is a legal entity or companies in a consortium, that receives a concession or authorization from ANEEL to produce electricity, and to trade all or part of the energy produced, at their own risk.
- APE: Power Self-Producer, is an individual or legal entity or companies in a consortium, that receives a concession or authorization to produce electricity intended for their own exclusive use.

The National Interconnected System (SIN) works as a centralization of all energy agents such as consumers, traders, generators (PIE, APE and regulated), distributors and transmitters. All the free market contracts must be registered at CCEE, so the regulator might be able to assign to which agent the energy produced and consumed belongs.

In addition, all energy commercialization rules for both free and regulated markets are compiled by CCEE in a single document called “Commercialization Rules” and it has 27 sub-modules. The commercialization rules explain the relevant information that should be included in free market PPAs (the bilateral free market PPAs and the spot market liquidations), how free market PPAs are registered in CCEE, mechanisms for contract exposures and excess of energy, and many other terms[15].

[12] Law 9.427/1996. Available at: http://www.planalto.gov.br/ccivil_03/leis/L9427compilada.htm
[13] https://www.aneel.gov.br/cadastro-de-agentes/-/asset_publisher/9HySU9UbBbG2/content/cadastro-de-agentes?inheritRedirect=false&redirect=https%3A%2F%2Fwww.aneel.gov.br%2Fcadastro-de-agentes%3Fp_p_id%3D101_INSTANCE_9HySU9UbBbG2%26p_p_lifecycle%3D0%26p_p_state%3Dnormal%26p_p_mode%3Dview%26p_p_col_id%3Dcolumn-2%26p_p_col_count%3D2
[14] Law 9.648/98. Available at: http://www.planalto.gov.br/ccivil_03/leis/L9648cons.htm#art4
[15] CCEE. Available at: https://www.ccee.org.br/portal/faces/oquefazemos_menu_lateral/regras?_afrLoop=1169079954818941&_adf.ctrl-state=1afte5wfsa_1#!%40%40%3F_afrLoop%3D1169079954818941%26_adf.ctrl-state%3D1afte5wfsa_5

When a consumer is buying energy in the free market, it has several options to choose from: if it will buy conventional or incentivized energy sources, and if this will be from a PIE or if it will become an APE generator. All of these options will have different impacts on the cost of the energy for the consumer, as will be discussed in the following sections.

As mentioned before in this report, industrial consumers can buy energy in the regulated market (from power distribution companies) and in the free market (through bilateral PPAs), both for an established price and period. CCEE carries out the accounting of all contracts in the Brazilian market every month. At the end of each accounting period, CCEE finalizes the information on consumer demand measurements and compares this consumption with the PPAs signed in the Brazilian market (regulated and bilateral). This is when the spot or merchant market kicks in in Brazil. Consumers are not in the merchant market in Brazil for the long term. As of March 2020, 86% of industry's consumption is in the free market.

In the spot market, the excess or deficit energy will be valued by the spot price PLD. This price will determine how much the consumer will need to pay or receive. If the consumer is in deficit (consumes more than it has contracted) and it does not have any capacity contracted to cover this energy, it will incur in penalties.

A. Independent Power Producer (PIE) – *Produtor Independente de Energia*

A PIE must be registered at ANEEL and at CCEE as an independent power producer. It owns the power plant and has the right to sell its power to other agents through a contract (a PPA) that must be registered at the CCEE. The PIE is also responsible for the plant's construction and operation, as well as for securing all authorizations and for paying all costs and taxes involved in building and connecting a power plant.

When a consumer acquires energy directly from a PIE or from an energy trading company, it is subject to all general energy commercialization rules, independent of the energy source.

An exception of the general rule is applied when the source of energy is renewable, and if it is characterized as incentivized energy obtaining its *Outorga* before March 2022. In this case, the consumer will be able to benefit from a discount on TUSD (charged by the distribution company) from the energy it acquires. This discount is for the entire period of the project's *Outorga*, which is 35 years usually. Additionally, the power plant generating renewable energy source will receive a discount on the TUSDg or TUST paid to the distribution/transmission system in order to inject energy into the SIN[16].

B. Power Self-Producer (APE) – *Autoprodutor de Energia*

When a consumer acquires energy from an APE, the consumer will have to become the energy generator itself, and thus registering at ANEEL and CCEE as a generator. So, in the eyes of ANEEL and CCEE the consumer is both the generator and the consumer, being responsible for the plant's construction and operation, as well as for securing all authorizations, and for paying all costs and taxes involved in building and connecting a power plant. As a result, there will be no PPA involved, as the energy is generated and consumed by the same entity. This applies to onsite but also offsite projects from any source.

This type of consumer invests in the production of electricity, assuming several risks unknown to a simple consumer, with a specific purpose: to guarantee the competitiveness of the industrial activity through price risk hedge and energy supply guarantee.

[16] ANEEL`s resolution for TUST discount. Available at: http://www2.aneel.gov.br/aplicacoes/audiencia/arquivo/2016/038/resultado/ren2016745.pdf

In order for a power plant be characterized as APE, the consumer must have ownership over the power plant's legal entity, given that the amount of energy generated considered as self-production will be proportional to the consumer's ownership. Therefore, if the consumer owns 50% of the APE project, 50% of the power of the generation unit will owned by the consumer and 50% will benefit from APE incentives. If the consumer owns 10% of the APE, 10% of the power of the generation unit will benefit from APE incentives. The power plant does not need to be located next to the consumer, but additional charges (energy transportation charges such as TUSD) may apply if the project is located in a different location from the consumer.

The benefits for incentivized energy sources (discount on TUSD/TUST) also apply in cases of APE – please refer to Figure 6 and Table 4. In addition to those benefits, the consumer as an APE will also be exempt from the payment of sector charges such as CDE (Energy development account) and Proinfa (Renewable Energy Sources Incentive Program)[17]. But the most important benefit (for the client) of being an APE is its exemption on ICMS tax charges[18], as it can be taxed from 18% to 32%, depending on the state. All of these discounts and incentives make the APE option a very competitive option for the generator/consumer, as will be detailed in the next section.

It is important to mention that the ICMS tax exemption in APE is a common understanding in the sector, as there is no sale of energy from one party to other in this structure. However, the ICMS tax is a state tax and each state has a different view on how taxes should be charged. Regarding this topic, CELA is aware of cases where the state charged de ICMS tax for this type of project and the energy consumer had to contest this decision through legal proceedings.

APEs can also sell excess energy, according to REN 676/2015, to free consumers, to special consumers, to commercialization companies and to other generation agents. It can also be sold in the spot market (*Mercado de Curto Prazo* – MCP).

Some energy generation players, having understood the benefits of an APE structure, have been also developing APE projects in partnership with client consumers that wish to benefit from an APE project without having to invest and operate a power plant themselves, as it is not their main business. As a result, there is also a possibility of a structure where the APE is the consumer itself – the consumer registers as the APE (consumer as the generator and consumer) at ANEEL and CCEE (therefore taking on all the risks and penalties involved during the construction and operation of the project) but outsources the investment and operation to a third-party investor / operator.

This business model is structured in a way that the APE (consumer) leases the power plant equipment from the investor / operator through a lease contract and subcontracts its operation and maintenance services through an O&M contract, which must be submitted to ANEEL and CCEE. As a result, as no sale of energy is involved, no PPA is signed. The APE must also submit a form with energy allocation (*formulário de alocação de geração própria*).

This model is eligible for all the benefits (mainly reduced taxes and sector charges) of a pure APE structure, but presents some important risks for the consumer, as it "owns" the generation and is accountable to ANEEL and

[17] ANEEL. Available at: http://www2.aneel.gov.br/aplicacoes/audiencia/arquivo/2016/067/documento/nt_224_2016_srm_abertura_ap_regras_2017.pdf

[18] Available at: http://www.planalto.gov.br/ccivil_03/constituicao/constituicaocompilado.htm

CCEE regarding all responsibilities of an APE and its generation / activities. To minimize this risk, some investors offer to sign parallel contracts with the consumer (APE), taking responsibility for the APE's project and generation. However, this responsibility cannot be accepted by ANEEL and CCEE, where the consumer APE is registered. Other difficulties involve the fact that there can be no sale of energy, and therefore energy delivery is guaranteed by a lease contract (which could eventually be questioned by the regulator if it considers that this lease contract is "masking" a de facto PPA).

CELA recently conducted interviews with several of the main renewable energy generators and a couple of very important industrial consumers and has not found one case of an actual "APE-lease[19]" structure that is already in place and operational. Only "pure-APE" where there is no third-party generator involved. However, several of the interviewed companies are trying to structure projects in this way.

C. Independent Power Producer (PIE-SPV) "equated" to a Power Self-Producer – *Produtor Independente Equiparado a Autoprodutor*

There is yet another option, that is increasingly being studied by renewable energy players, a PIE-SPV. Some players call this structure an APE with a PPA, but regulatorily-speaking, it is a PIE that is equated to an APE. This structure allows for a PIE to be able to benefit from some of the incentives (reduced taxes and sector charges – namely CDE and Proinfa) of an APE but does not benefit from exemption of ICMS tax as an APE because it needs to have a PPA signed between the project and the energy consumer. This structure is also eligible for TUSD/TUSD discount if the project complies with the criteria for incentivized energy (as described in previous sections). However, this structure is contractually more straightforward for the client as there is an actual PPA in place.

Both investor and consumer come together in a SPV structure and are shareholders of the generation unit (the SPV). The SPV is the entity that is registered at ANEEL and CCEE and is therefore responsible for the generation unit. All energy is supplied to the consumer shareholder of the SPV, and its rules and conditions are structured in a free market PPA as well as a shareholders' agreement. All of the "self-production" PPAs signed in Brazil that CELA is aware of today are under this arrangement.

iv. Current renewable energy incentives

Renewable energy projects, including wind and solar PV projects in the free market, have the following incentives:

Federal and State Incentives

In order to incentivize renewable energy, the federal government and some state governments have implemented a set of incentives for wind and solar energy.

A. <u>Federal Tax Incentives that certain solar and wind projects can benefit from</u>

Law 9.427/96 – TUSD (power transmission charges) and TUST (power distribution charges) discounts[20]

[19] This does not mean it does not exist today, just that CELA has not yet identified one. The main difficulty in structuring this type of PPA is that there could be a risk for the renewable energy company. Under this structure, the generation plant is registered under the name of the consumer at all regulatory bodies (ANEEL, CCEE), but it is actually built and owned by the energy generation company, who leases it to the consumer.

[20] Available at: http://www.planalto.gov.br/ccivil_03/leis/L9427compilada.htm

RESOLUÇÃO NORMATIVA N° 77, DE 18 DE AGOSTO DE 2004[21]
Updated by RESOLUÇÃO NORMATIVA ° 745, DE DE 2016 [22]
Updated by Law No. 14,120/2021[23]

Solar and wind projects that obtained *Outorga* or were awarded at regulated auctions by March 2022 can benefit from TUSD and TUST discounts, depending on the project's injected energy capacity and the auction PPA date or *Outorga* date, as per the table below. New projects that obtain *Outorga* authorization after March 2022 no longer benefit from it:

Size (injected energy)	*Outorga* or Auction date	Type of energy	Energy source	Discount TUST/TUSD
Up to 30 MW	Up to 03/2022	Incentivized	Solar and Wind	50%
More than 30 MW	Before Dec-2016	Conventional	Solar and Wind	No discount
Up to 300 MW	From 2017 up to 03/2022	Incentivized	Solar and Wind	50%
More than 300 MW	From 2017 up to 03/2022	Conventional	Solar and Wind	No discount
Any size	From 03/2022	Conventional	Solar and Wind	No discount

Table 4: Projects eligible for TUSD/TUST discounts; and energy characterization. CCEE, 2021 and CELA adaptation, 2022.

The table above also illustrates if the project can be characterized as incentivized or conventional (eligible or not for the TUST / TUSD discount). The discount is awarded to the energy generator on the tariffs that must be paid to the distribution or transmission company (TUSD or TUST), but this discount also applies to eligible energy consumers on their distribution costs (TUSD) based on kW. This is because both generators and consumers pay for TUSD.

Solar projects that started operations before 31 December 2017 have a reduction of 80% in the TUSD/TUST for the first 10 years of operation, then 50% for the remaining period of the *Outorga*. Wind, biomass and cogeneration projects with capacity smaller than 30MW and with COD between 23 April 2003 and 31 December 2003 have 100% discount in the TUSD/TUST.

Income Tax (IR) reduction and accelerated depreciation to less developed regions (SUDAM and SUDENE)[24]

Established in 2001, this federal tax incentive secures a 75% reduction on Income Tax (IR) for 10 years, so that the base tax to be paid will be 3.75% and the additional tax will be 2.5%, and 1-4 years of accelerated

[21] ANEEL`s webisite. Available at: http://www2.aneel.gov.br/cedoc/bren2004077.pdf
[22] ANEEL`s webisite. Available at: https://www2.aneel.gov.br/aplicacoes/audiencia/arquivo/2016/038/resultado/ren2016745.pdf
[23] Available at: https://www.in.gov.br/en/web/dou/-/lei-n-14.120-de-1-de-marco-de-2021-306116199
[24] SUDAM is the abbreviation for *Superintendência do Desenvolvimento da Amazônia* and it covers the amazon region represented by the following Brazil's states: Acre, Amapá, Amazonas, Mato Grosso, Pará, Rondônia, Roraima, Tocantins and Maranhão. SUDENE is the abbreviation for *Superintendência do Desenvolvimento do Nordeste* and includes the states: Alagoas, Bahia, Ceará, North of Espírito Santo, Maranhão, North of Minas Gerais, Paraíba, Pernambuco, Piauí. Rio Grande do Norte and Sergipe

depreciation (for IR calculation) for energy projects and companies located in the priority regions of SUDAM[25] and SUDENE[26]. The project or company needs to adopt the "Real Profit" tax regime to benefit from this incentive.

The SUDAM/SUDENE tax benefit has the same characteristics for all SUDAM/SUDENE states, and it also requires that projects use the values of avoided tax in a reserve account, which should only be used to refrain company losses or to make new investments.

Figure 7: States eligible for SUDAM and SUDENE benefits; for Minas and Espírito Santo states projects in the north of the states are eligible, not the entire state.[27]

In order to benefit from SUDAM/SUDENE tax benefits, the company must submit a claim to SUDAM/SUDENE attaching the documentation established according to the Instructions Manual[28] for preparing claims for Tax Incentives and Benefits. After the claim, there are 3 more steps to be able to use the benefits:

1. The claim will be analyzed by SUDAM/SUDENE and, if it meets the conditions provided for in the legislation and regulations in force, the Constitutive Report of the right to the tax benefit will be issued
2. In possession of the Constitutive Report, the company must submit a request to the SRF unit to which it is subject, instructed with the referred Report (original document) and with a specific form from the Federal Revenue Service, requesting the recognition of the benefit
3. If the Constitutive Report was issued in the same year in which the project entered into operation, then the fruition will start from the following year, otherwise, the fruition will start from the year of issuance of the Constitutive Report

Special Incentive Scheme for Infrastructure Development (REIDI)

[25] SUDAM decree. Available at: http://www.planalto.gov.br/ccivil_03/decreto/2002/D4212.htm
[26] SUDENE decree. Available at: https://www2.camara.leg.br/legin/fed/decret/2002/decreto-4213-26-abril-2002-456772-publicacaooriginal-1-pe.html
[27] Data of SUDENE municipalities. Available at: http://www.sudene.gov.br/area-de-atuacao/estados-e-municipios
[28] SUDENE guidelines and important documents. Available at: http://www.sudene.gov.br/incentivos-fiscais/reducao-de-75-do-irpj-para-novos-empreendimentos

REIDI is a federal-level incentive based on Law No. 11,488 / 07 (Articles 1 to 5), Decree No. 6,144 / 07, Normative Instruction of the Federal Revenue of Brazil No. 758/07, and MME Ordinance No. 274/13.

REIDI grants a suspension of the contribution for PIS taxes, for the Civil Servant Heritage Training Program (PASEP) and for COFINS, in case of acquisition or import of new machinery, apparatus, instruments, equipment and construction materials and services used for infrastructure projects, among which, plants generating solar and wind energy. The project must be approved by the MME, and the benefit is valid for five years, counting from the qualification of the project.

In order to benefit from REIDI tax benefits, the company must follow these 4 steps:

1. Project must obtain its *Outorga* with ANEEL
2. The company interested in joining the REIDI, must request the framing of the project to ANEEL, accompanied by an Information Form generated in the REIDI System - SREIDI[29], or to the Secretary of Geology, Mining and Mineral Transformation - SGM, of MME, according to each case. The Agency analyzes the suitability of the claim and instructs the process, forwarding the documentation for a final decision by the MME
3. The MME analyzes the legal framework and publishes the Ordinance approving the framework of the project in REIDI or the Order for Dismissal of the application
4. With the issuing of the Ordinance approving the project framework at REIDI by MME, the company must apply for qualification under the Regime at the Secretariat of the Federal Revenue of Brazil, in order to be entitled to the respective benefits, in terms of the regulations established by the Ministry of Finance

In CELA's experience, the REIDI benefit can be obtained in 12 months, with an optimistic scenario of 9 months if the steps are performed consecutively and with no delays.

The REIDI benefit is not retroactive, therefore if it is obtained during or at the end of the project construction, all the PIS/COFINS tax paid before the fruition of the benefit can be used a tax credit offset if the project has opted to the Real Profit regime.

B. Federal Tax Incentives for solar only projects

PADIS- Semiconductor Industry Technology Development Support Program[30]

Established in 2007, PADIS includes a set of federal tax incentives to attract investments to the semiconductor and display manufacturing industries. It enables manufacturing companies to be exempt from federal taxes such as Import Tax (II), PIS/PASEP (PIS – Social Integration Program; PASEP – Training Program of the Civil Servants) and COFINS (Contribution to Social Security Financing) both on imported and internal equipment, including PV cells and modules. Also, the Industrialized Products Tax (IPI) and the Income Tax (IR) may be subject to zero rate, when conditioned to investments in research and development. As it also does not include all the components of a PV system, an extension to include more components is being requested by PV and other industrial players.

Computing Law[31]

[29] SREIDI is available at the following link: http://www.mme.gov.br/sreidi/pages/login.xhtml
[30] Decree 8.247/2014. Available at: http://www.planalto.gov.br/ccivil_03/_Ato2011-2014/2014/Decreto/D8247.htm
[31] Available at: http://www.planalto.gov.br/ccivil_03/_Ato2004-2006/2004/Lei/L11077.htm

Established in 1991, this law institutes tax benefits for computer and automation goods, including the production of equipment for PV generation. These benefits are conditional on investments in research and development and are not restricted to solar PV.

C. State Tax Incentives

ICMS exemption or deferral on the purchase of energy – per state, per project, per project type, etc

The most relevant state incentive is the reduction in ICMS tax on the purchase of energy, as it is taxed approximately 18% to 32%, depending on the state. Each state has its own specific ICMS incentive package, which is also usually applied differently within each state depending on the project (i.e. on a project-by-project basis). Therefore, it is suggested that investors contacts the fiscal authorities of the state it plans to invest in to understand all the options that could be available to investors' specific projects.

Furthermore, ICMS on energy is always paid by the last link in the chain: here, it would be the final consumer. So, in case an investor signs a PPA with a commercialization company, no ICMS tax will be paid in this specific transaction. It will be paid later on by the commercialization company's final client.

Please notice that ICMS charges on the acquisition of energy is only relevant when selling energy (for PIE model but not for APE model) to the final consumer (not to a commercialization company).

A final point to consider: the ICMS tax rate not only varies per state, but also varies if it will be paid to the state where generation is located or to the state where consumption takes place, depending on the generation and consumption states. This means there is an added level of complexity here.

Agreement 101/1997- CONFAZ- ICMS (Brazilian state tax on goods and services circulation) exemption on solar and wind equipment[32]

Established in 1997, this agreement exempts the Brazilian tax on goods and services circulation (ICMS) for solar equipment such as PV modules and wind equipment such as wind turbines, wind towers, wind blades, etc, whether national or imported. As the ICMS tax rate varies from 7 to 18%[33] depending on the state of origin and destiny of the goods or services, this agreement has a great impact on equipment costs. However, this tax incentive does not include all of the PV system components such as meters and balance of system (BOS).

v. Current regulation for distributed generation - Law 14.300/2022

Since 2012, through ANEEL normative resolution REN 482/2012, distributed generation (DG) in Brazil is defined as energy generation plants, with installed capacity up to 5 MW, connected to the distribution grid through consumer units. The regulatory framework for DG was updated in 2022 through Law No. 14.300/22, bringing legal security for the sector and implementing new concepts to the net-metering system, which will be discussed in detail on this section.

DG regulation history in Brazil: the beginning of the net-metering scheme

[32] CONFAZ, Convênio ICMS 101/97. Available at: https://www.confaz.fazenda.gov.br/legislacao/convenios/1997/CV101_97

[33] ICMS rates. Available at https://www.taxgroup.com.br/intelligence/tabela-icms-atualizada/

The first DG regulatory framework was established in 2012 by ANEEL's normative resolution REN 482/2012. It instituted the general conditions for DG access to the distribution grids and created the possibility for customers to offset the excess energy generated with power supplied from the grid to which it is connected. The scheme is known as net-metering. Figure 3 bellow illustrates the energy flow between the DG unit and the distribution grid.

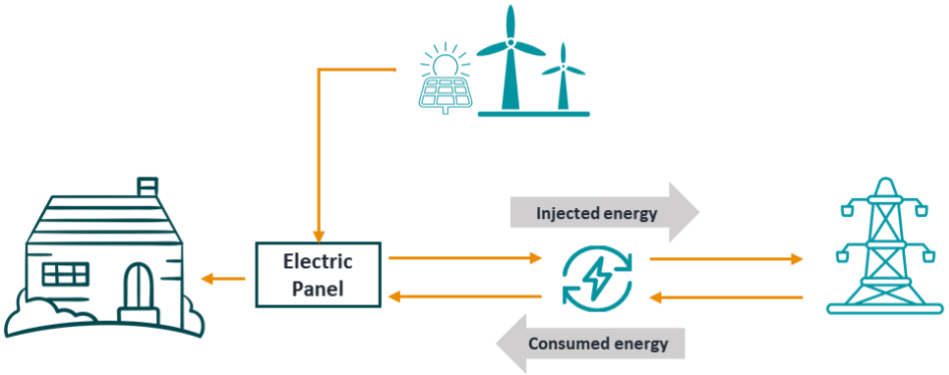

Figure 8: Net-metering scheme

Generation that is consumed instantaneously (generation is simultaneous with consumption) results in lower metered consumption and excess generation that is fed into the grid generates a power credit that the consumer can use to offset consumption at a later time. The generation units, or credits, cannot offset an entire power bill. For units connected in low voltage[34], a minimum bill amount is calculated based on 30kWh, 50kWh or 100kWh of monthly consumption, depending on the connection pattern[35]. For medium/high voltage, the units must pay for a contracted demand.

The grid works as a large battery for the customers and the transactions happen only in the form power credits, there is no money exchange. The net-metering scheme is applicable to any renewable and qualified cogeneration distributed energy sources, including solar PV.

The REN 482/2012 was updated in 2015 by REN 687/2015 expanding the DG capacity limit from 1 MW to 5 MW, extending the validity of power credits to 60 months and, most importantly, establishing new business models[36], such as remote self-consumption, neighborhood solar and community solar.

One of the most important aspects of the REN 482/2012 and REN 687/2015 is that the net-metering offset value included both the retail power tariff (TE – *tarifa de energia*) and transmission and distribution tariff (TUSD – *tarifa do uso dos serviços de distribuição*) and is valued at 100% of the regulated power consumer tariff, detailed on Figure 9 below. In other words, if the unit consumes 10 kWh and generates the same amount of 10kWh, the offset will be in full. The unit will only have to pay the fixed minimum bill amount (low tension) or contracted demand (medium and high tension).

[34] Connected to tension lower than 2.3 kV
[35] Fixed charge known as "*custo de disponibilidade*" or "*demanda contratada*"
[36] ANEEL, REN nº 687/2015. Available at: http://www2.aneel.gov.br/cedoc/ren2015687.pdf

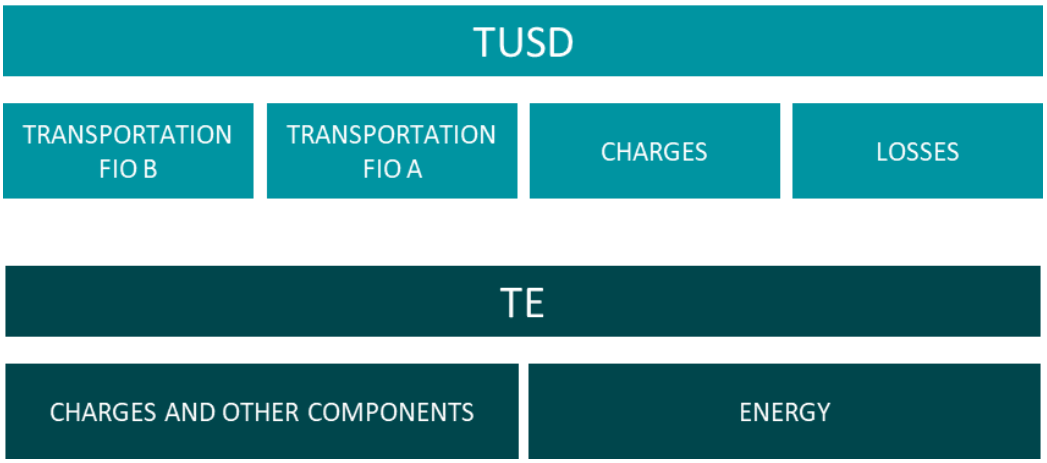

Figure 9: Regulated power tariff basic structure

Since the conception of the regulation for DG, it was already foreseen that REN 482/2012 would be periodically revised by ANEEL, a fact that occurred in 2015 and in 2017, through REN 687/2015 and REN 786/2017 respectively, both revisions maintaining the offset rules initially instituted in the net-metering system. Nevertheless, as DG progressed in installed capacity, the debate on a review of the criteria for the power offset increased. Therefore, ANEEL instituted this topic in its Regulatory Agenda for the 2018-19 and 2020-21 biennia, starting the discussions with society from the publication of the Technical Note 010/2018, of May 2018.

ANEEL faced divergent stakeholders' points of view during the revision process. On one hand, power distribution companies and some non-DG consumers argued that the REN 482/2012 net-metering offset value did not remunerate the distribution infrastructure costs properly, transferring DG costs to other consumers that have not implemented a DG system. On the other hand, DG companies and DG consumers claimed that there are multiple benefits of DG to society which were not currently valued, such as environmental benefits and reduction of transmission costs and losses, and request the maintenance of the REN 482/2012 net-metering offset value as a crucial instrument to consolidate the DG market.

As a result, at the end of 2021, after 4 years of intense discussions on the future of DG market, with a historic agreement between the MME, ANEEL and the main associations of the power sector, the main changes in the net-metering system were outlined that would compose the Legal Framework for Distributed Generation, approved practically unanimously by the National Congress and sanctioned by the Presidency of the Republic under Law No. 14.300/22, on January 6th, 2022.

Current Legal Framework for distributed generation: Law No. 14.300/22

The following section presents a summary of the Law No. 14.300/22 and net-metering updated scheme.

D. Secured right for projects

Projects already connected to the grid before the publication of the Law 14.300/22 and projects that file the access to the grid request until January 6th, 2023, will maintain the net-metering offset value established in REN 482/2012 until December 31st, 2045. Therefore, the value of the energy injected by DG will be offset by the same value of the power tariff supplied by the grid.

E. Updated net-metering scheme:

Projects that file the access to the grid request after January 6th, 2023 will go through a transition period, that will be defined according to the date of access to the grid request, the business model and the installed capacity of the project.

To explain the updated net-metering scheme applicable to projects, we separate the process into three moments: (1) Secured right Rule, before the publication Law 14.300/22 and before January 6th, 2023, (2) Transition Rule, and (3) Definitive Rule.

1) *Secured right Rule:* The net-metering offset value of a DG credit has the same value as the power tariff supplied by the grid.

2) *Transition Rule:* The net-metering offset value of the credit of a DG is reduced if compared to the value of the power tariff supplied by the grid. During the transition period, the consumer who receives the credits from a DG will need to pay the difference between the value of the DG credit and the regulated power tariff to the distribution company, remunerating the distribution company for the use of the grid.

3) *Definitive Rule:* This will be the general the net-metering offset value to be applied for DG projects after the end of the Secured right Rule or the Transition Rule established for the project. The net-metering offset value of a DG will be valued based exclusively on the power component of the tariff of regulated consumers, added to the benefits provided by DG projects to the Brazilian Electric System, which will be defined by the CNPE and calculated by ANEEL.

Below, it is presented the main variations of the net-metering offset value for DG credits, according to different project profiles. There are two possibilities: 1) local projects or with installed capacity below 500kW (Figure 10); 2) Community Solar projects with consumer with 25% or more of participation in the generation or Remote Self-consumption, both with installed capacity above 500kW (Figure 11).

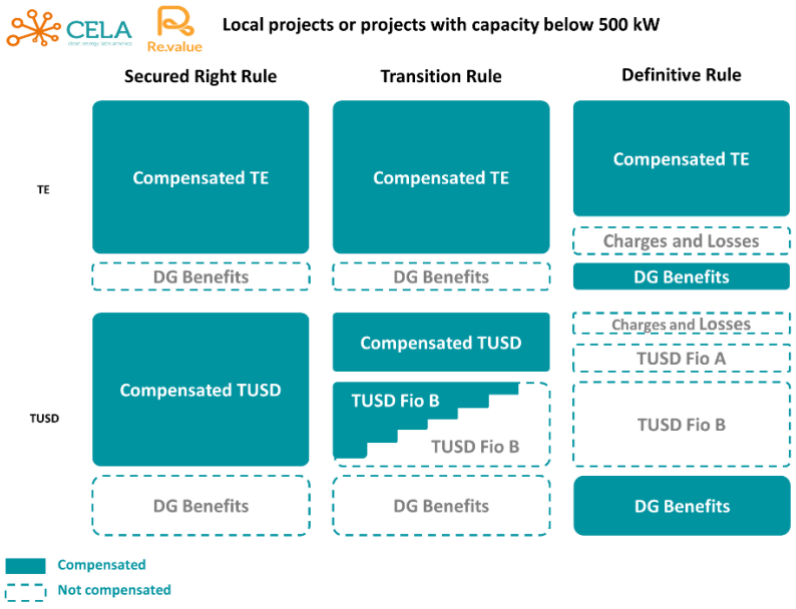

Figure 10: Net-metering offset value for local projects or projects with capacity below 500kW

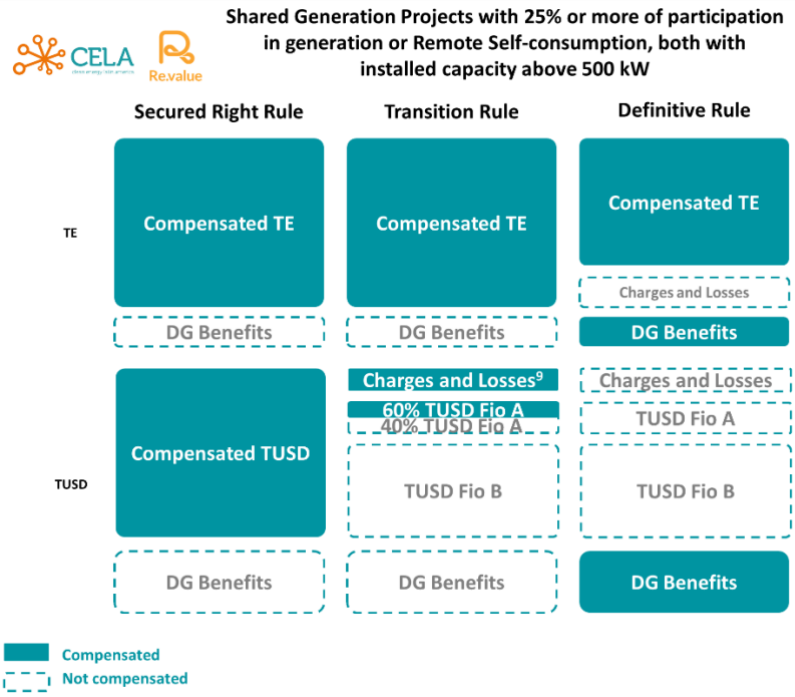

Figure 11: Net-metering offset value for Community Solar projects with consumer with 25% or more of participation in the generation or Remote Self-consumption, both with installed capacity above 500kW[37].

Regarding the part of the tariff that refers to the Power Tariff (TE), the net-metering offset value is equal for all different types of projects. During the Secured Right and Transition Rule periods, the TE continues to be offset in its entirety, while in the Definitive Rule the offset value of the TE loses the components Charges and Losses and may or may not decrease, depending on the calculation of the benefits of DG.

As for the part of the tariff referring to the Distribution System Use Tariff (TUSD), there is the differentiation of the rule according to the business model and installed capacity of the project. However, during the Secured right period, the TUSD continues to be offset in full for all projects.

For local projects or with installed capacity below 500kW, the offset value of the TUSD for DG starts to gradually decrease between 2023 and 2028, until it does not offset the entire TUSD Fio B component. For plants above 500kW in the Community Solar model, with consumers who have more than 25% of the plant's generation share, and Remote Self Consumption, the compensation during the Transition Rule is more severe, totally losing the value of TUSD Fio B component, 40% of the TUSD Fio A component and some other charges in the net-metering offset value.

For the Definitive Rule, the entire TUSD tariff component will no longer be offset for all projects, regardless of installed capacity and business model.

Additionally, from the amounts to be paid for the use of the distribution system, the benefits provided by DG projects to the Brazilian Electric System should still be deducted. These do not yet have a clear guideline on how they will be established and applied, but they will play an important role in the viability of DG projects in the future.

[37] *All charges are offset under this rule, except for P&D and TFSEE*

As a reference, if we consider the DisCo from DF-Brasília (CEB-D) with a transition period for projects above 500kW, the DG compensable tariffs with taxes in each rule would be:

- Secured right rule: R$ 574.9/MWh
- Transition rule: R$ 447.0/MWh
- Definitive rule: R$ 256.3/MWh

Finally, the criteria that determines in which rule the DG project will be framed is the date of the access to the grid request and the date of publication of the Law 14.300/22. From these dates, it is possible to know if the plant will be framed in the Secured right Rule or if it will enter one of the two Transition Rules, as shown in Figure 12.

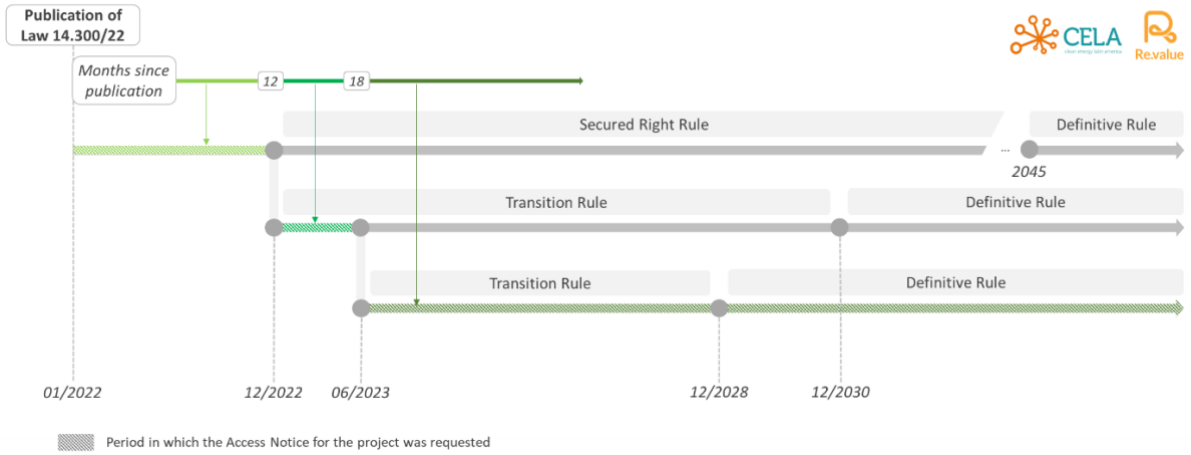

Figure 12: Law 14.300/22 rules timeline

F. Contracted demand according to generation projects:

After the periodic tariff review of the distribution company in which the DG project is connected, it will be considered, for all projects that are eligible to pay the contracted demand (medium to high voltage), the application of the energy injection tariff (TUSDg), instead of the demand tariff (TUSDd) that has a higher value. This change is applicable to all projects, independently of the net-metering offset rule that is being applied in the project.

G. Guarantee of Faithful Fulfillment:

Projects with installed capacity between 500kW and 1MW must provide guarantee in the amount of 2.5% of the investments and projects with installed capacity above 1MW must provide guarantee in the amount of 5.0% of the investments, being retained for up to 30 days after the connection. Projects with installed capacity below 500kW or with Community Solar or Neighborhood Solar business models are exempted from the contribution.

This guarantee was included in Law 14.300/22 because several companies asked for the access to the grid with the intention to make a market reserve and sell the access to the grid permits. With a strict timeline for projects to be framed on the Secured right rule, it was important to add a guarantee so the permits would be issued for projects that have more probability and resources for construction.

H. Limitation of the installed capacity:

Installed capacity limitation for new DG solar PV projects will be 3 MW (dispatchable with battery or non-dispatchable), for other dispatchable energy sources it will remain 5 MW.

I. Minimum consumption:

Once in the Definitive Rule, there will be no minimum consumption charge because DG consumers are already paying the TUSD components.

J. REN 482/2012 characteristics that are maintained on Law 14.300/22:

- Energy offset limited to the utility concession area where the generation and consumptions units is located;
- Net metering credits are valid for 60 months;
- Net metering scheme applicable only to regulated customers, not applicable to the wholesale market;
- DG unit capacity is limited to the installed load (low tension units) and to the contracted demand (medium and high-tension units);
- Excess energy generated by a DG unit cannot be commercialized. The only way to "market" surplus generation is through net-metering credits;
- For micro-generation, the distribution company must bear the cost of the metering system change / conformation. On the other hand, for mini-generation, the customer is the one that must bear the cost of the difference between the new bidirectional metering system and the conventional meter.

Update on Federal and State Incentives that impact the net-metering offset value

Law 13.169/2015 - PIS/COFINS tax exemption[38]

Established in 2015, this federal tax incentive exempts PIS/PASEP and COFINS from generation projects under the DG regulation. It covers the active energy supplied by the distribution company in the corresponding amount to the injected energy plus credits accumulated by the consumer unit. It is restricted to solar PV premises under the same ownership, therefore excluding the neighborhood and community solar business models. Table 5 below presents a summary of the applicability of PIS/CONFINS tax exemption according to size and credits ownership.

Agreement 16/2015- CONFAZ- ICMS exemption[39]

Established in 2015, this state tax incentive is now signed by all the 26 Brazilian states and DF (the Federal District)[40]. Like the PIS/COFINS tax exemption, it exempts ICMS on the active power supplied by the DG company in the corresponding amount to the injected power plus credits accumulated by the consumer unit. It is also restricted to solar PV premises under the same ownership and, additionally, is only applicable to projects up to 1 MW. Due to the ICMS high rates across Brazilian states (varying from 12% to 32%), this tax exemption has a substantive impact on the economic feasibility of solar PV projects.

[38] PIS/COFINS exemption law. Available at: http://www.planalto.gov.br/ccivil_03/_Ato2015-2018/2015/Lei/L13169.htm
[39] ICMS exemption agreement 16/15. Available at: https://www.confaz.fazenda.gov.br/legislacao/convenios/2015/CV016_15
[40] Paraná, Santa Catarina and Amazonas states were the last ones to sign the agreement 16/15 on May 2018. Available at: https://www.canalenergia.com.br/noticias/53062316/isencao-de-icms-sobre-geracao-distribuida-alcanca-todo-pais. Accessed 21 August 2019

		Ownership	ICMS Exemption	PIS-COFINS Exemption
CAPACITY	< or = 1 MW	SAME	ALL	ALL
		DIFFERENT	ONLY MG, RJ and ES STATES	N/A
	> 1 MW	SAME	ONLY MG, RJ and ES STATES	ALL
		DIFFERENT	ONLY MG, RJ and ES STATES	N/A

Table 5: ICMS and PIS-COFINS energy balance tax exemption according to size and projects ownership, by state (all = nationwide)

There are some local exceptions that change the exact contents of this tax benefit in some states: MG, RJ and ES states established its own regulation, extending the tax exemption to projects above 1MW and to all the business models, including the ones with different ownership; Paraná and Santa Catarina states limited the exemption duration to 48 months counting from the plant COD. Also, some power distribution companies, based on a legal loophole on the 16/15 agreement, are not considering the full tariff offset scheme, calculating the injected energy value, for tax purposes, based only on the power rate (TE), and not on the total port tariff (power rate - TE plus distribution rate - TUSD)[41], reducing the tax benefit. Figure 13 summarizes the adoption and exceptions across Brazilian states.

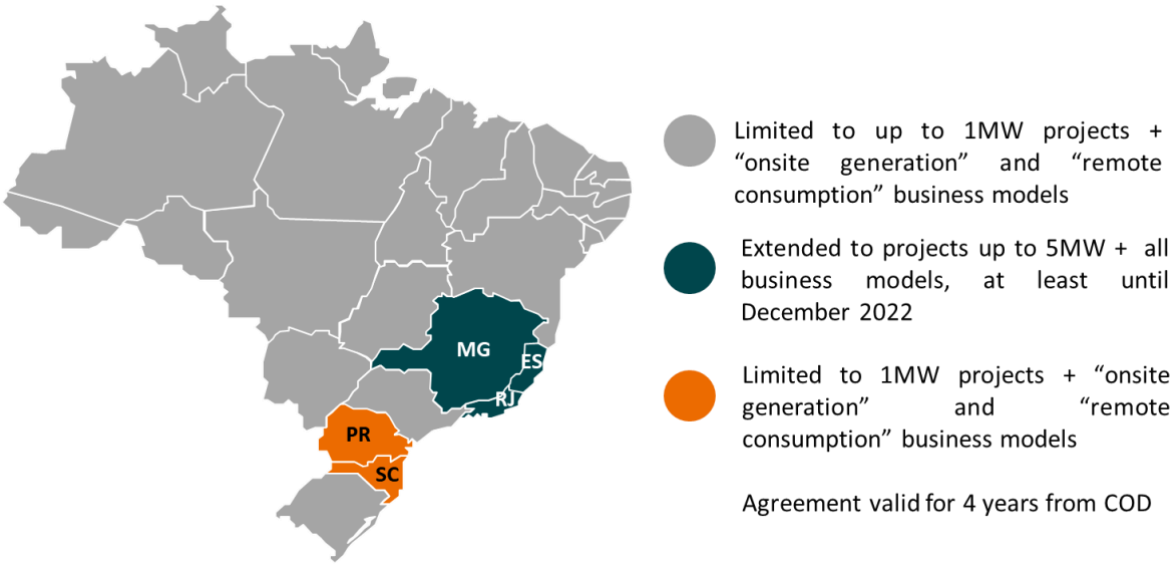

Figure 13: ICMS tax exemption rules, per state

[41] Excluding the distribution rate (TUSD) from the tax benefit and causing the offset energy value to drop up to 30% in some cases

II. Overview of the C&I market in Brazil

i. Main segments and players in the C&I market in Brazil

There are 21 GW of wind projects in operation in Brazil, and 15 GW of solar PV projects. Practically all the wind projects in operation are utility-scale projects. For solar PV, the majority (10 GW out of the total 15 GW) are from distributed generation projects and 5 GW are from utility-scale projects.

Segment 1: Wind Utility-Scale

There are 21 GW of wind projects in operation in Brazil, and wind is the 3rd most important source of energy in the country. Historically, energy was contracted in the regulated market via auctions, so approximately 17 GW of all wind projects in operation sell energy in the regulated market.

The remaining operational projects represent energy in the free market, selling energy directly through PPAs. Several other GW have secured PPAs in the free market and are under development / construction. For wind utility-scale projects, returns can vary significantly, depending on COD (feed-in-tariff projects for example have really strong returns), location of the project and PPA conditions. CELA estimates project level returns between 6 to 12% (real terms – not adjusted for inflation).

The main players in terms of installed capacity are:

1. **ENEL Green Power (2,157 MW):** ENEL Green Power (EGP) is the renewable energy platform of Italian utility ENEL. ENEL is also present in Brazil as a power distribution company and operates several power distribution concession areas in the country. EGP is the largest wind and solar generation company in the country, with 1,234 MW of utility-scale solar projects in operation and another 2,157 MW of utility-scale wind projects in operation in Brazil. It is active both in the regulated market (power auctions selling energy to power utilities) and in the free market (ACL selling power directly to C&I consumers). ENEL announced recently it plans to invest 70 billion Euro in wind and solar globally by 2030.
2. **CPFL Renováveis (1,300 MW):** CPFL Renováveis is the renewable energy platform of CPFL, a Brazilian utility which is a public company and has China's State Grid as an investor. It operates several power distribution concession areas in Brazil, similar to ENEL.
3. **Echoenergia (1,200 MW):** Echoenergia used to be the wind platform of Actis, the UK investor that owns Atlas Renewable Energy. Echoenergia was recently sold to Brazilian energy giant Equatorial for BRL 7 billion and has plans to continue growing especially in the free market (ACL).
4. **Omega Energia (952 MW):** Omega was one of the first pure play renewable energy companies in Brazil, founded in 2008. It concluded its IPO in the Brazilian stock exchange in 2017, the second pure play renewable energy to IPO, after the now defunct Renova Energia. Omega, like several of the main renewable energy players in Brazil, is investing heavily in the free market, and especially Omega is structuring itself to operate in the free market for very small consumers as well.
5. **AES (740 MW):** AES is an American utility that operates as a power generator and power commercialization company in Brazil. It has expressive wind and solar operations in the country, which initiated in the regulated market (auctions) but is growing fast in the free market, selling energy directly to final consumers. AES is one of the pioneers of self-production PPAs in Brazil and expects to add another 1,300 MW of installed capacity in the short to medium term.

Segment 2: Solar PV Utility-Scale

There are 5 GW of solar PV utility-scale projects in operation in Brazil, and solar is still a growing source of energy in the country. Historically, energy was contracted in the regulated market via auctions, so approximately 4.8

GW of all solar PV utility-scale projects in operation sell energy through auctions. The remaining operational projects represent energy in the free market, selling energy directly through PPAs. Several other GW have secured PPAs in the free market and are under development / construction, as in the wind sector. For solar PV utility-scale projects, returns can vary significantly, depending on COD, location of the project and PPA conditions. CELA estimates project level returns between 5 to 10% (real terms – not adjusted for inflation).

The main players in terms of installed capacity are:

1. **ENEL Green Power (1,234 MW):** ENEL Green Power (EGP) is the renewable energy platform of Italian utility ENEL. ENEL is also present in Brazil as a power distribution company and operates several power distribution concession areas in the country. EGP is the largest wind and solar generation company in the country, with 1,234 MW of utility-scale solar projects in operation and another 2,157 MW of utility-scale wind projects in operation in Brazil. It is active both in the regulated market (power auctions selling energy to power utilities) and in the free market (ACL selling power directly to C&I consumers). ENEL announced recently it plans to invest 70 billion Euro in wind and solar globally by 2030.
2. **Canadian Solar (570 MW):** Canadian Solar, a Canadian/Chinese public company, occupies the second position in terms of installed capacity of solar utility-scale projects, operating 570 MW of projects that it secured PPAs for and build. However, Canadian Solar has sold additional projects to other players, after securing PPAs and constructing them, especially as it is a solar module manufacturer, and continues with a strategy of building, operating and selling its assets.
3. **Atlas Renewable Energy (421 MW):** Atlas is the solar generation platform of Actis, a UK investor. It was created when Actis acquired SunEdison's operations in Latin America (CELA Clean Energy Latin America was SunEdison's advisor on the sell side). This platform is under negotiation for sale to a strategic player, and the transaction will be announced soon. It is a platform that continues to grow strongly in the region.
4. **Elera Renováveis (360 MW):** Elera is the recently created renewable energy arm of Brookfield, the Canadian conglomerate. It plans to become the largest renewable energy player in Brazil, with a target of 3 GW of wind and solar projects to become operational by the end of 2023.
5. **AES (296 MW):** AES is an American utility that operates as a power generator and power commercialization company in Brazil. It has expressive wind and solar operations in the country, which initiated in the regulated market (auctions) but is growing fast in the free market, selling energy directly to final consumers. AES is one of the pioneers of self-production PPAs in Brazil and expects to add another 1,300 MW of installed capacity in the short to medium term.

Segment 3: Distributed generation

There is 10 GW of DG installed capacity in Brazil today. A large amount are small residential rooftops (4.5 GW). For companies offering leases to C&I consumers, project level returns are in a range of 6 to 20% (real terms – not adjusted for inflation), depending on COD, business model and region where the project is located.

Offering energy leases to C&I consumers, the largest players in installed capacity are:

1. **Órigo Energia:** 150 MW (investors: MOV + TPG own 83% of the company and Mitsui 17%). The company offers solar leases to its residential and C&I consumers connected to lower and medium tensions in the regulated market.
2. **Mori Energia:** 149 MW (investors: 50% Vibra; 34.8% Perfin; 15.2% founding partners). The company offers solar leases to its residential and C&I consumers connected to lower and medium tensions in the regulated market.
3. **GD Sun:** 140 MW (investors: Darby and Servtec). The company offers solar leases to its residential and C&I consumers connected to lower and medium tensions in the regulated market.
4. **GDS (former GD Solar):** 70 MW (investors: 90% E1; 10% GD Solar founders). The company offers solar leases to its residential and C&I consumers connected to lower and medium tensions in the regulated market.

5. **GreenYellow:** 60 MW (Casino Group) The company offers solar leases to its C&I consumers connected to lower and medium tensions in the regulated market.

ii. ii. The National Interconnected System (SIN)

Most of the energy generation plants in Brazil are connected to the National Interconnected System (SIN), which allows power exchanges between different regions (to most of the country's municipalities, to all states or all 4 submarkets – South, Southeast/Midwest, North and Northeast) in the country. The SIN therefore interconnects practically the entire country, as illustrated in Figures 14 and 15 below.

The National System Operator (ONS) coordinates these exchanges, following certain rules for optimization of operation. The goal is to combine the lowest cost and best energy security conditions for the entire SIN. The SIN works as a single electricity machine owned by different proprietors, whose commercial relationships are governed by different regulated contracts (energy transportation and energy) as well as contracts freely negotiated in the free market (energy).

The operation of the system does not have any relation to the energy contracts signed among agents. The operation of the system is in a physical environment, and contracts are in a merely financial environment. The guarantee of energy supply to consumers is obtained through registering the contracts in the CCEE (clearing house).

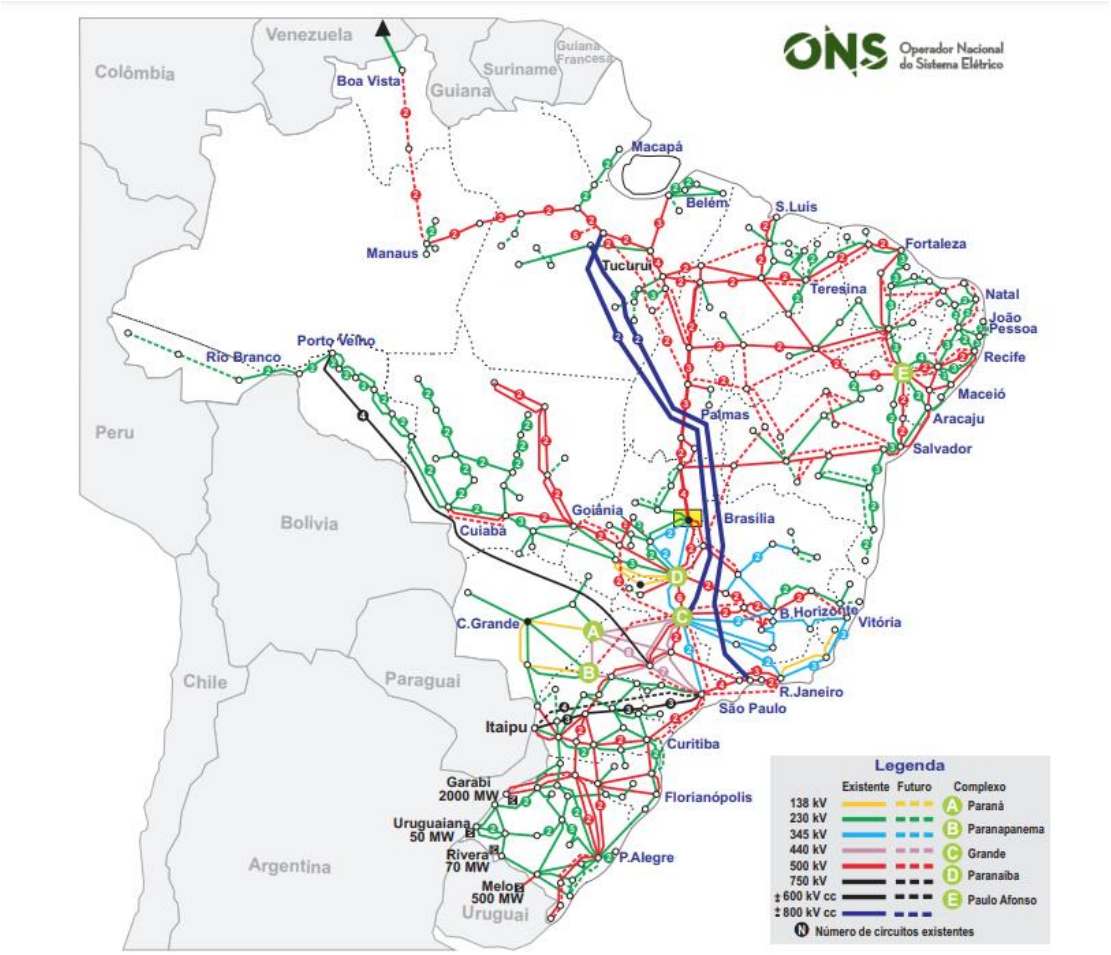

Figure 14: The National Interconnected System (SIN).

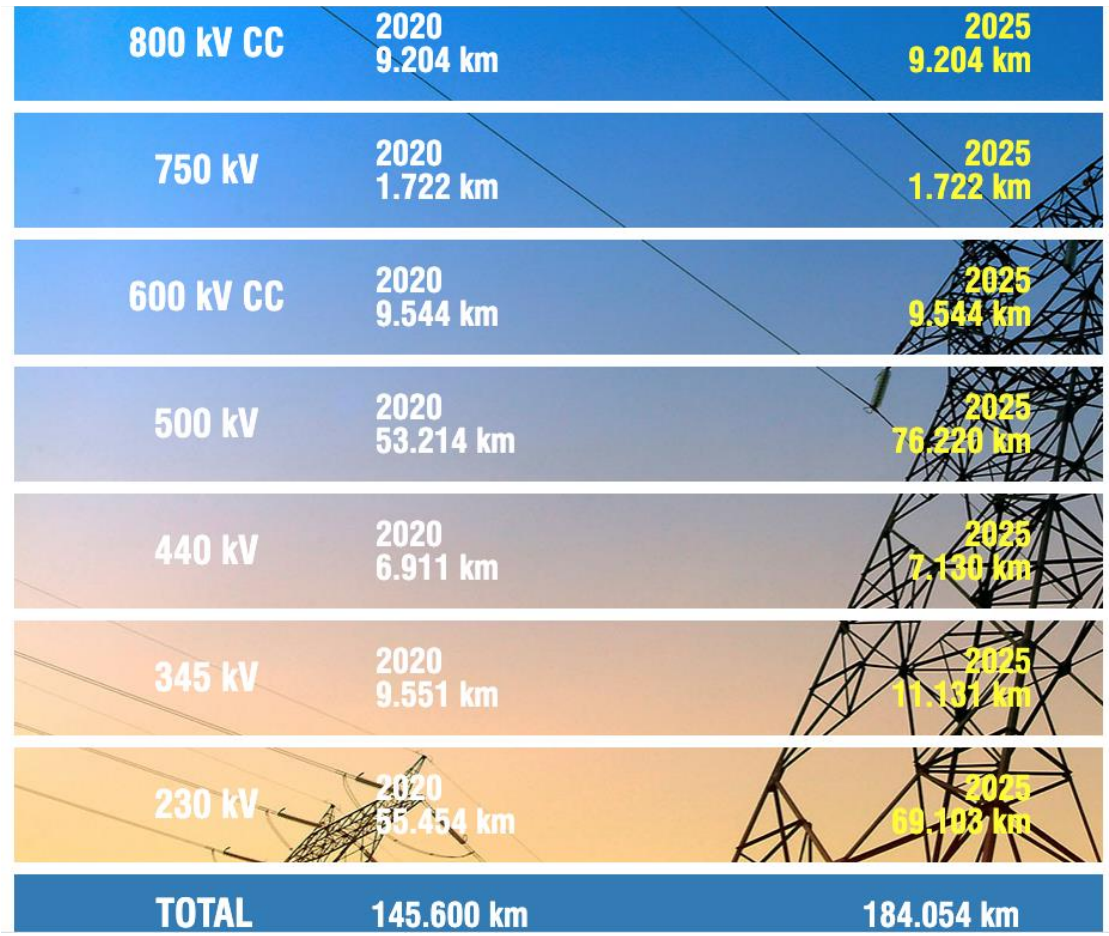

Figure 15: Extension of the National Interconnected System (SIN), 2020-2025.

National Interconnected System KPIs[42]

The indicator of the Basic Network Robustness aims to evaluate the capacity of the Basic Grid to withstand contingencies without interruption of load. It is obtained from the percentage relation between the number of disturbances without the total number of disturbances verified in the Basic Grid, for a period. On Figure 16 it is possible to see that since 2020, the submarket with most disturbances was the North submarket and the one with the least disturbances was the Southeast/Midwest submarket.

[42] ONS website. Available at: http://www.ons.org.br/paginas/resultados-da-operacao/qualidade-do-suprimento

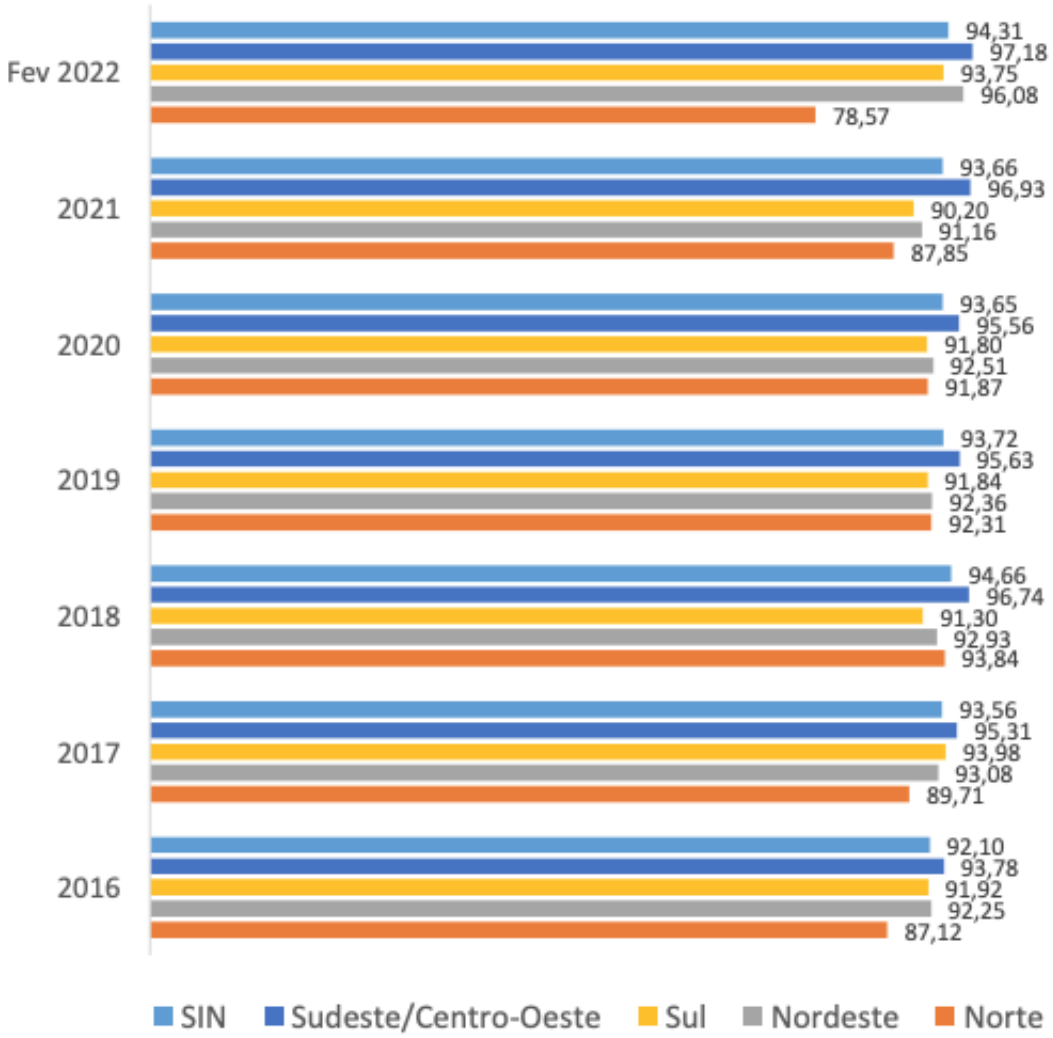

Figure 16: Basic Network Robustness of the National Interconnected System (SIN), 2016-2022

The Equivalent Duration of Load Interruption (DREQ) indicator aims to quantify the duration equivalent to the total loss of service, as a result of equipment shutdowns in the Basic Grid, so that one can evaluate the capacity of the system to maintain the reliability, the operational flexibility of the system and the ability of the system and the ability of the operation teams to recompose the system. On Figure 17 it is possible to see that in 2020, the interruption on the North submarket was significantly high, due to a very serious incorrection that happened in Amapá state and interrupted the energy supply for several days.

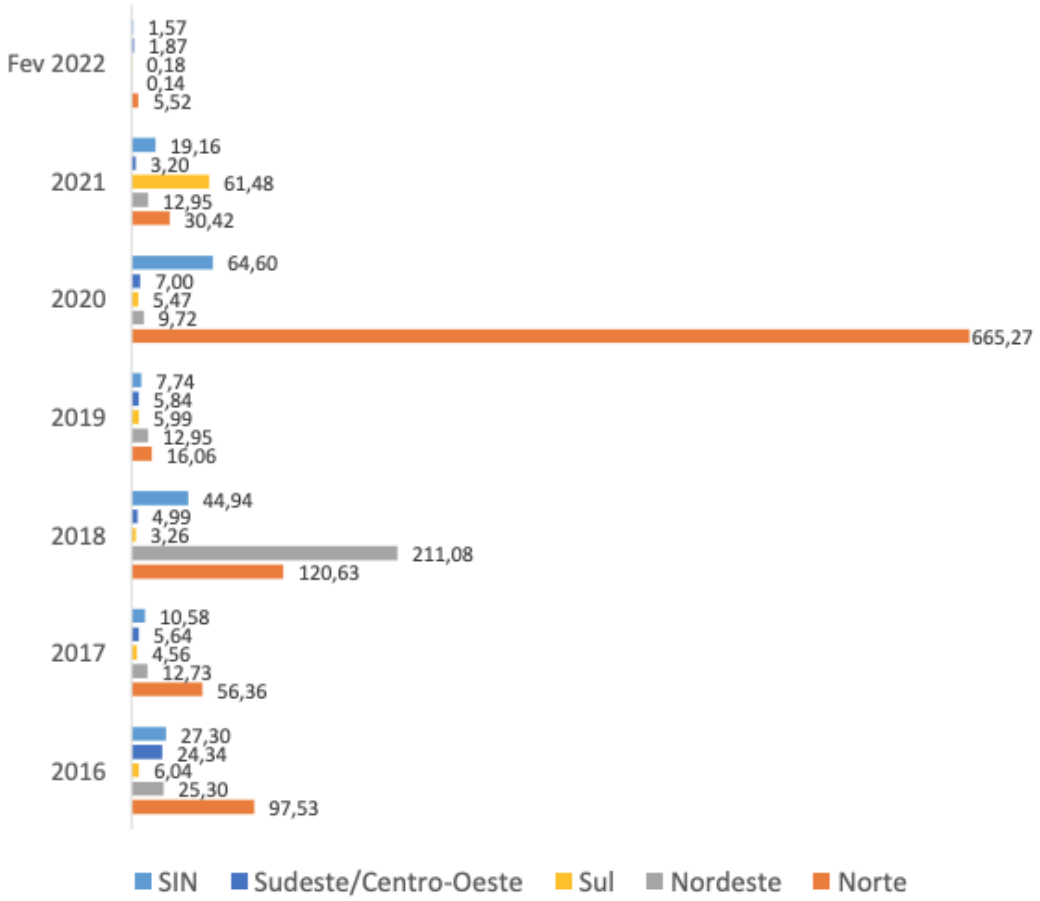

Figure 17: Equivalent Duration of Load Interruption (DREQ), in minutes, of the National Interconnected System (SIN), 2016-2022

The objective of the equivalent frequency of load interruption (FREQ) indicator is to quantify the equivalent number of times that there was full loss of service with shutdowns of equipment of the Basic Network equipment, to evaluate the capacity of the system to maintain the reliability of reliability. On Figure 18 it is also possible to see that submarket with most load interruption was the North submarket and the one with the least interruption was the South submarket.

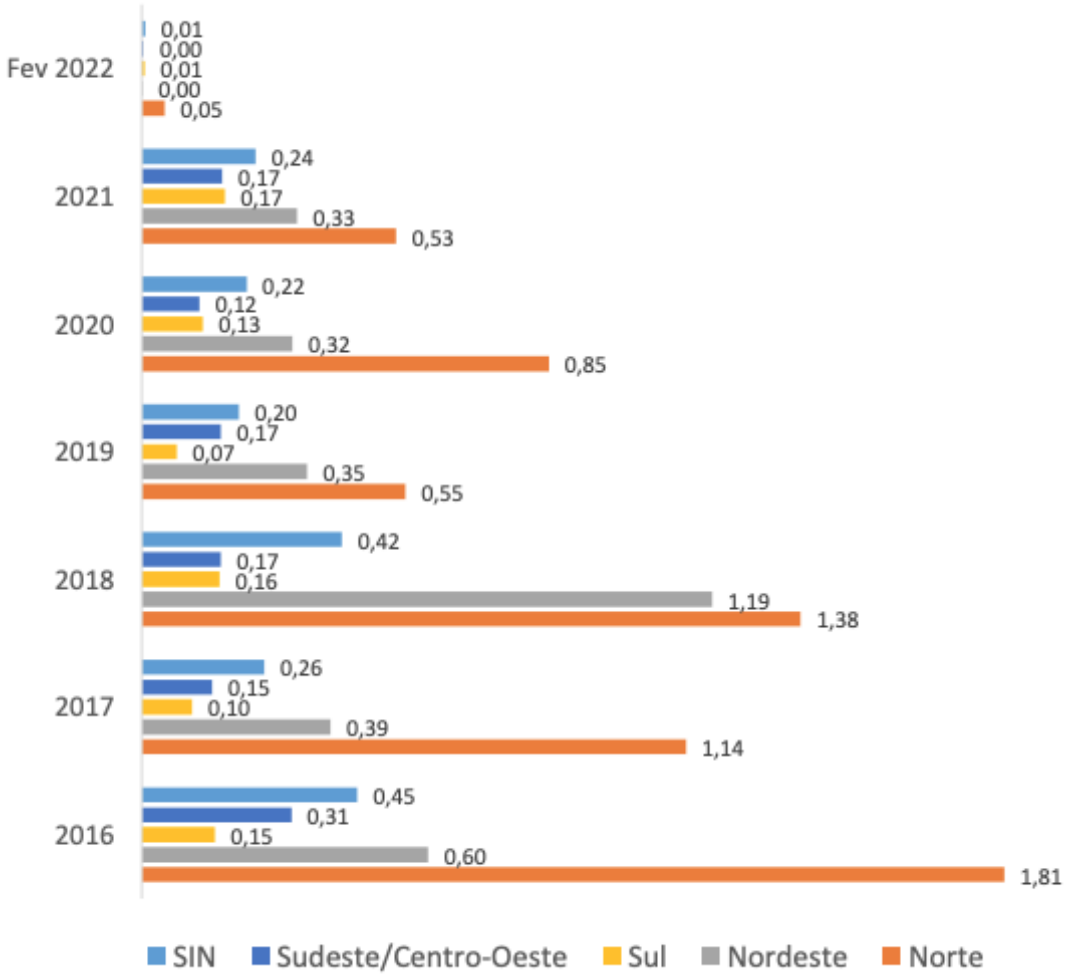

Figure 18: Equivalent Frequency of Load Interruption (FREQ) of the National Interconnected System (SIN), 2016-2022

III. 3. Macroeconomic risk assessment for Brazil

i. Brazil's monetary policy mechanisms

The monetary policy transmission mechanisms in Brazil are the channels through which changes in the SELIC rate (which is the main monetary policy instrument available to the Brazil's Central Bank) affect the behavior of other economic variables.

Monetary policy affects prices in the economy through: (i) the decision between consumption and investment by families and companies; (ii) the exchange rate; (iii) the price of assets; (iv) credit; and (v) expectations[43]. In this analysis we will focus on historical aspect of the inflation -item (i)- and exchange rate -item (ii)- in Brazil, together with the SELIC rate values.

(i) The channel for transmitting interest rates to consumption and investment decisions is the best-known channel for monetary policy. When the SELIC rate rises, real interest rates also tend to rise. The increase in the real interest rate, in turn, can lead to a decrease in investments by companies and a decrease in consumption by families - which, in turn, tends to reduce the demand for goods and services in the economy, contributing to for the reduction of inflation.

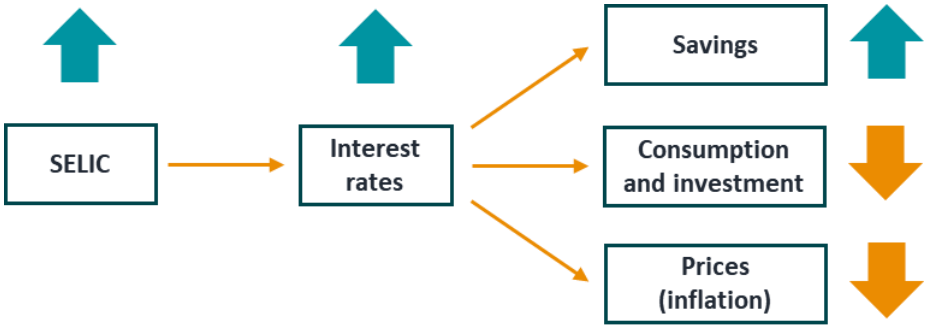

Figure 19: Investment and consumption channel

(ii) Another important channel for transmitting monetary policy is the exchange rate, especially in open economies. When the interest rate rises, the domestic currency tends to appreciate (the dollar becomes cheaper against the Real), reducing the price level of internationally tradable goods when expressed in national currency. The exchange rate affects inflation through two mechanisms. The first is the decrease in the prices of imported consumer goods and of inputs used in the production of goods. The other effect occurs through aggregate demand. The cheaper dollar discourages exports and encourages imports. As a result, demand for domestic goods falls, reducing pressure on the price level.

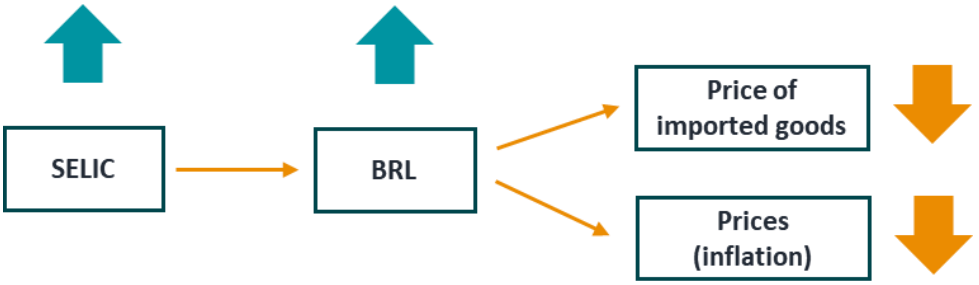

Figure 20: Exchange rate channel

[43] Banco Central do Brasil. Available at: https://www.bcb.gov.br/controleinflacao/transmissaopoliticamonetaria

It is important to notice that other monetary policy also acts through variations in the wealth of economic agents due to changes in the interest rate, credit availability and expectations which in turn can also affect exchange rates and inflation.

Although the effect of SELIC rate is quickly observed in the exchange rate of BRL, regarding inflation it takes on average 9 months to perceive the impact of SELIC rate variations[44]. That's one of the reasons why the impact on the Brazilian monetary policy does not affect both exchange rate and inflation in the same proportion at the same time.

ii. Historical data and projections

SELIC rate:

In the past 23 years, SELIC rate had its highest value at 24.4% in 1999 and lowest value at 2.9% in 2020, as Brazil's Central Bank reduced SELIC rate to promote investments and consumption due to Covid-19 pandemic.

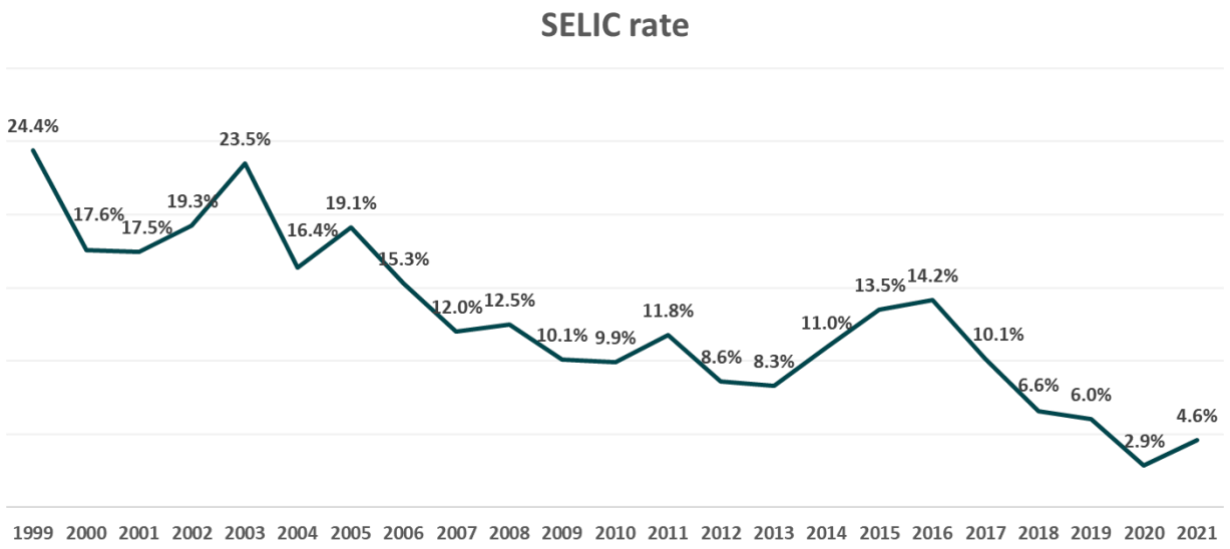

Figure 21: SELIC rate historical data. Brazil's Central Bank, 2022.

In the latest Focus Report[45] published by Brazil's Central Bank, indicates the following expectations for SELIC rate in the following years:

[44] Banco Central do Brasil. Available at: https://www.bcb.gov.br/controleinflacao/transmissaopoliticamonetaria

[45] Focus Report is a document released by Brazil's Central Bank that gathers the most important information regarding expectations regarding the Brazilian economy. The Focus Report is extremely useful for not only directing government actions, but also serving as a compass for thousands of investors.

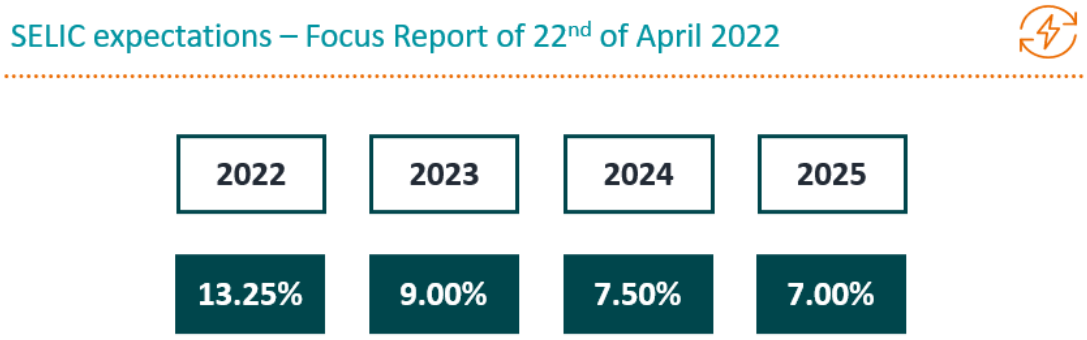

Figure 22: SELIC projections. Brazil's Central Bank, 2022.

Inflation (IPCA):

In the past 23 years, inflation had its highest value at 12.5% in 2001 and lowest value at 2.9% in 2017 and it had a very accentuated increase in 2021, reaching 10.1%.

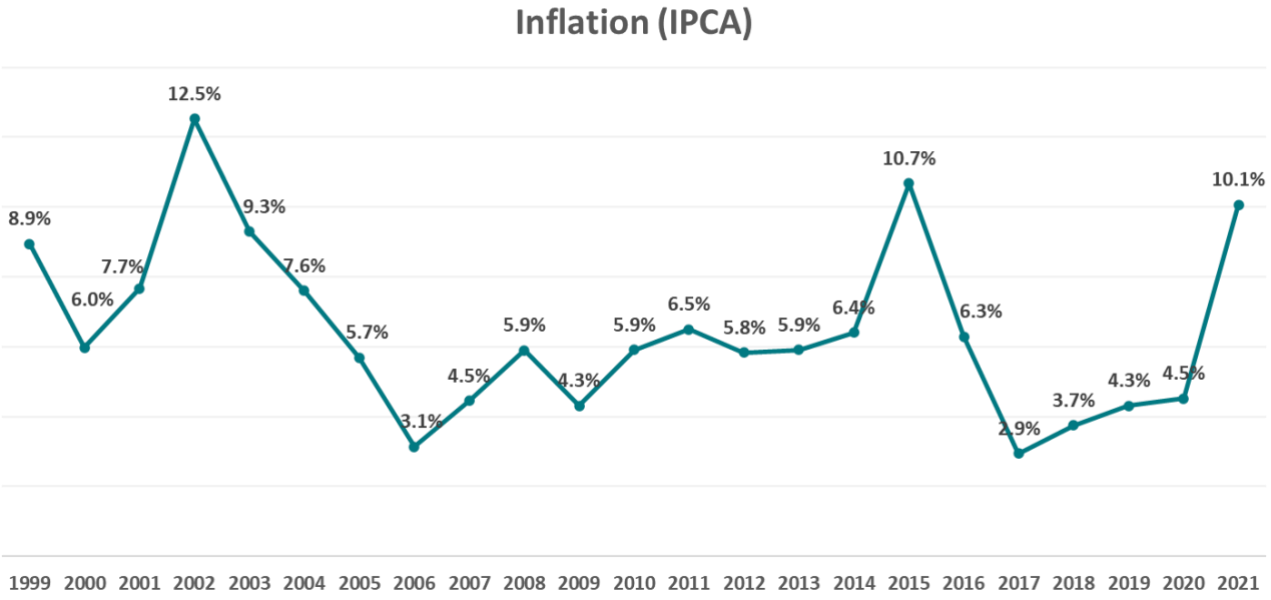

Figure 23: Inflation (IPCA) historical data. IBGE, 2022.

In the latest Focus Report published by Brazil's Central Bank, indicates the following expectations for Inflation (IPCA) in the following years:

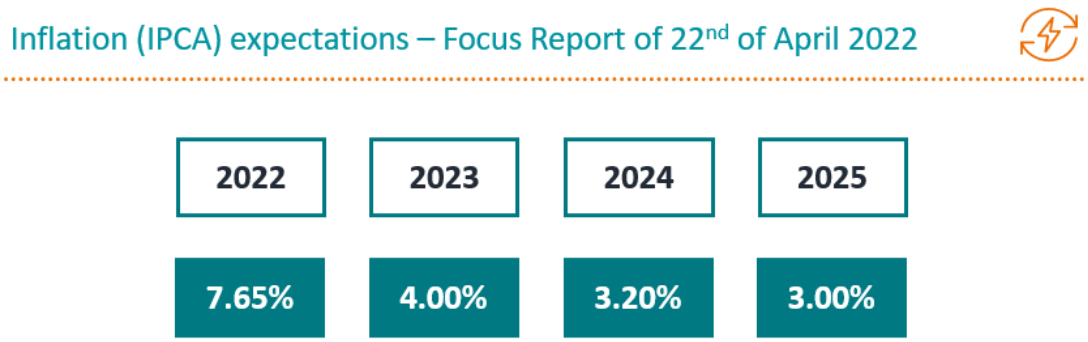

Figure 24: Inflation (IPCA) projections. Brazil's Central Bank, 2022.

Exchange rate:

In the past 23 years, the exchange rate variation had its highest appreciation of 16.8% in 2005 and highest depreciation of -56.4% in 1999. It also had a very accentuated devaluation in 2020 of -30.7%.

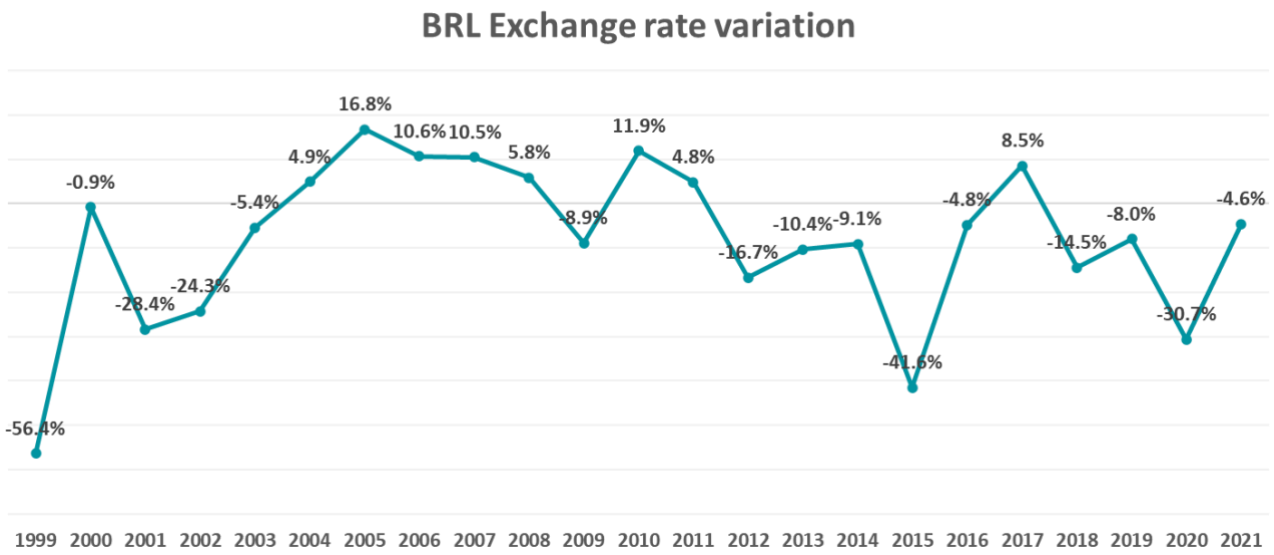

Figure 25: Inflation (IPCA) historical data. IBGE, 2022.

In the latest Focus Report published by Brazil's Central Bank, indicates the following expectations for exchange rate variation in the following years:

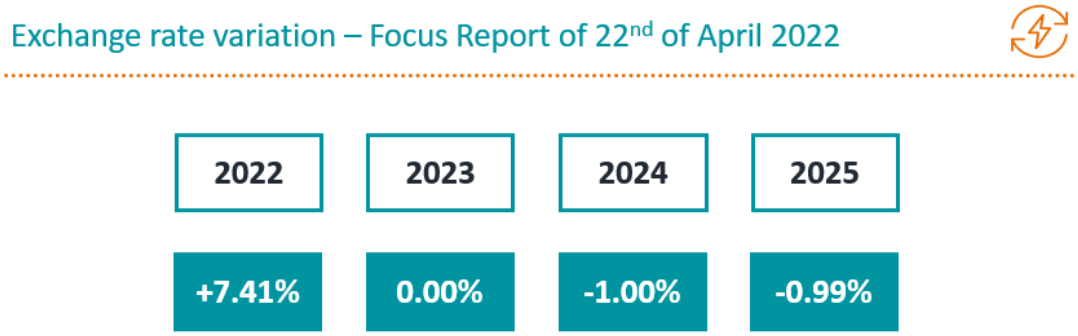

Figure 26: BRL Exchange rate variation projections. Brazil's Central Bank, 2022.

iii. Conclusions

If we compare the historical inflation and BRL exchange rate variation, in the long-term inflation tends to be higher than BRL depreciation. Even though in the long-term this is true, it is important to notice the schedule to take the investments from Brazil, because in the short-medium term this equation might not be true, as described on table 6.

Period	Inflation (IPCA) in %	BRL Exchange rate variation in %
23 Years (2021-1999)	319.7%	-92.0%
15 Years (2021-2007)	134.0%	-73.3%
10 Years (2021-2012)	79.8%	-78.7%
5 Years (2021-2017)	28.1%	-43.5%

Table 6: Cumulative inflation (IPCA) and BRL exchange rate in specific periods.

If it is considering a timeframe of the past 23 or 15 years, the inflation index surpasses the BRL depreciation and if considered the timeframe of the past 10 years, the inflation index is basically the same as the BRL depreciation. On the other hand, is it is considered the timeframe of the last 5 years, the inflation index is lower than the BRL depreciation, therefore it is important to notice that in moments of crisis it might not be interesting for the investor to cash out its investments in the country.

About the Subnational Climate Fund:

The Subnational Climate Fund (SCF) is a global blended finance initiative that aims to invest in and scale mid-sized (5 – 75 M $USD) subnational infrastructure projects in the fields of sustainable energy, waste and sanitation, regenerative agriculture and nature-based solutions in developing countries.

The SCF finances projects with a blend of concessional and conventional capital, along with Technical Assistance grants that help mitigate risk and ensure financial and environmental goals are achieved.

For further information about the SCF, visit: www.subnational.finance