THE smarter E SOUTH AMERICA

EXHIBITION & CONFERENCE
AUGUST 27–29, 2024
SAO PAULO, BRAZIL

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EXHIBITION & CONFERENCE
SEPTEMBER 3–5, 2024
MEXICO CITY, MEXICO

WEBINAR

The Promising Growth Outlook of Energy Storage in Brazil and Mexico

ABOUT THE ORGANIZER OF THE WEBINAR

The smarter E South America

LATAM’s innovation hub for the new energy world

By uniting four parallel exhibitions, **The smarter E South America is LATAM’s largest platform for the new energy and mobility world**. Following the vision of a renewable, decentralized and digital energy world and a sustainable mobility future, The smarter E South America takes a comprehensive approach by presenting cross-sector solutions and technologies. It creates opportunities to address all key areas across sectors and industries. Focusing on the interplay of **power generation, storage, energy management and e-mobility**, The smarter E South America brings together international stakeholders of the energy and mobility future from across the world’s most influential markets.

QUICK FACTS

INTERSOLAR MEXICO 2024

The 1st solar-plus-storage event in Mexico after the elections!

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- **Date**: September 3–5, 2024
- **Venue**: Centro Citibanamex, Mexico City
- **Topics**: PV, solar heating & cooling, energy storage
- **Co-located events**: The GREEN Expo®, Aquatech Mexico
- **Special Exhibition**: ees (electrical energy storage) Mexico
- **Exhibitors**: 400+ expected (combined)
- **Visitors**: 12,000 expected (combined)
- **Content:** 2-day conference program, 3-day Stage program and technical workshops
- **Entrance fee**: entry to the exhibitions free of charge
- **Ticket Shop**: www.intersolar.mx/registration

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The smarter E South America,
August 27-29, 2024

- Element1 (Green H2) Pavilion
- Special Exhibit E-Mobility
- Europe Pavilion
- U.S. Pavilion

More Information

Intersolar Mexico,
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Join the ees & eMobility Pavilion or LATAM Pavilion. Pricing starts from $2,500.

More Information

CONTENT

The Promising Growth Outlook of Energy Storage in Brazil and Mexico

Content of Webinar

Despite the exponential growth of the global energy storage market, Latin America has not yet emerged as a significant player. Currently, the largest energy storage projects in the region are being implemented in Chile. Like Chile, Brazil is experiencing a surplus of renewable energy and requires large-scale energy storage solutions to enhance operational flexibility. Meanwhile, Mexico is on the brink of a new era in renewable energy, with the new government's plans for the next six years potentially sparking the development of the storage market. Join us in this webinar to discover why energy storage in Brazil and Mexico holds a promising growth outlook.

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Consultant

matters

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Time for Questions

MEXICO & BRAZIL

Upcoming Events

The smarter E South America

August 27–29, 2024

Sao Paulo, Brazil

Intersolar Mexico

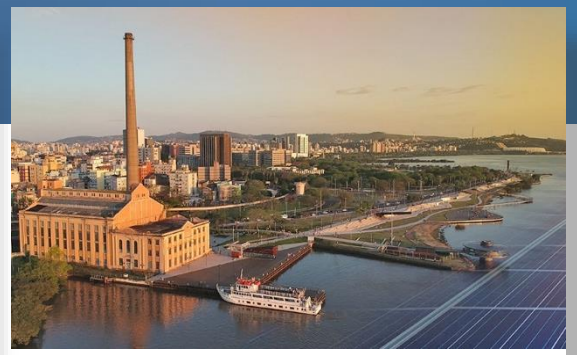
September 3–5, 2024

Mexico City, Mexico

Intersolar Summit Brasil Nordeste

April 23–24, 2025

Fortaleza, Brazil



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Porto Alegre, Brazil

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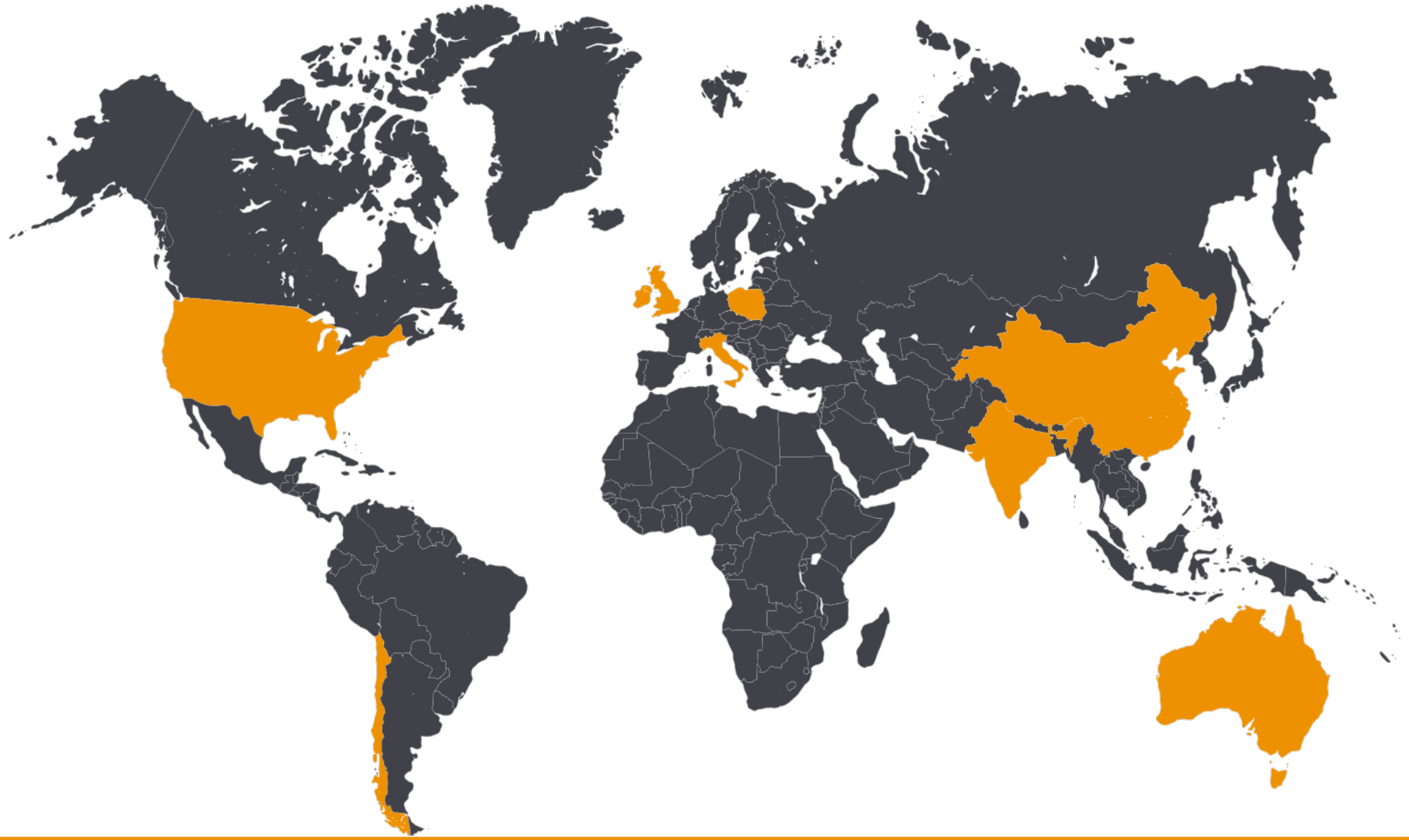
Thank you for your Attention!

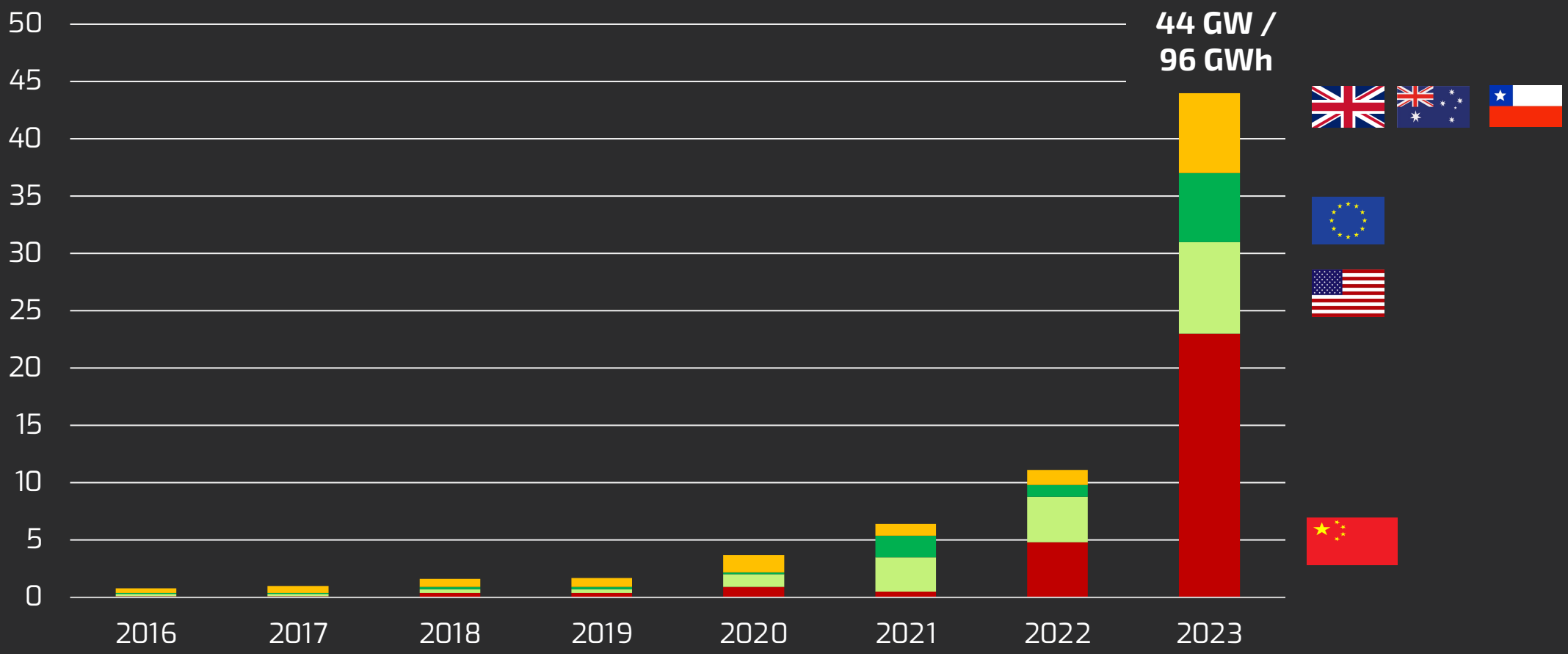
The Promising Growth Outlook of Energy Storage in Brazil

NEWCHARGE academy



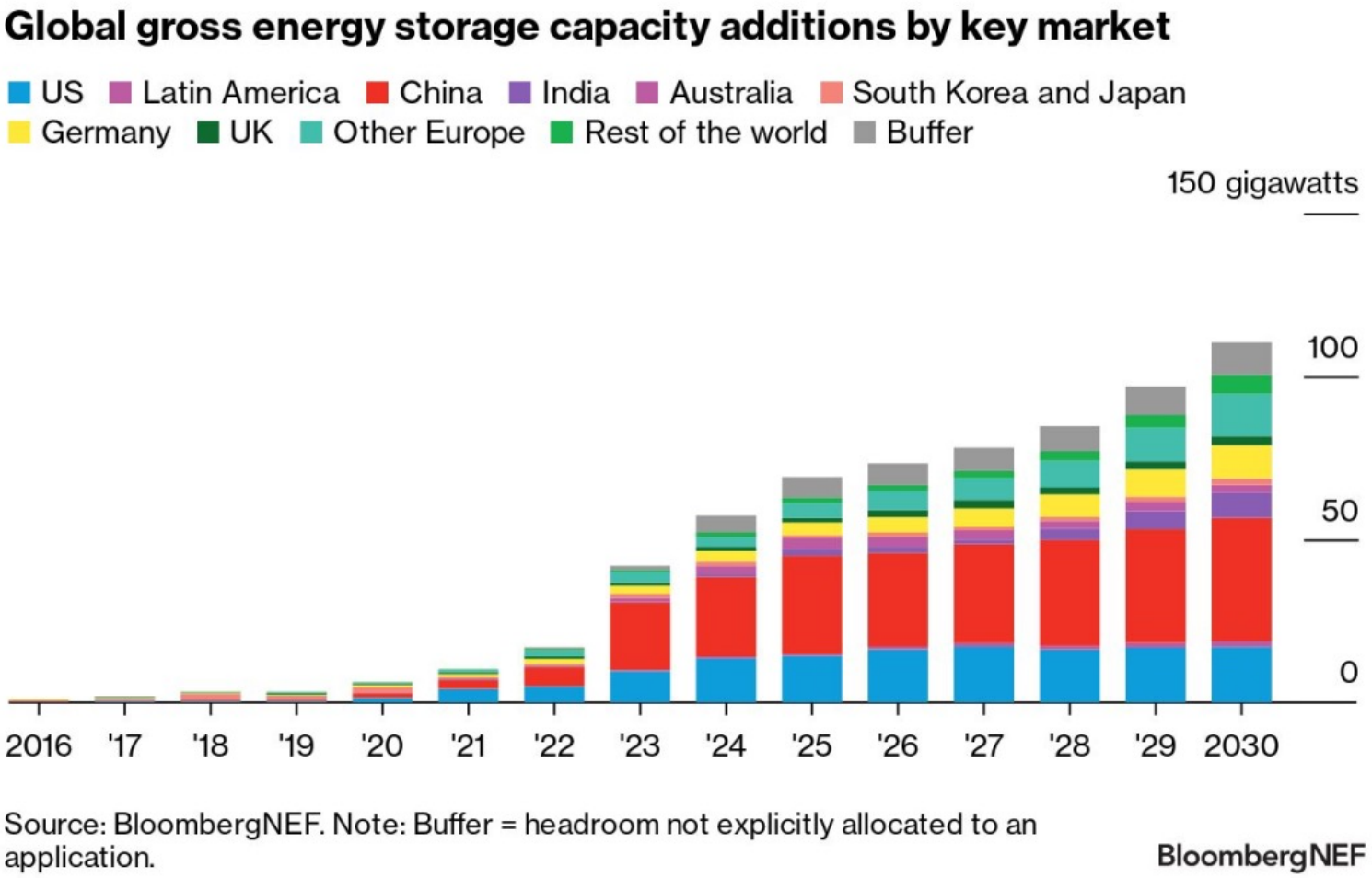
The global energy storage ‘heat-map’

Novas instalações de projetos de armazenamento com baterias (GW)



The global energy storage market is growing exponentially

ENERGY STORAGE IS ABSOLUTELY VITAL TO SUSTAIN THE GROWTH OF LOW-CARBON RENEWABLE SOURCES



Key applications

Front of the meter

- Support integration of variable renewable generation;
- Postpone investments in transmission and distribution;

Behind-the-meter

- Consumption and cost management (load-shifting, peak shaving);
- Energy backup;
- Electric vehicles integration/ vehicle-to-grid;

Offgrid

- Replacement of fossil generation with renewable sources (solar) with storage;

CURRENTLY, CHILE IS THE LEADING MARKET FOR ENERGY STORAGE IN SOUTH AMERICA

AES ANDES SOLAR:
- 112 MW / 560 MWh;
- PV Coupled;
- COD August 2023;

AES LOS ANDES:
- 12 MW / 4 MWh;
- COD in 2009

AES ANGAMOS:
- 20 MW / 5 MWh;
- COD 2009;
- Coupled with coal plant

ENGIE LA COYA:
- 181 MW solar + 638 MWh BESS;
- Just went online

EGP LA CABAÑA:
- 106 MW wind + 30 MW BESS;

EGP RIHUE:
- 120 MW wind + 30 MW BESS;

IMPLEMENTED

DEVELOPMENT / CONSTRUCTION

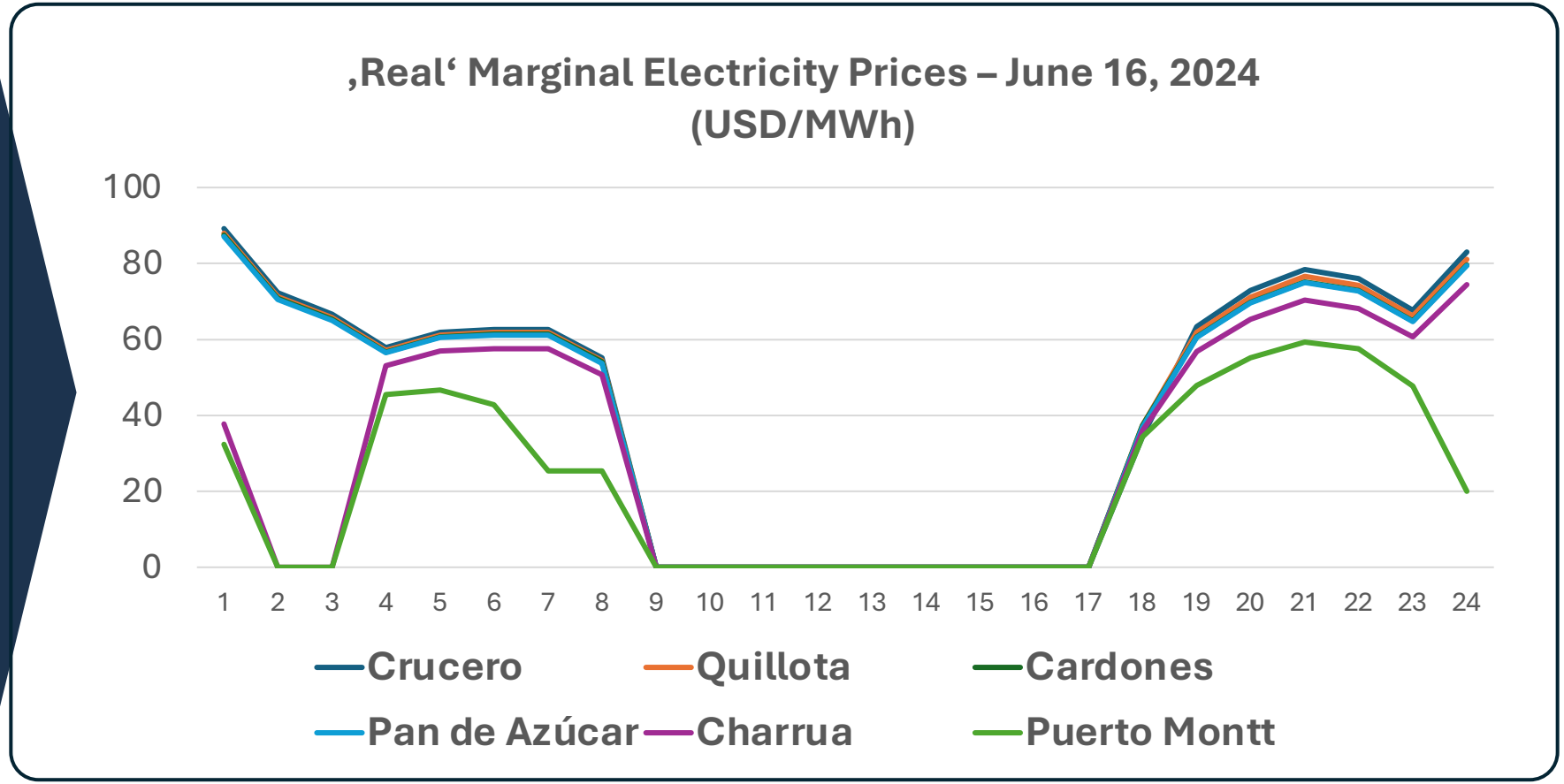
LARGEST BESS IN SOUTH AMERICA

- All projects coupled to renewable plants, as supported by the current regulatory framework;
- Main functions: alleviate curtailment, optimize IPP revenue;

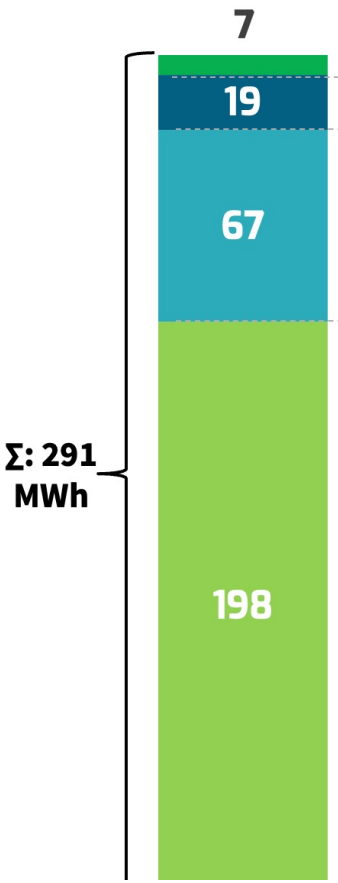
THE CHILEAN MARKET OFFERS VIABLE CONDITIONS FOR THE IMPLMENTATION OF LARGE-SCALE STORAGE PROJECTS

CHALLENGE OF INTEGRATING ‚NEW' RENEWABLES WITH CONVENTIONAL SOURCES –

- Roughly 30% of Chilean electricity is provided by inflexible coal and hydropower;
- Massive, daily curtailment of wind and solar, equivalent to ≈ 40% of its generation capacity;



Installed capacity of storage projects in Brazil (MWh, as of 11/2023)



Off-grid systems
- Projects for farmers and pilots in the Amazon region;
- ***Regulatory status:*** *partially addressed – needs clarification*

'Behind-the-meter'
- Projects for cost optimization and energy backup;
- ***Regulatory status:*** *partially addressed - needs further clarification;*

'In-front-of-the-meter'
- **Comercial 60-MWh project** at Registro (SP) substation;
- **Several R&D** projects implemented;
- ***Regulatory status:*** *partially addressed for transmission. For stand-alone projects and BESS coupled to generation, new regulation expected by December;*

Rural electrification projects
- Small systems for serving isolated residences - contracts via the energy distributor.
- Federal government target to install over 200,000 systems by 2026.
- ***Regulatory status:*** *concluded;*

Pioneering 'in-front-of-the-meter' BESS projects:

isa CTEEP — 30MW/60MWh BESS in transmission at the Registro Substation/SP

ENGIE — 1 MW/1MWh R&D BESS installed in Tubarão/SC in a hybrid solar PV and wind power plant

Other companies with BESS initiatives – ANEEL Strategic R&D Program nº 21/2016:

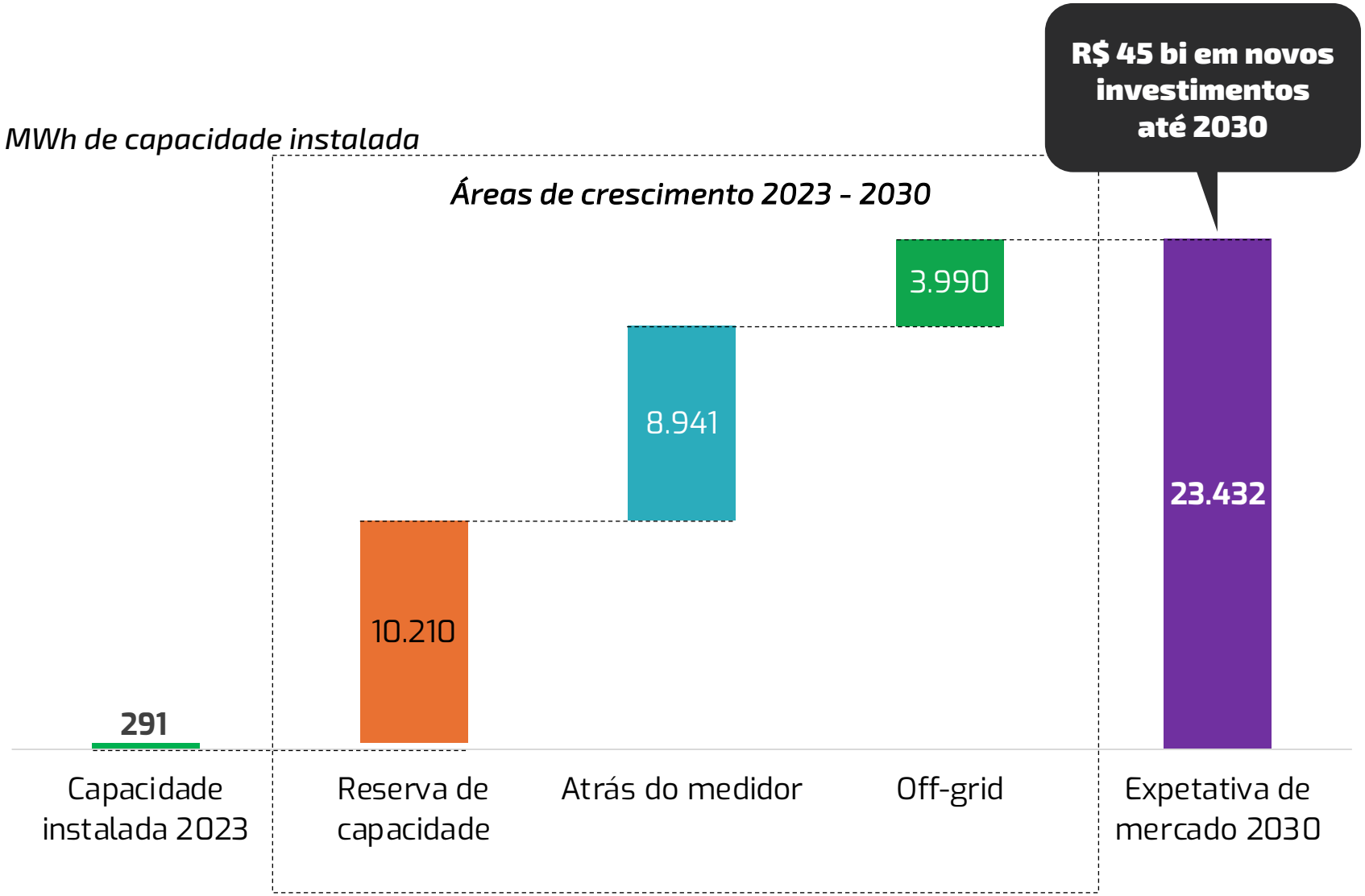
Eletrobras
- Generation;
- Green hydrogen;

auren
- Generation

CEMIG
- Distribution
- Generation

COPEL
- Distribution
- Transmission

The Brazilian BESS market is still at an early stage of development



Reserva de capacidade:

- Crescimento de fontes renováveis trará a necessidade de expansão de fontes de confiabilidade;

Atrás do medidor:

- Oportunidades de gerar economias para consumidores em média tensão e atuar em mecanismos de resposta da demanda;

Off-grid:

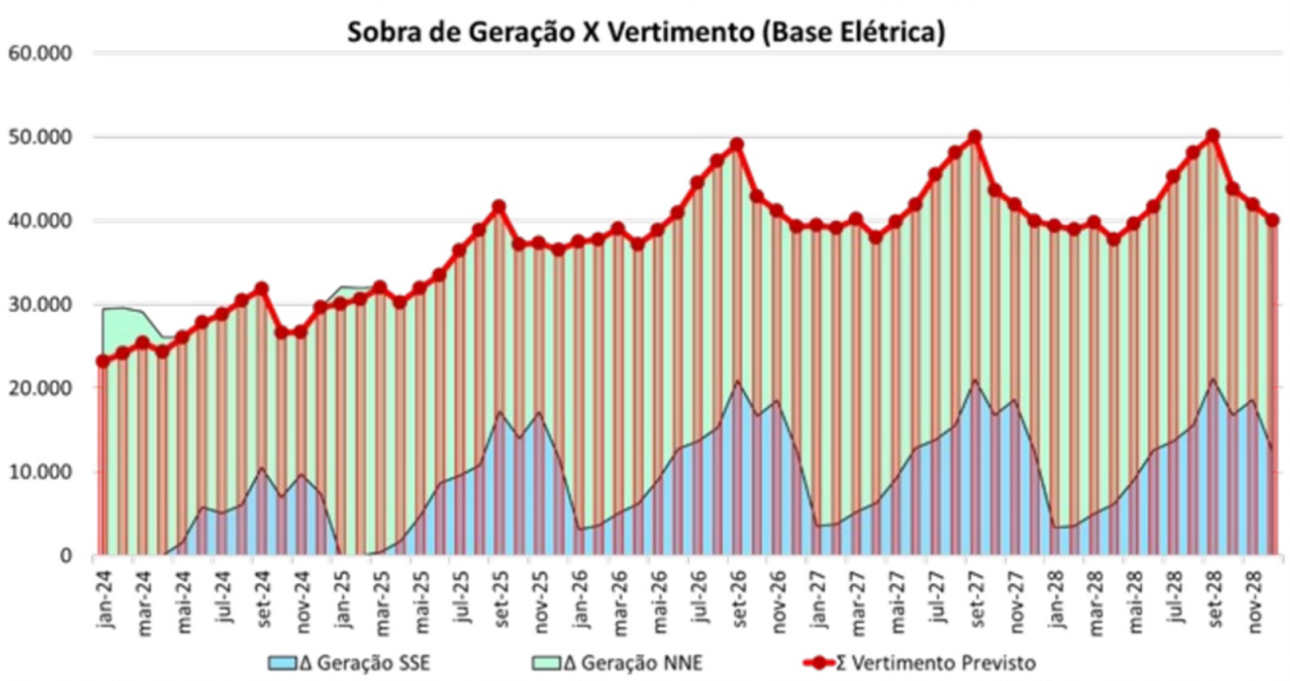
- Substituição de fontes fósseis caras e poluentes por soluções renováveis com armazenamento.

The Brazilian energy storage market is expected to reach an installed capacity of 23 GWh by 2030

Fonte: NewCharge, 2023

LIKE CHILE, BRAZIL IS ALSO FACING SURPLUS RENEWABLE ENERGY AND NEEDS LARGE-SCALE STORAGE FOR OPERATIONAL FLEXIBILITY

Curtailment of renewable energy expected to reach 50 GW by 2028



Expected duration of dispatches for reserve capacity not to exceed 4 hours

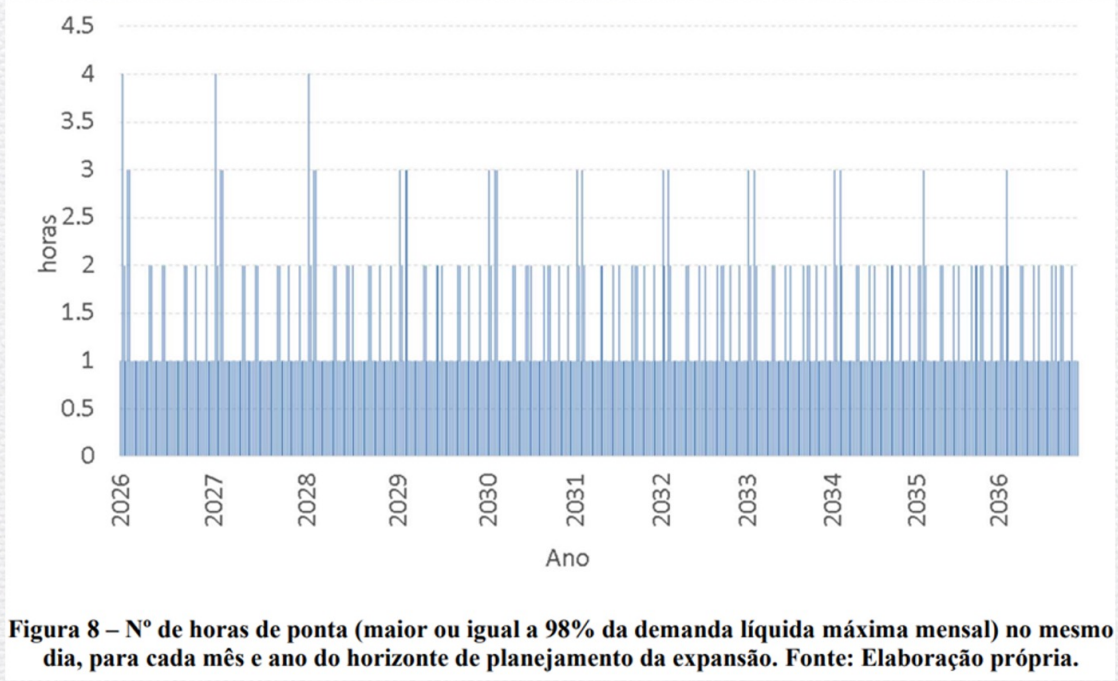


Figura 8 – Nº de horas de ponta (maior ou igual a 98% da demanda líquida máxima mensal) no mesmo dia, para cada mês e ano do horizonte de planejamento da expansão. Fonte: Elaboração própria.

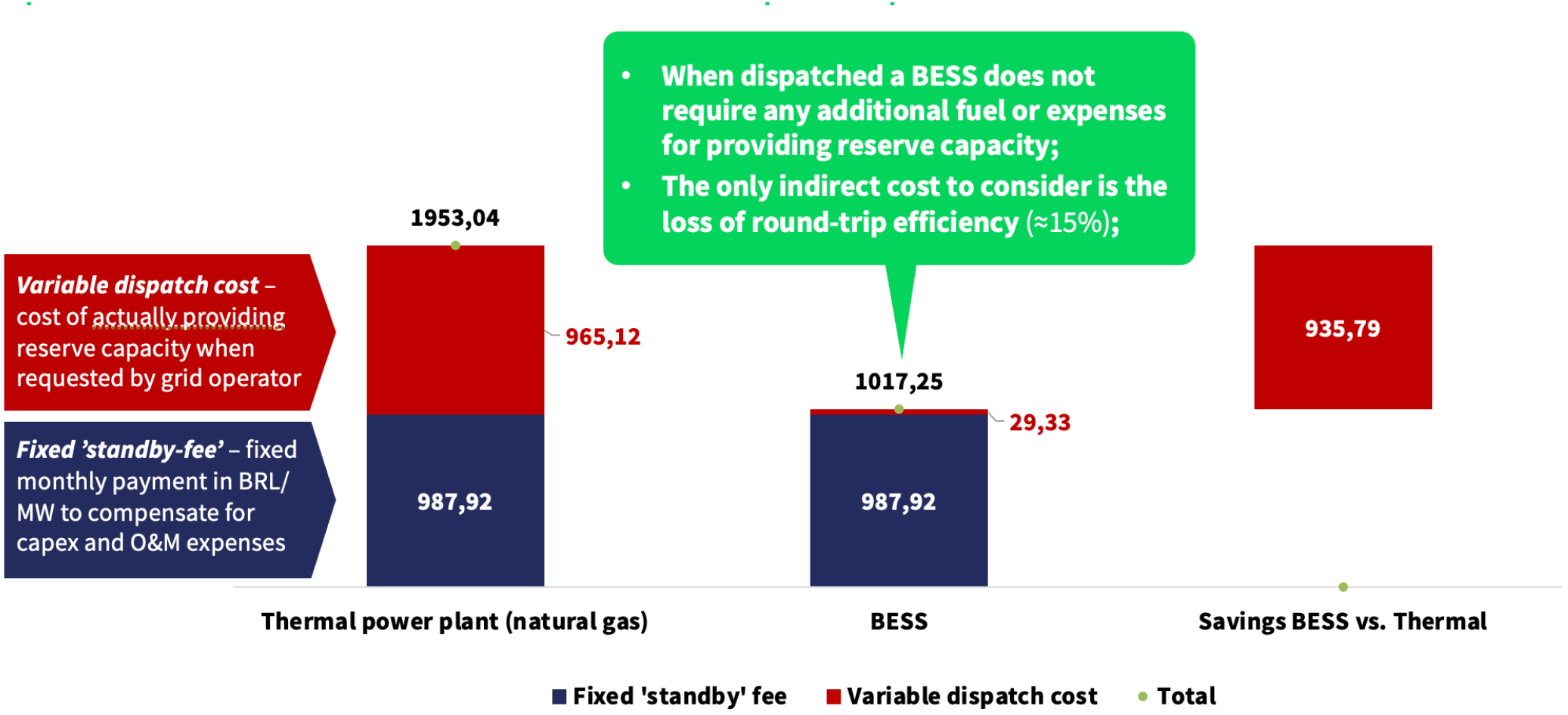
SO FAR, THE GOVERNMENT IS ONLY CONSIDERING THERMAL AND HYDROPOWER FOR RESERVE CAPACITY

LRCAP 2024		
PRODUTO	**DURAÇÃO/CONTRATO**	**INÍCIO DE OPERAÇÃO**
Potência termo-elétrica **2027**	7 anos	01/07/2028
Potência termo-elétrica **2028**	15 anos	01/082028
Potência hidroelétrica **2028**	15 anos	01/02/2018

PRICIPAIS REQUISITOS 2024	
TÓPICOS	**LRCAP 2024**
Produtos a serem contratados	Apenas produto potência
Fontes elegíveis	UTE, UHE
Requisitos rampa	R-up: ≤1,5 horas T-on: ≤ 8 horas R-dn: ≤ 1 hora T-off: ≤ 8 horas
Remuneração despacho	Durante tempo requisitado: max (CVU, PLD)Outros horários: PLD
Custo rampa	Custo do empreendedor

SMART CHOICE ... ??

A 4-HOUR BESS FOR RESERVE CAPACITY IS ALREADY COMPETITIVE WITH THERMAL POWER PLANTS



- **When dispatched a BESS does not require any additional fuel or expenses for providing reserve capacity;**
- **The only indirect cost to consider is the loss of round-trip efficiency** (≈15%);

EXAMPLES OF COMMERCIAL ENERGY STORAGE PROJECTS IN BRAZIL

THE BRAZILIAN REGULATORY AGENCY EXPECTS A BASIC REGULATORY FRAMEWORK TO BE IN PLACE BY DECEMBER 2024

In **2023** ANEEL conducted a **public consultation** (CP 039/2023) on energy storage, focusing on large-scale stand-alone project and BESS coupled to generation projects.

Highlights:

- Simplified approval for BESS coupled to generation projects;
- Definition of the 'energy-storage agent' for stand-alone BESS projects;
- Non-cumulative calculation of grid-connection fees *(similar to hybrid solar + wind projects)*;
- Possibility of revenue-stacking

Go-to-market Case: Distributed generation in Brazil

- Distributed Generation in Brazil has faced a vertiginous growth since regulatory framework in 2012. Increase of electricity tariffs, decrease of solar PV equipment prices, adequate regulation, tax exception and public policy.
    - 2012: REN ANEEL nº 482/2012 – Distributed generation regulatory framework
    - 2015: REN ANEEL nº 687/2015 – Framework for new possibilities of compensation and tax incentives on compensation (PIS, COFINS e ICMS)

Recent statements from executives from ANEEL

Sandoval Feitosa
Director General

"ANEEL will not be the limiting factor for the development of the energy storage market"

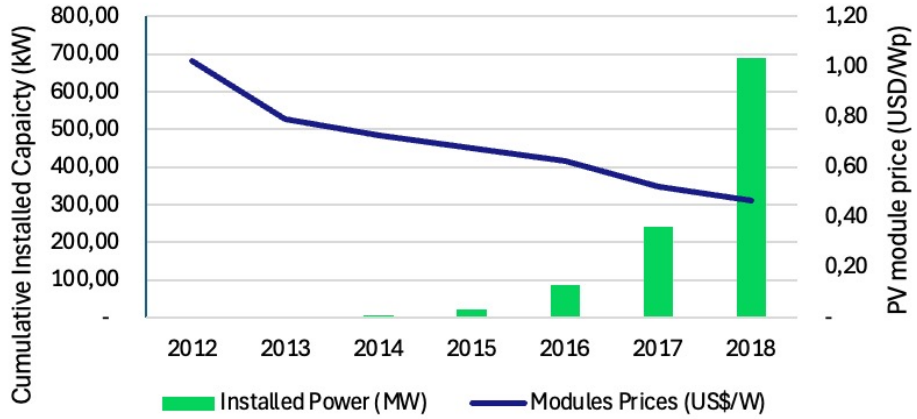
Ricardo Tili
Director

"The normative resolution for energy storage will be ready by December/24"

Alessandro Cantarino
Superintendent

"Very soon we will conduct a public consultation on the new storage resolution"

Overview of PV Instalations (2012-2018)

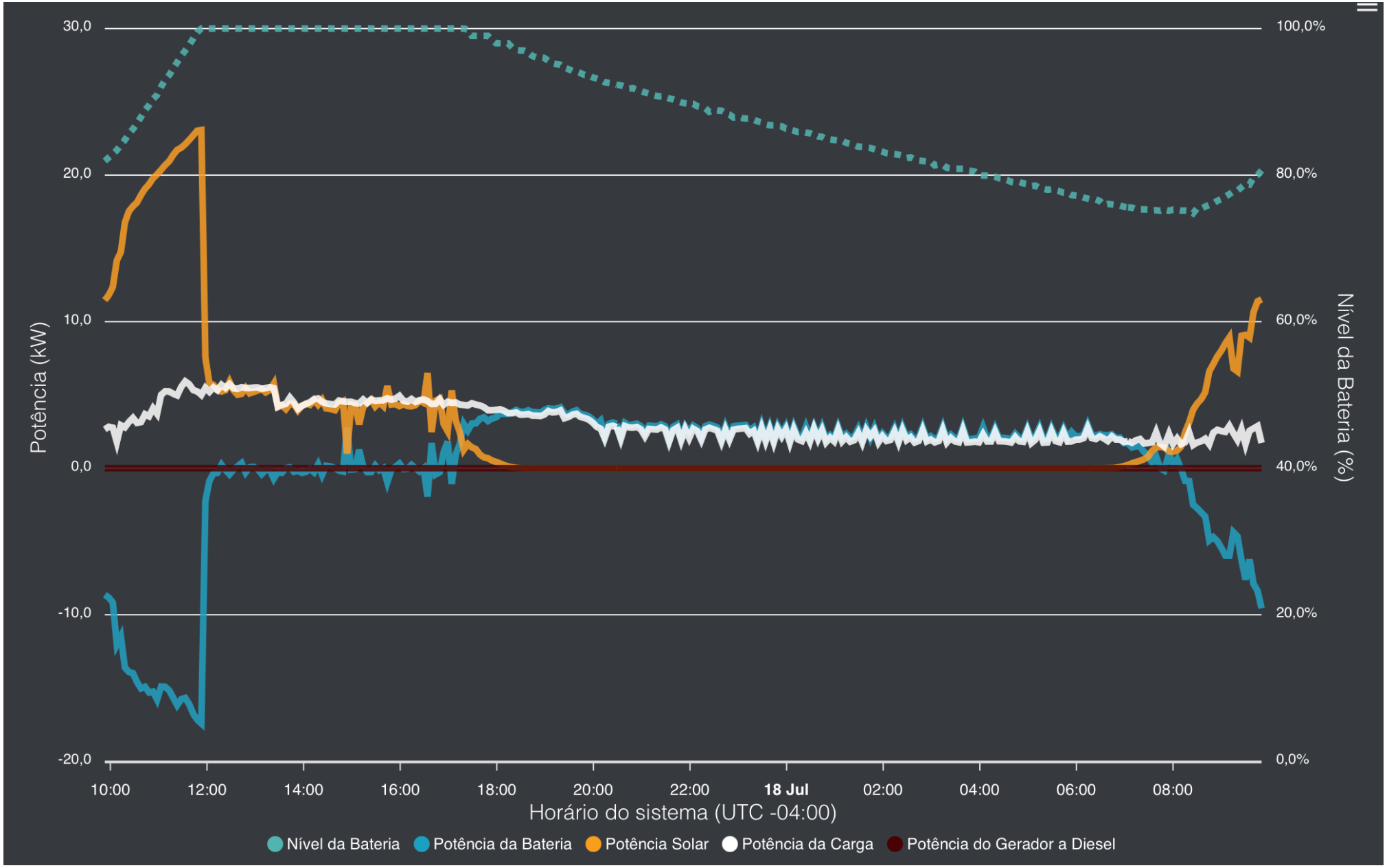


2 pilot projects –

- 5,7 MVA Diesel generators
- 1,9 MWp solar power plants
- 1,4 MWh BESS
- 30% renewable energy
- 30.000 consumers served

ENERGY STORAGE PLAYS A VITAL ROLE FOR LOW-CARBON ELECTRICITY SOLUTIONS IN THE AMAZON REGION

CONTROL PANEL OF A HYBRID SOLAR+BESS OFF-GRID PLANT



- Brazil is poised to become the largest energy storage market in South America;
- The key value proposition of BESS is cost savings, not decarbonization;
- A first wave of energy storage have already been implemented and is proving the technical and economic viability of energy storage in Brazil;
- Reserve capacity is likely become the key storage application in the short-term. Participation in reserve capacity auction will mark an 'inflection point' and propel the local energy storage market to a new level of growth;
- Public policies are lagging and will require future evolution – regulatory frameworks and taxation guidelines.

Key take-aways from the Brazilian energy storage market

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The Promising Growth Outlook of Energy Storage in Mexico

Webinar, July 18 2024

Red de Almacenamiento de Energía

laboratorio de almacenamiento de energía

The Electric Grid in Mexico and Why Energy Storage is Necessary

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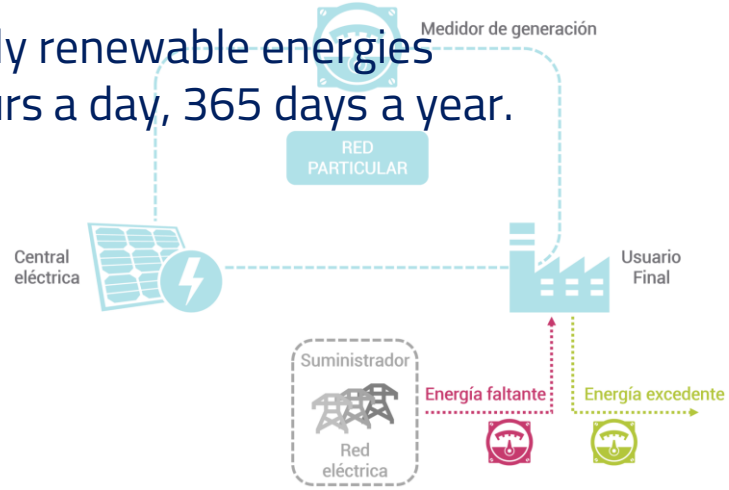
Only 12.1% of energy comes from renewable sources, such as solar and wind energy.

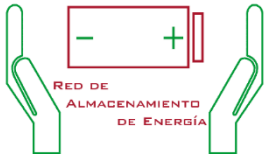
Due to its variability, the National Electric System cannot transition to solely renewable energies without risking grid reliability, which requires energy to be available 24 hours a day, 365 days a year.

Energy Storage is the catalyst for the energy revolution in our country.



Current Status of the Electrical GRID

- The transmission and distribution lines are very old.
- The Advantage is that frequency is more stable.
- But renewable energies have an impact on frequency
- Making the use of **Batteries** very relevant



Distributed generation 0.5 MW limit in México

- Generate and consume on site.
- Transmission or distribution grids are not used, and it is the opposite of distributed generation.

More than 0.5 MW is Isolated supply and BATERRIES are the solution

https://pireos.com/almacenamiento-de-energia-en-mexico-la-nueva-herramienta-de-ahorro/

REGULATION

- **Quality Standards:** fire hazards from the panels have arisen.
- **Electricity Cost**: does not reflect the real cost and monitoring tools are required
- **Financial Schemes**: are limited due to a lack of regulation.
- **Energy Regulatory Commission**: storage regulation is under consultation and expects to approve it in the following months. The case of **Chile** was studied.
- **Regulation:** will help improve efficiency and transition much faster from a heavy system with 86.4% fossil fuel emissions.
- **Storage Systems:** accelerates this transition, growth of the transmision grid, and penetration of renewable plants mitigating reliability issues.

https://www.energiaestrategica.com/la-cre-anticipa-el-lanzamiento-de-regulacion-para-almacenamiento-energetico-en-mexico/

The virtual president-elect Claudia Sheinbaum announced the creation of a National Energy Plan, which will seek to encourage investment in the country.

Sheinbaum indicated that this plan will enable the development of renewable energy sources, and will also aim to expand electromobility and other development schemes for the country.

1.- Transmission and distribution grids Will be modernized to achieve a greater integration of renewable energy into the National Electric System (SEN).

2.- Achieve that 54% of CFE´s energy comes from clean energy, especially wind and solar.

https://greentology.life/2024/06/03/cual-es-el-compromiso-de-claudia-sheinbaum-en-energia-y-sostenibilidad/
https://www.forbes.com.mx/sheinbaum-anuncia-la-creacion-de-un-plan-nacional-de-energia/

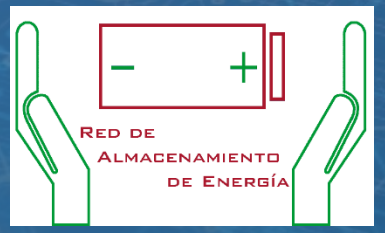
https://www.energiaestrategica.com/inventario-asolmex-la-capacidad-fotovoltaica-en-mexico-alcanzo-los-10479-mw/

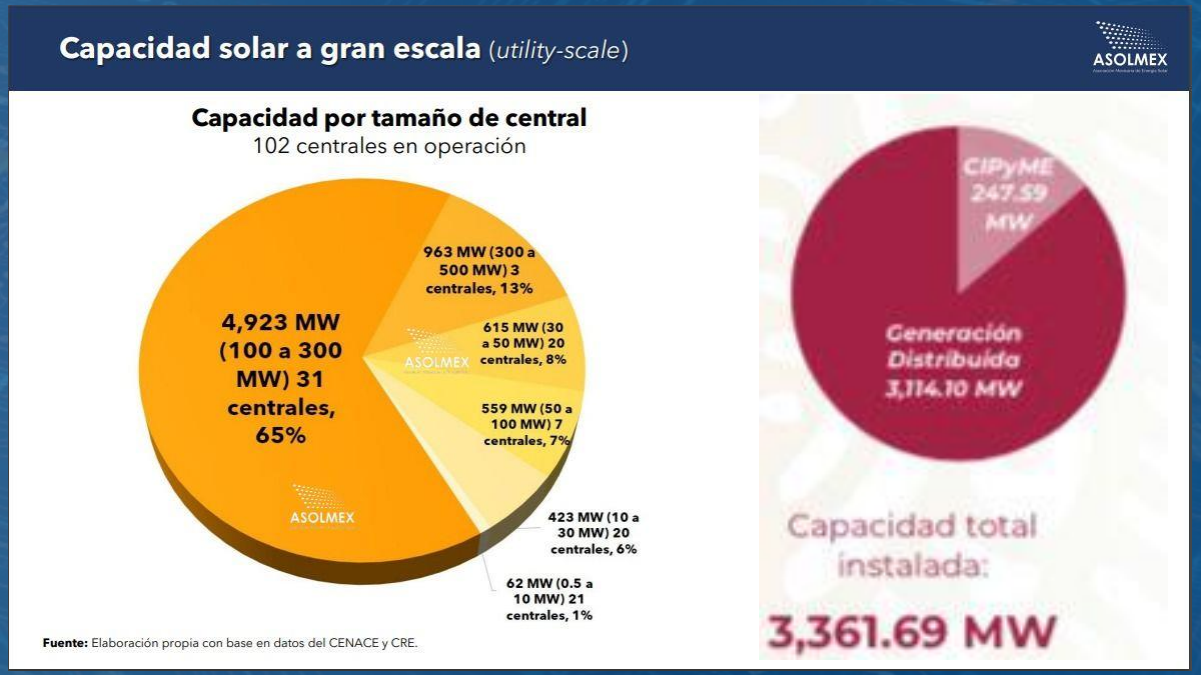
Gabriela Francovig. Energía Estratégica, 25 de octubre 2023 "Inventario Asolmes: la capacidad fotovoltaica en México alcanzó los 10,479 MW"

3,361.69 MW installed capacity (CRE)

ASOLMEX: Solar Energy Mexican Association

30% at least of energy storage in every solar power plant





Invenergy

La Toba: in Baja California Sur, with a peak generation capacity of 39.4 MW, of which 35 MW can be injected solely by photovoltaic systems, representing 3% of demand.

La Rumorosa Solar Park: in Baja California, with an installed capacity of 41 MW.

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AURA SOLAR III: In La Paz, Baja California Sur, it has ***lithium-ion batteries*** with a capacity of 10,5 MW / 7,0 MWh

PLAN SONORA

Due to the demand from the Puerto Peñasco project (1000MW), there was a need to develop a solution for overseas projects, which involves a 1MW/2MWh solution developed with 0.5P charge/discharge capability (discharge in 2 hours).

Therefore, the system was designed with high-density lithium battery cells using LiFePO4, a nominal power of 1000 KW (0.5P) for charge/discharge, a nominal capacity of 2258 KWh, 280 Ah capacity.

It will have 45% storage capacity.

https://www.pv-magazine-mexico.com/2023/04/10/almacenamiento-de-energia-en-la-central-fotovoltaica-de-puerto-penasco/

Relevance of Battery Storage Systems

The most modern container ships can carry approximately 15,000 containers (with a base área of 400 m x 56 m).

Fully loaded with battery containers, this equates to a capacity of 15 GWh/ 15 GW (equivalent to all German pumped hydroelectric power plants: 60 GWh / 6 GW)

≡

Energy

≡

Power

Red de Almacenamiento de Energía

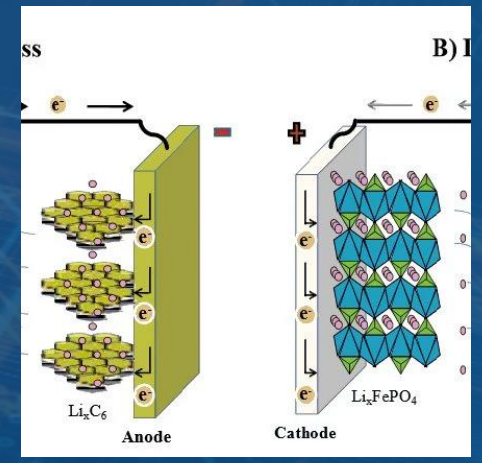
Energy Storage Systems

Image from SPIC México archive

1. Is a solution for regulation, flexibility, and energy reserves
2. There is a concern about battery safety, not only regarding fires but also cybersecurity
3. It is expected that batteries will improve energy quality
4. Companies can save up to 40% with the use of batteries.

Traditional Lithium Batteries

1. Cobalt is a problem to the environment and human health
2. 80% of the reserves are in Congo, and its extraction ethics are questionable.
3. Sustainable alternatives include replacing it with LiFePO4, which offers comparable efficiency and lower cost, and double the lifespan.



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https://www.bloomberglinea.com/latinoamerica/mexico/mexico-alista-regulacion-para-almacenamiento-de-energia-electrica/

Re-using Recycling

1. Every technology has its pros and cons, and as technology advances, its impact could be minimized.
2. Reusing batteries from electric vehicles could be useful for peak shaving on the electrical grid

Electromobility,

1. In crowded cities, the use of public transportation is very important.
2. Electromobility regulation is under consultation.
3. A Mexican official standard on electromobility is being prepared to establish an electric charging tariff.
4. CFE and companies that have electric charging stations could establish a fair charge.
5. Companies with electric chargers in the country will need to regularize.
6. CRE has previous regulation where companies must report energy sales but they fail to comply with the regulation.

https://www.bloomberglinea.com/latinoamerica/mexico/mexico-alista-regulacion-para-almacenamiento-de-energia-electrica/

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