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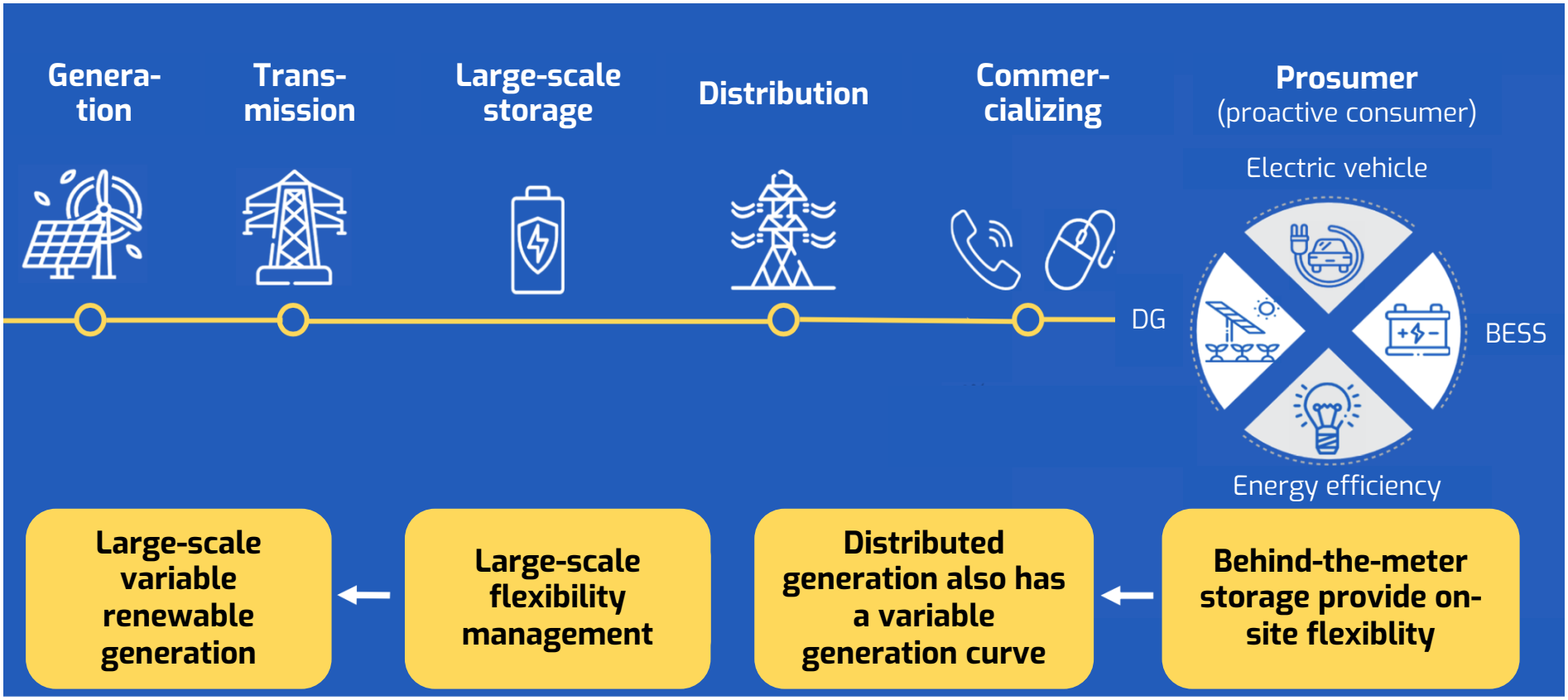
Discover new opportunities for the growing PV market in Brazil - Storage and Green Hydrogen

NEWCHARGE
ENERGY FREEDOM

ees
electrical energy storage

12/05/2022

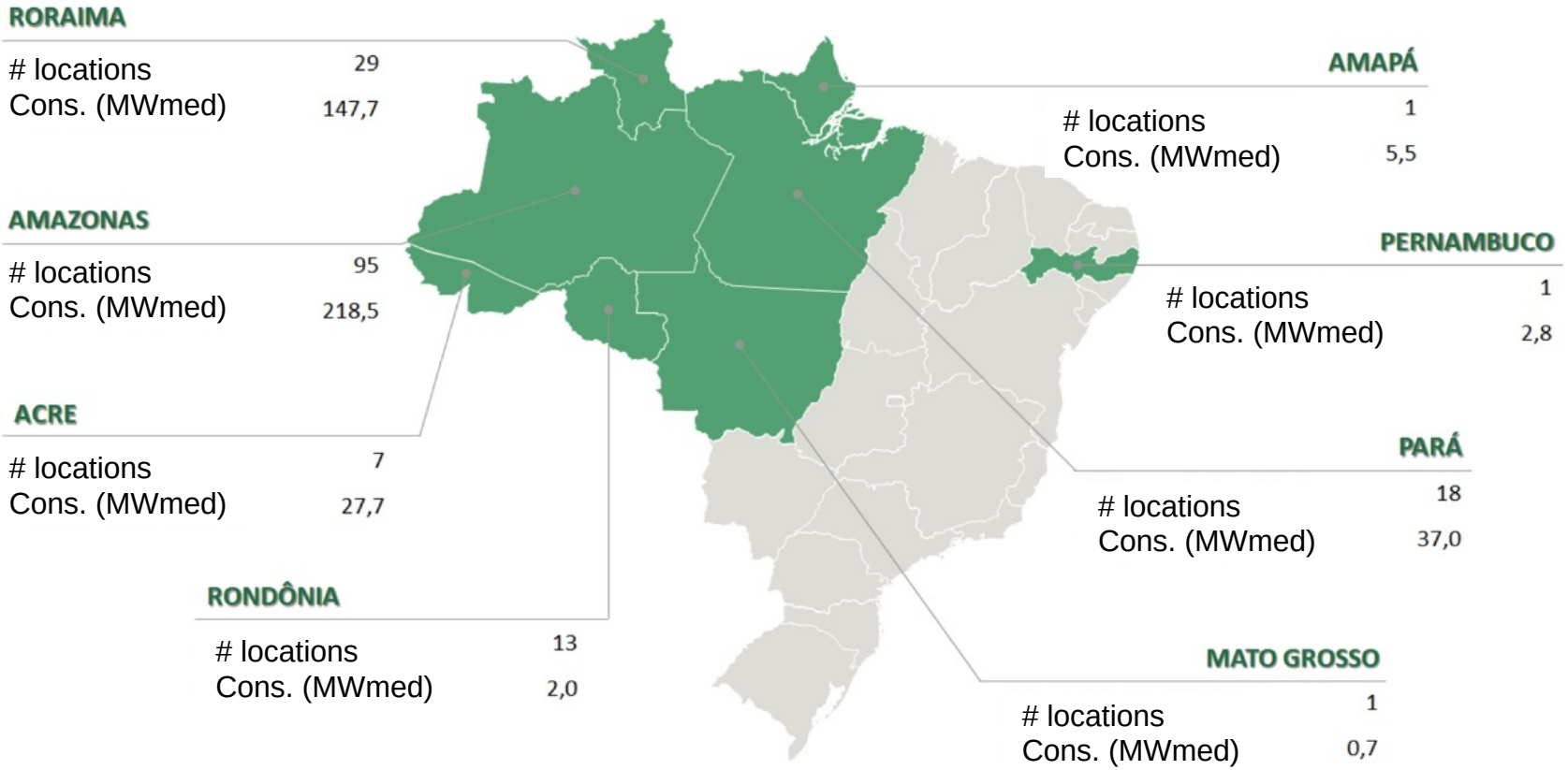
Energy storage is becoming a key element for modernizing the electricity sector across the globe



Business proposition of energy storage in Brazil?

Source: IFC, ABSOLAR

Energy storage will contribute to decarbonizing the energy generation in the Amazon region



- **≈ 300** off-grid systems serving **≈ 3 mn** people;
- **97%** of installed capacity are **Diesel** generators whose fuel is heavily subsidized (≈ EUR 2 bn/yerar)

Source: ANEEL

The latest ‘innovation’ in large scale off-grid energy generation in the Amazon region

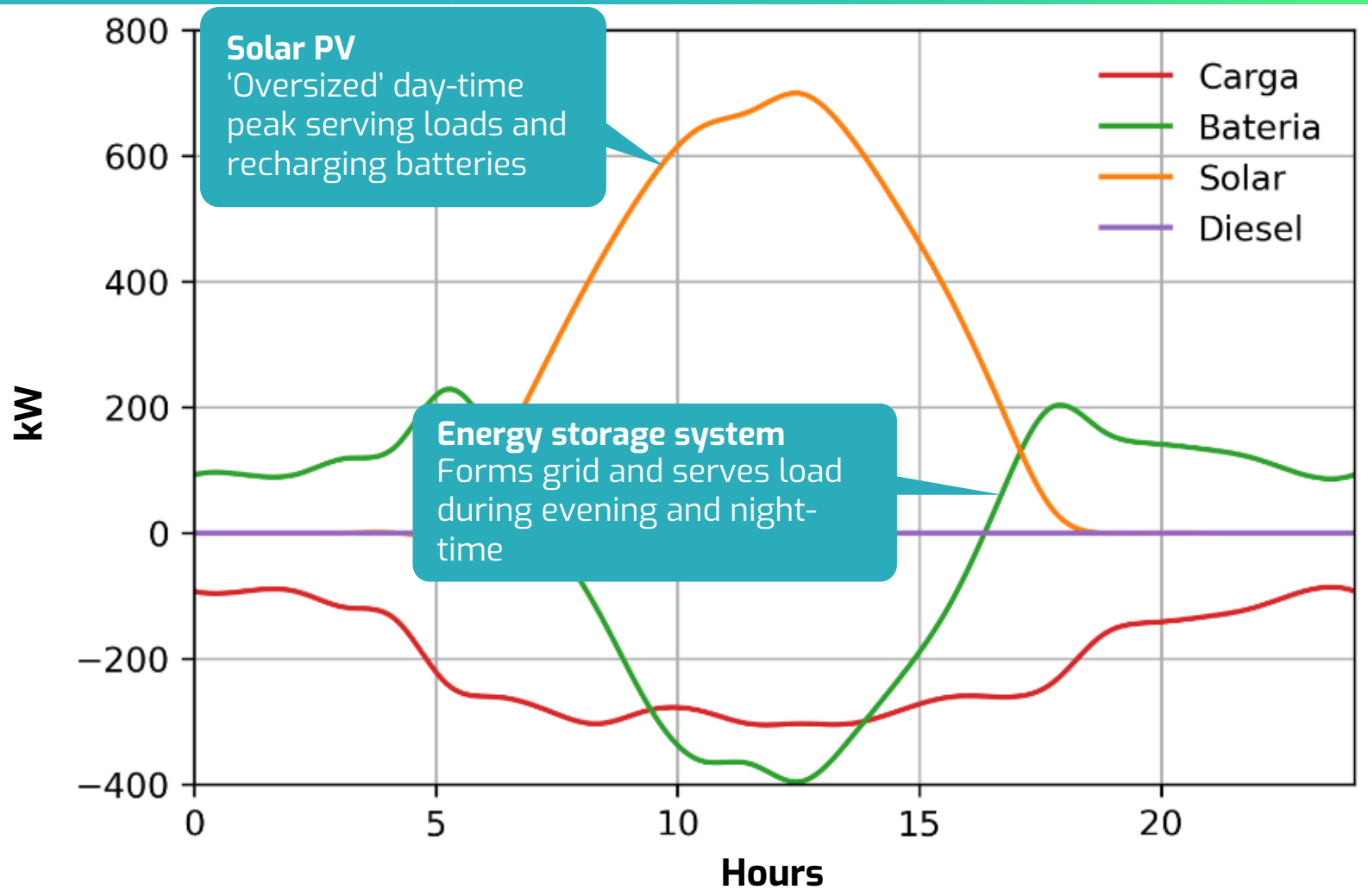
Jaguatirica II – 140 MW natural gas turbines

Boa Vista

- **State capital** of Roraima;
- **Coordinates**: 2°49’10”**N,** 60°40’17”” **W**
- **Population**: ≈500.000

Fuel logisticts in the Amazon region (BR 174)

Load and generation profile of a renewable off-grid system



Client: heliport serving oil platforms located in the Bacia do Campos

Case study – Vila Restauração (state of Acre)

Solution to provide carbon-free electricity to Vila Restauração

- **325 kWp** solar PV system;
- **829 kWh** energy storage system using LFP batteries;

Vila Restauração

- Remote community in Acre, close to border with Perú;
- Population: ≈ 750;
- Only accessible by river and aircraft;

Source: Energisa, Agência Acre, Canalsolar

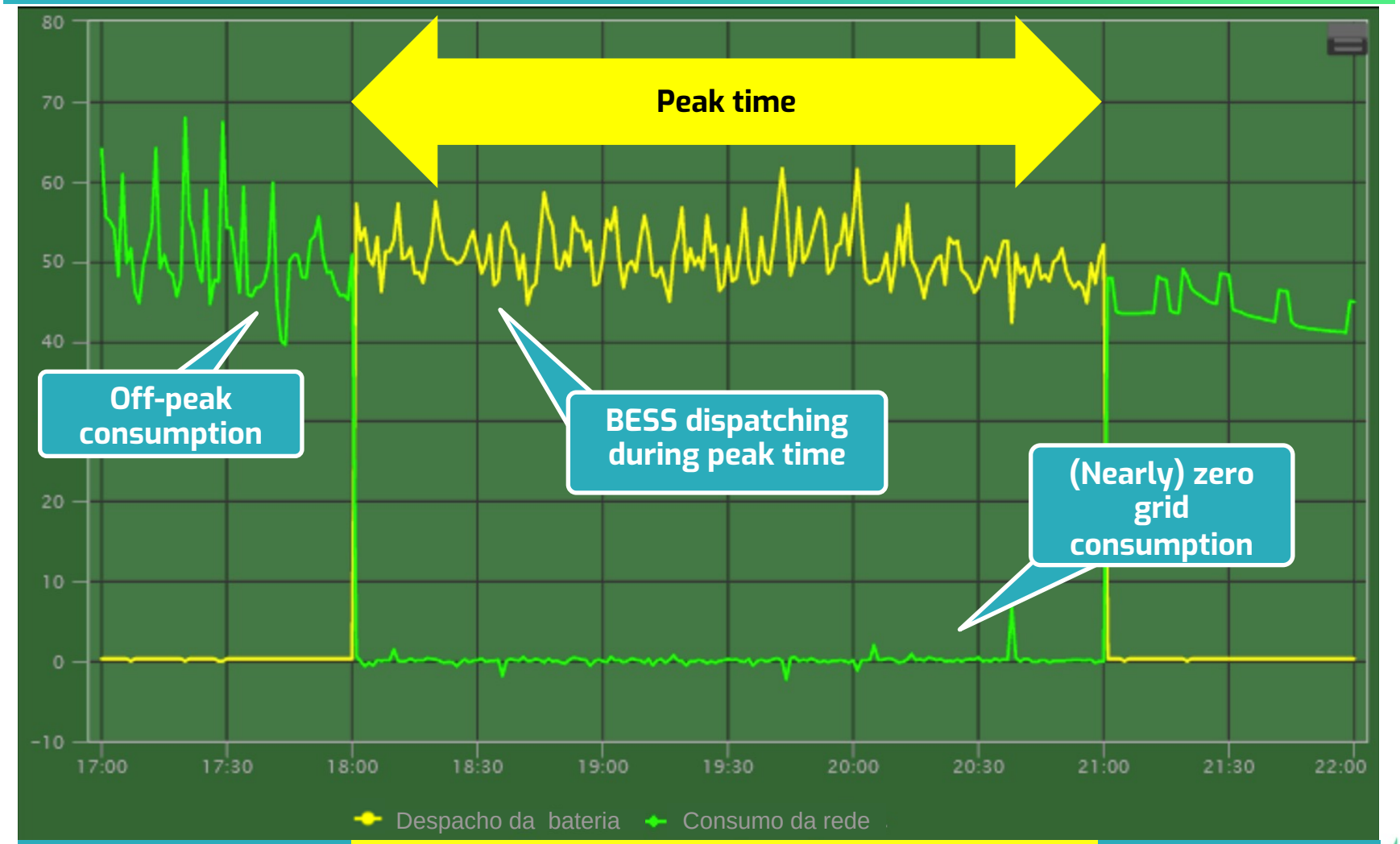
Electricity cost for selected telecom sites in Northern Brazil

Current electricity consumption and cost

Item	Amount	Rate	Annual cost
Contracted demand	939 kW	EUR 8,7/kW	EUR 98.174
Peak-time consumption	491 MWh/yr	EUR 831/MWh	EUR 407.432
Off-peak consumption	5.093 MWh/yr	EUR 79/MWh	EUR 401.197
Total			**EUR 906.804**

Real client data
2021 consumption

Using an energy storage system for load shifting allows to reduce electricity cost during expensive peak hours



Off-peak
(EUR 0,08/kWh)

Peak-time
(EUR 0,83/kWh)

Electricity spending of selected sites of telecom network operator AFTER project implementation

	Prior to project		After project	
Item	**Amount**	**Annual cost**	**Amount**	**Annual cost**
Contracted demand	939 kW	EUR 98.174	939 kW	EUR 98.174
Peak-time consumption	491 MWh/yr	EUR 407.432	35 MWh/yr	EUR 29.403
Off-peak consumption	5.093 MWh/yr	EUR 401.197	5.664 MWh/yr	EUR 446.126
Total		**EUR 906.804**		**EUR 573.704**

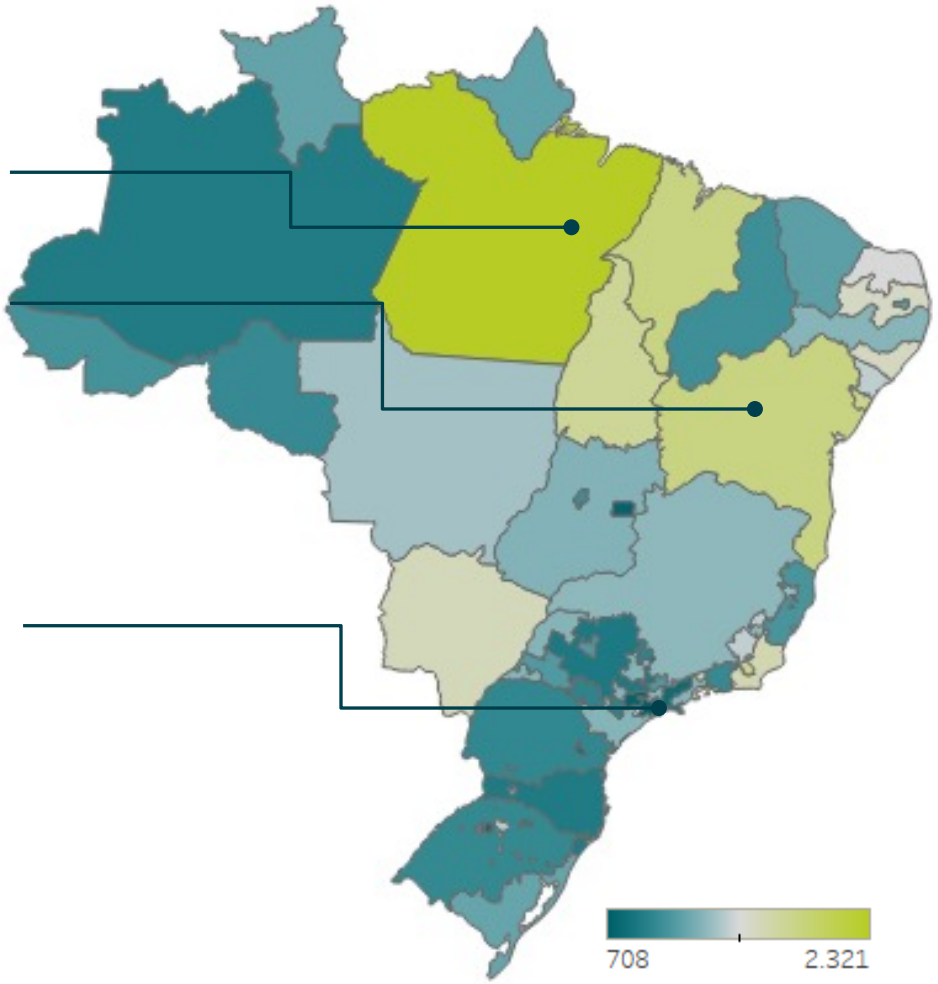
37% savings

Map of commercial and industrial electricity rates across Brazil

Electric utility	State	Δ P-OP* (BRL/MWh)
Equatorial PA	PA	2.419
Cemar	MA	2.066
Coelba	BA	1.889
Sulgipe	SE	1.846
ENF	RJ	1.825
ETO	TO	1.797
EPB	PB	1.761
Enel RJ	RJ	1.688
EMS	MS	1.646
CEAL	AL	1.618

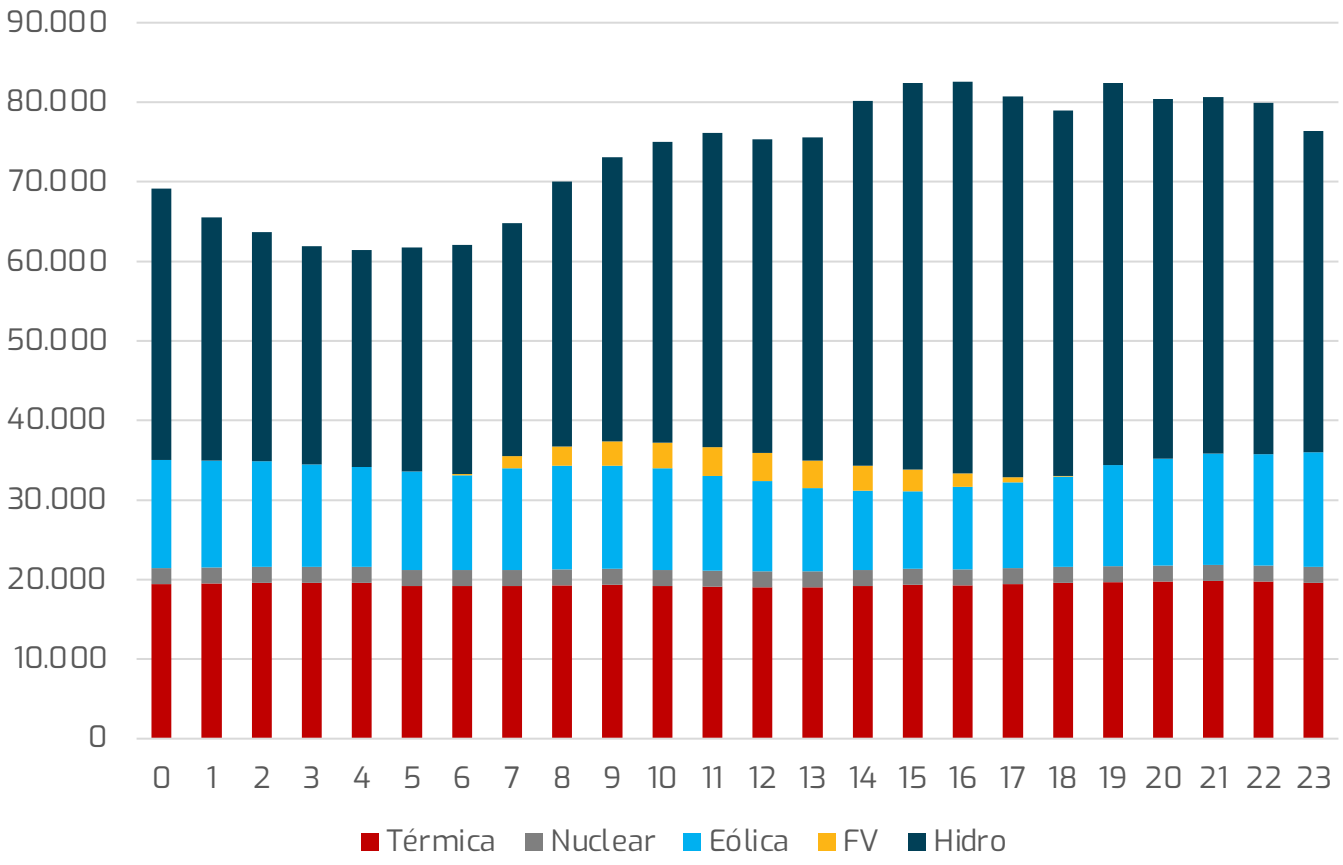
MORE ATTRACTIVE

LESS ATTRACTIVE



Today hydropower is providing flexibility and resilience to the Brazilian electricity grid

SIN, september 28, 2021 (MW)

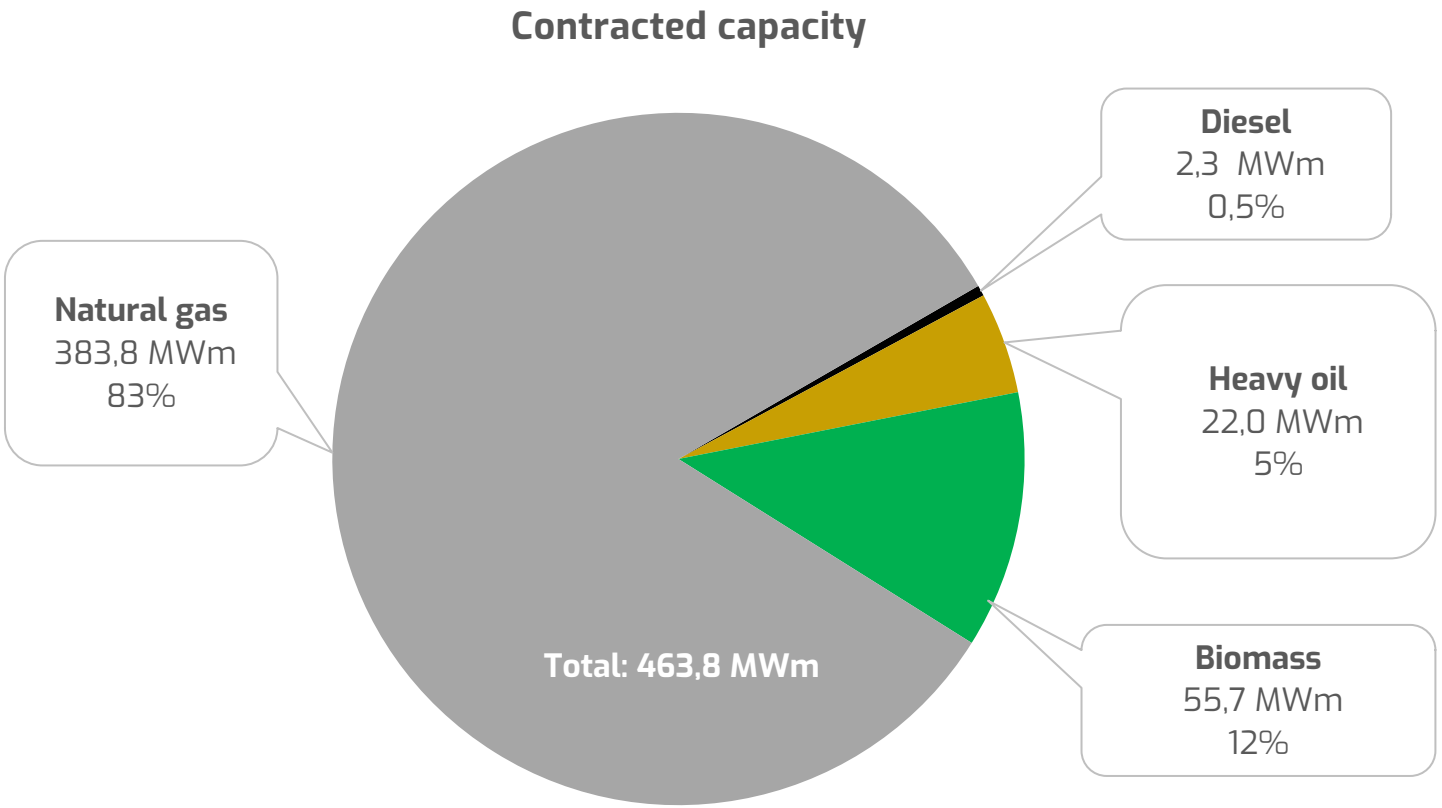


Currently the ONS is using hydroelectric power plants to match energy supply and demand. In the future, the growth of variable renewable source will require increased flexibility for grid management

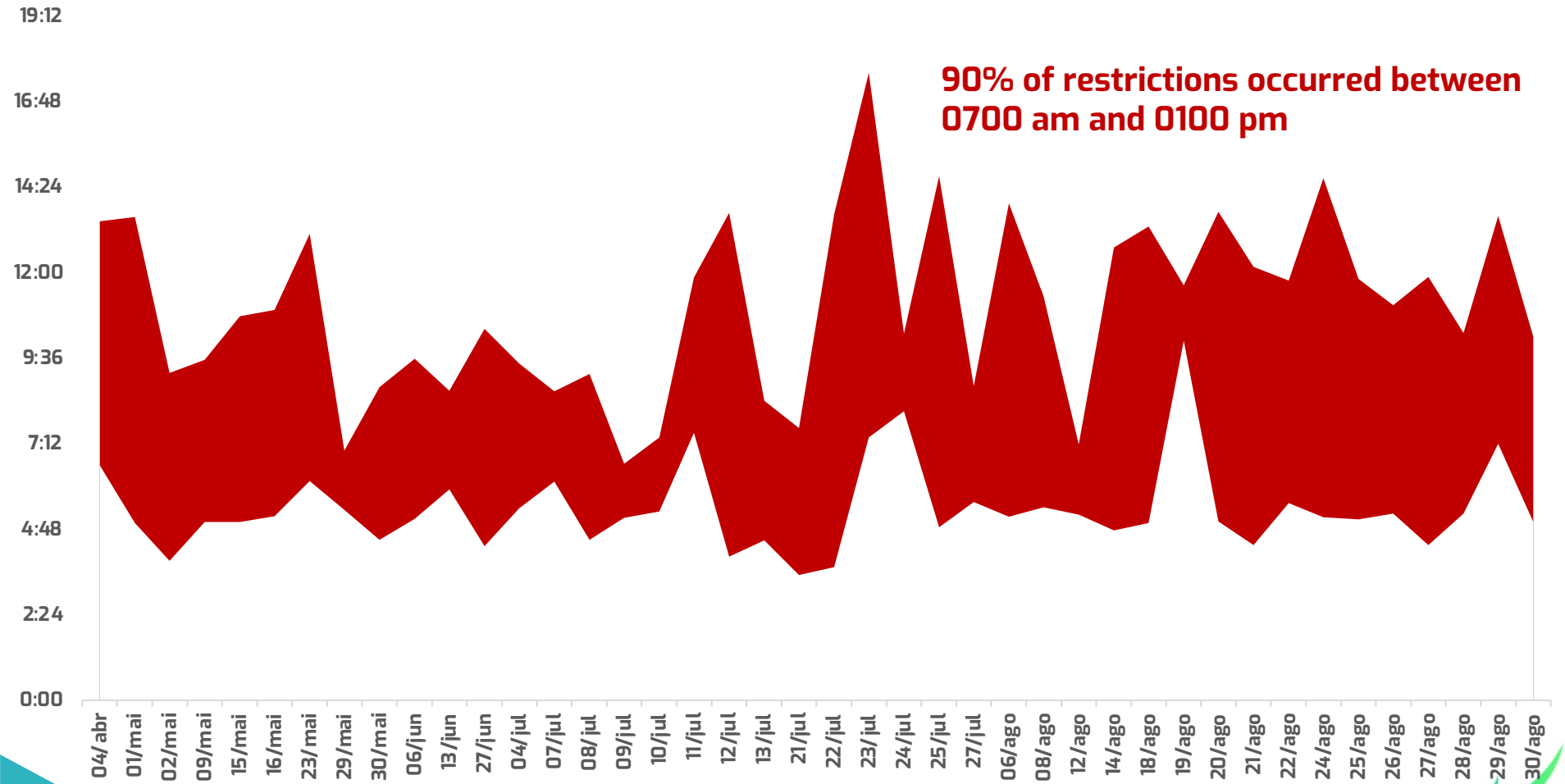
Source: ONS, NewCharge

Results from 2021 reserve capacity auction

Average price (EUR/MW/year)	≈ EUR 160.000

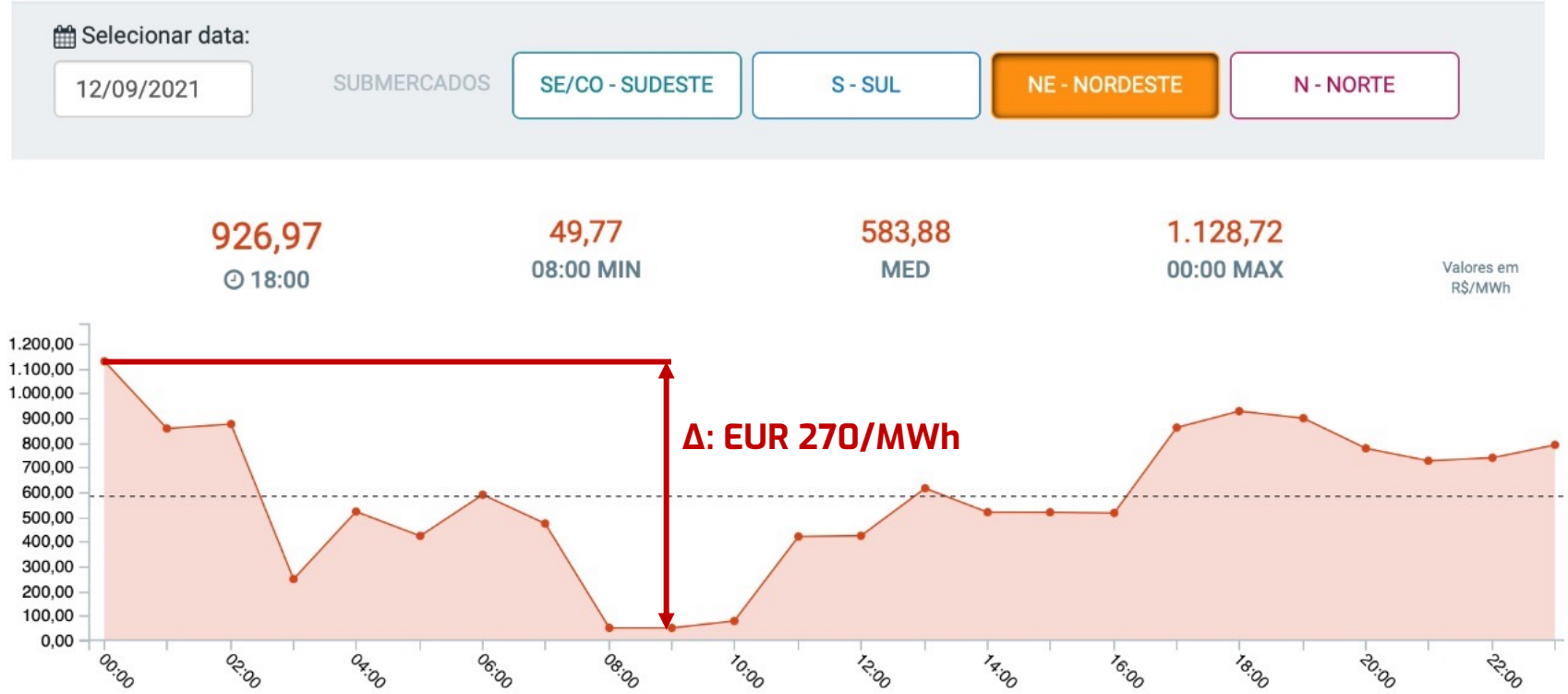


Curtailment of large-scale solar power plant located in Northeastern Brazil



In the medium-term, there will be attractive intraday and inter-day trading opportunities, especially in Northeastern Brazil

September 12, 2021



Source: CCEE

Building a business case for large-scale energy storage in Brazil

	Economic feasibility	Regulatory aspects
Short-term trading	• Could become economically feasible in Northeastern Brazil in the medium term	• Would require significant changes to calculation methodology for short-term market price
Ancillary services	• Not feasible at current prices; • Might become attractive after re-evaluation	• Would require minor regulatory changes
Reserve capacity	• Economically feasible with current prices	• Does require 'infra-legal' regulatory changes
Mitigate curtailment	• Contributes to business case but not viable on a stand-alone basis	• Does not require any regulatory changes; • Requires clarification of grid-access of BESS

Selected energy storage projects in Brazil

Virtual transmission (expected for Q4 2022 / Q1 2023) **–**
- 60 MWh project to be installed in state of São Paulo;
- Main goal is to relieve congestion relief in N-1 and N conditions;
- Approved in late 2021;

Solar x PV coupling (implemented) **–**
- 1 MWh R&D project coupled to utility-scale solar PV plant;
- Main goal is to evaluate different services energy storage can provide to large-scale solar PV plants and local distribution grid;

Offgrid (many implemented projects) **–**
- Rural electrification;
- Farming (irrigation);
- Mining compantes;
- 'Diesel killers'

C&I projects (several implemented) **–**
- Growing number of commercial C&I projects for shopping malls, distribution centers, hotels, telecom network operators, mining companies (≈ 100 kWh up to 10 MWh);
- Main purpose: load shifting, peak shaving, backup

Tax reform and regulatory adjustments will be critical to facilitate growth of the Brazilian energy storage sector

Taxation	• Excessive taxation –
	  • 65% for storage systems assembled in Brazil;
	  • 79% for imported systems;
	
	→ **Tax rates on storage systems and related components need to be reduced to stimulate market *(and even to increase tax revenues)***

Regulation	• The current regulations do not foresee energy storage and providers of storage services; • There are no rules for grid connection of storage projects; • Utilities are reluctant to authorize grid connections of behind-the-meter storage systems; → **Adequate definition of energy storage urgently needed;** → **Application-specific rules needed;**

Muito obrigado pela atenção

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