

**WEG**DAY2019

# RENEWABLE ENERGY

J.P. Silva


## Summary



Manufacturing sites in 5 countries



**196 MW**  
Solar farm installed



2<sup>nd</sup> in solar distributed generation in Brazil



Wide service network



**650 MW**  
Wind farm installed



One of top suppliers in Latin America market of Biofuel Power Generation



Certifications around the world such as UL and CE



One of top suppliers in Latin America market of Small Hydro Power



Full turnkey solution for BESS



Leader in Brazil and US market for renewable energy transformers



## Products

Wind Turbines



Solar Inverters (GD)



Solar Farm Inverters



Battery Energy Storage



Turbo-Generators



Hydro-Generators



Hydro Turbines



Steam Turbines

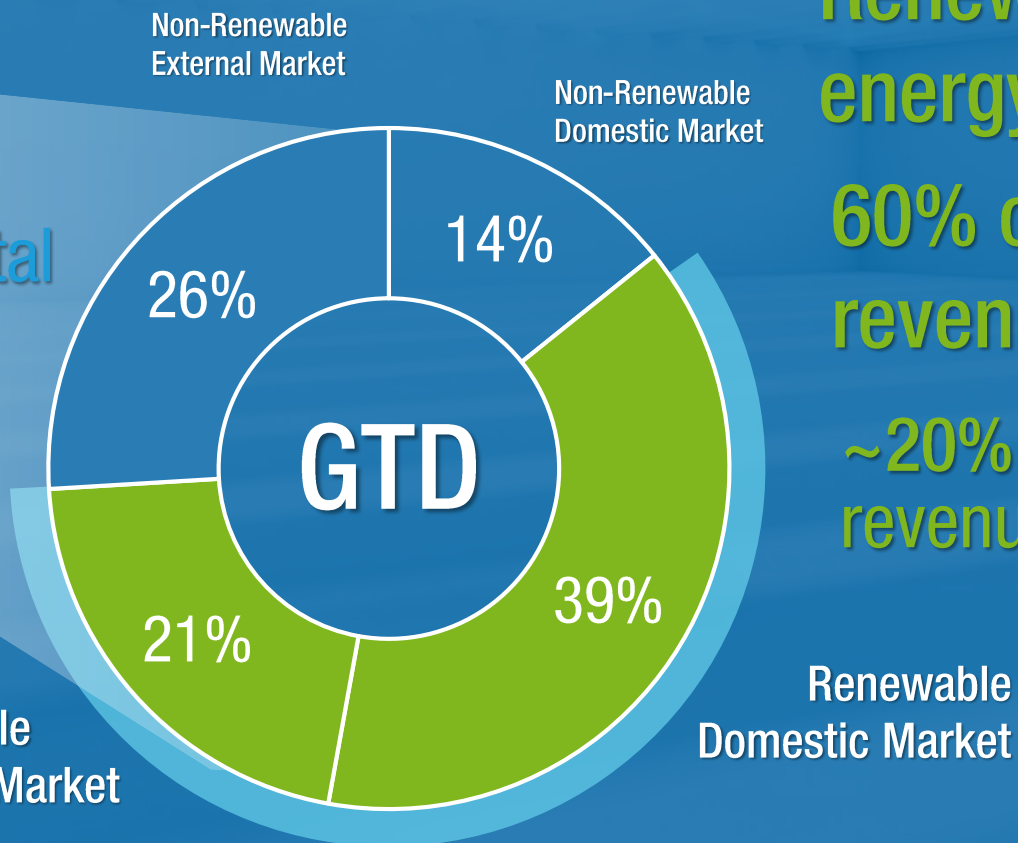
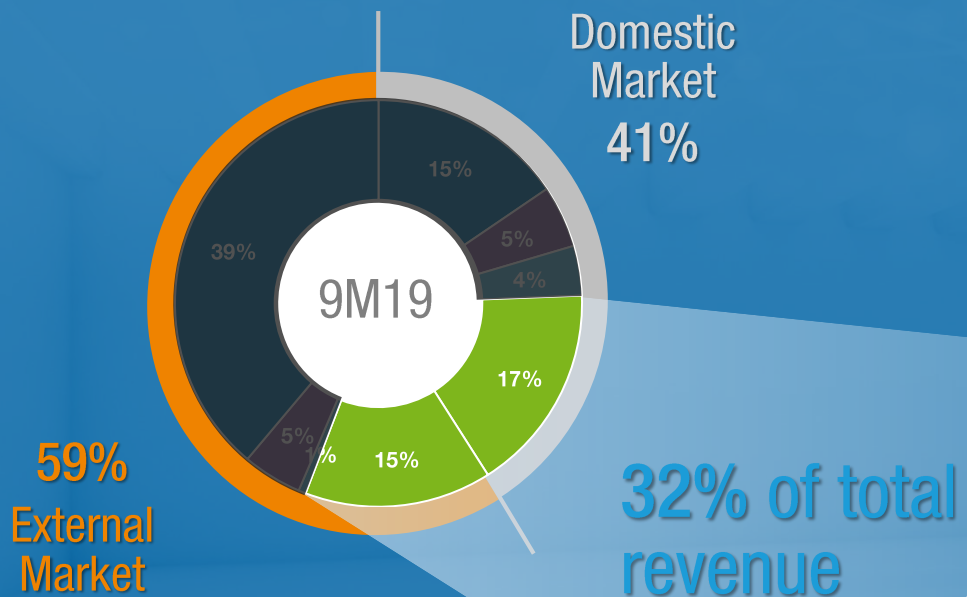


Transformers



# Renewable Energy

Renewable energy is an important share of our business



Renewable energy represents 60% of GTD revenues

~20% of total revenue



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# **SOLAR POWER GENERATION**





## Solar Power Plants



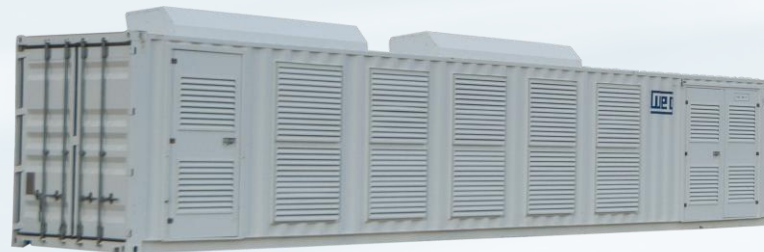
### ■ Products manufactured by WEG

- Central Inverters 1500V
- DC Strings Boxes, Protection and Control Switchboards
- Monitoring SCADA Systems
- High voltage Scope (Transformers, Substation e Transmission Lines)



### ■ WEG's scope

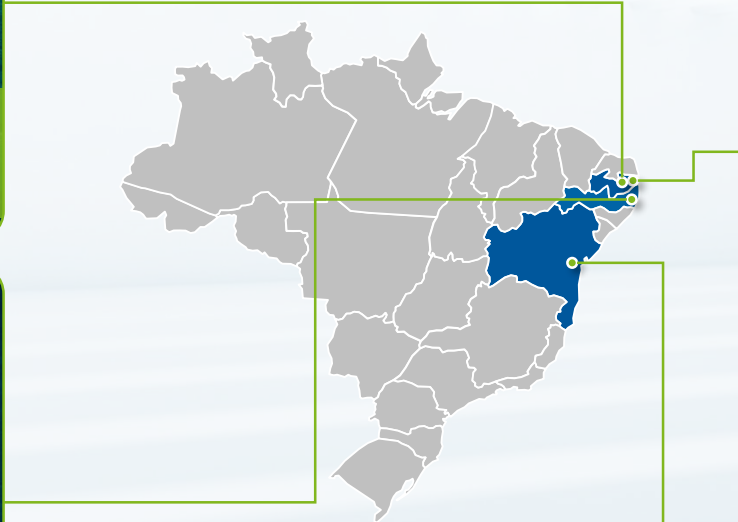
- Turnkey EPC solution (Engineering, Procurement and Construction)
- Complete products line for electrical equipment
- Central inverters assembled in containers
- Operation and Maintenance Services





# Solar Power Generation

WEG as reference provider of turnkey solar PV plants in Brazil



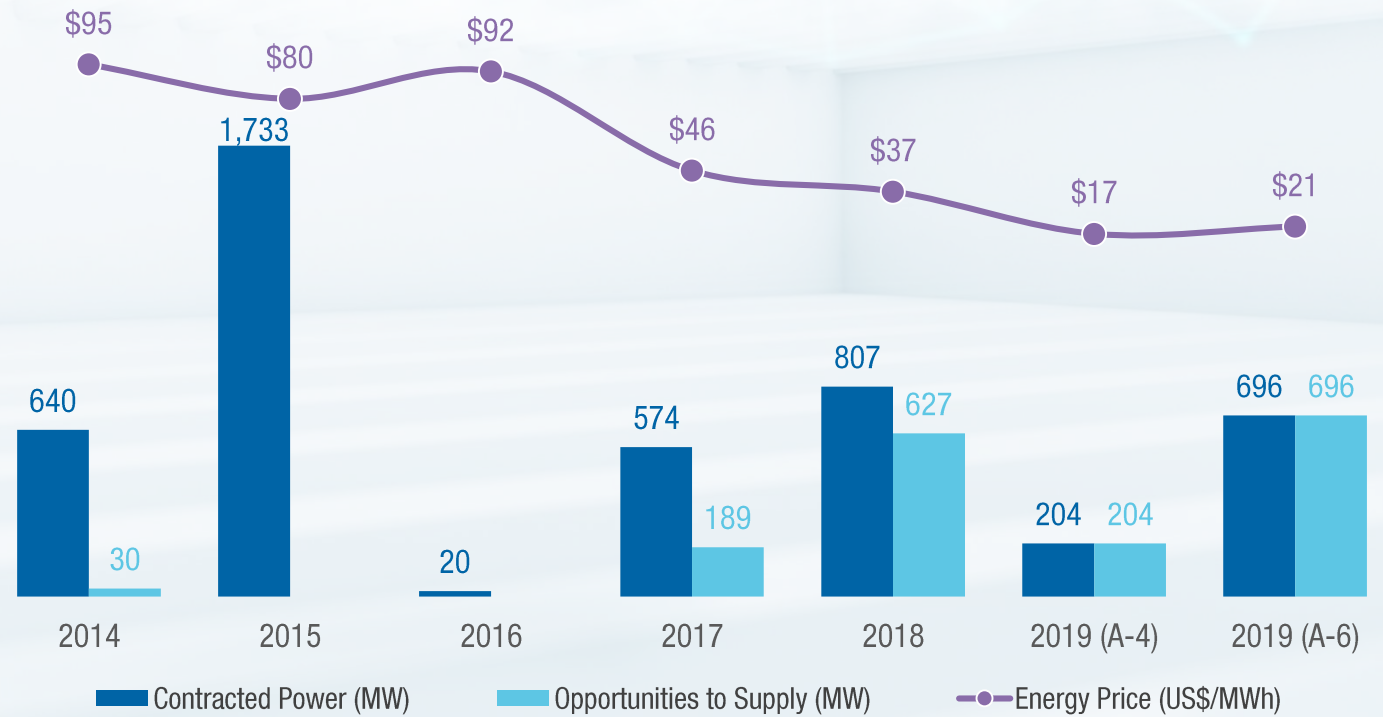


# Solar Power Generation

## Brazilian Market: New opportunities

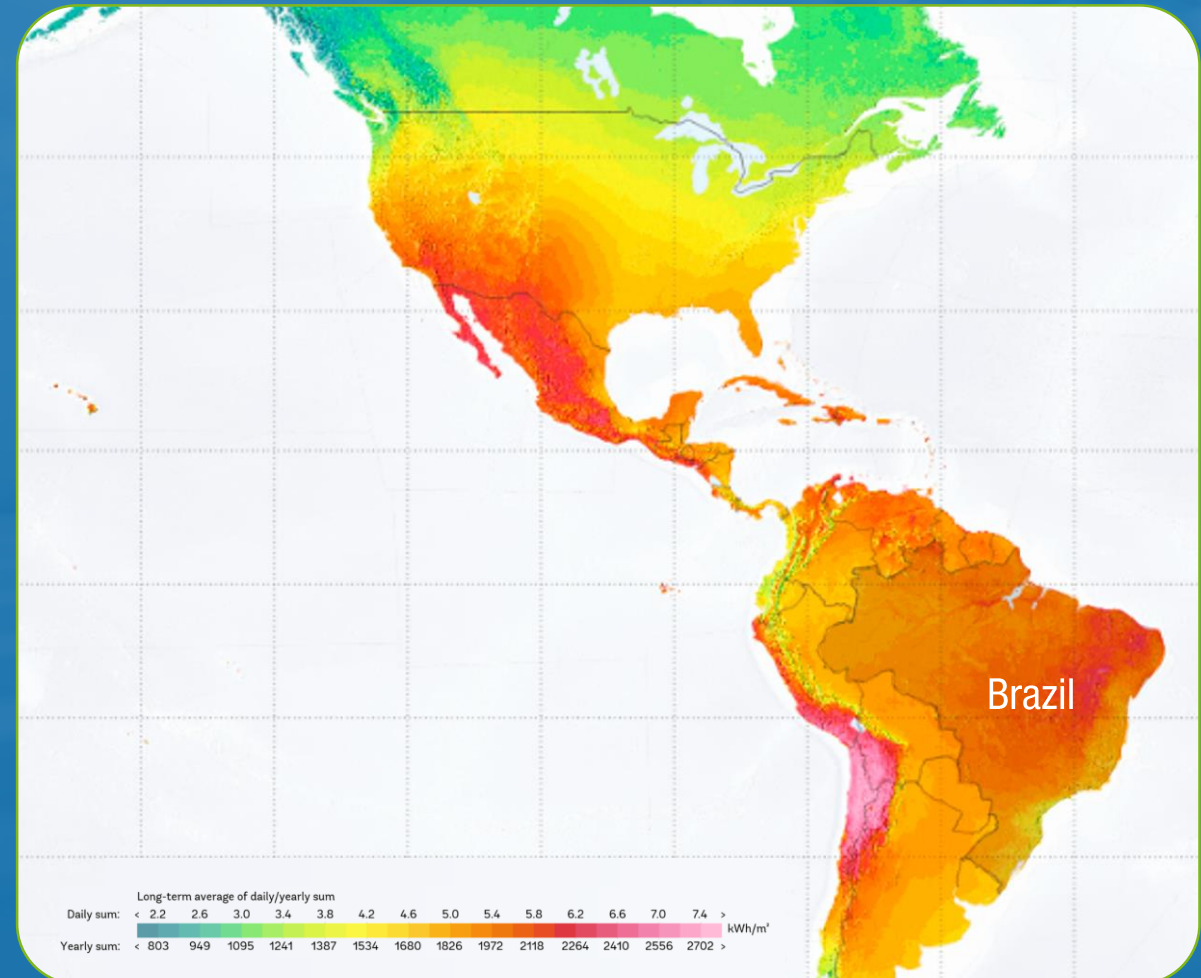


### Solar Power Generation Auctions



## Solar irradiation

- Brazil is one of the best countries in the world regarding solar irradiation
- The worst location in Brazil has 30% more irradiation than the best location in Germany

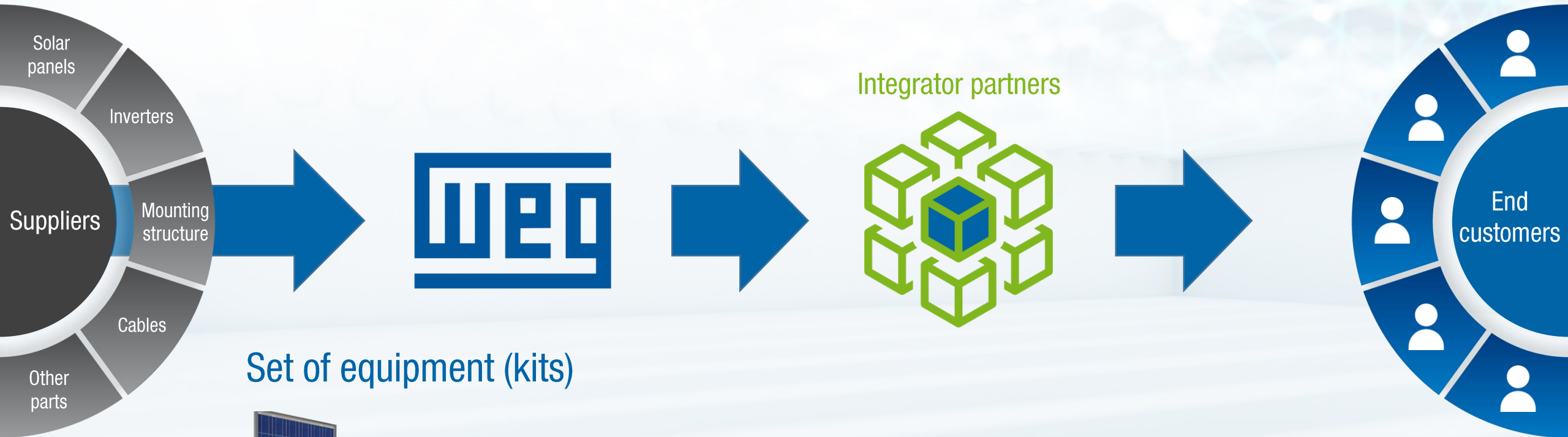


Source: World Bank Group, funded by ESMAP, and prepared by Solargis

# Solar Distributed Generation

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Complete product portfolio and unique business model creates important competitive advantages





# Solar Distributed Generation

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New warehouse - Ready to address the growing demand



**260,000 ft<sup>2</sup>**

Total area



**+64**

Employees

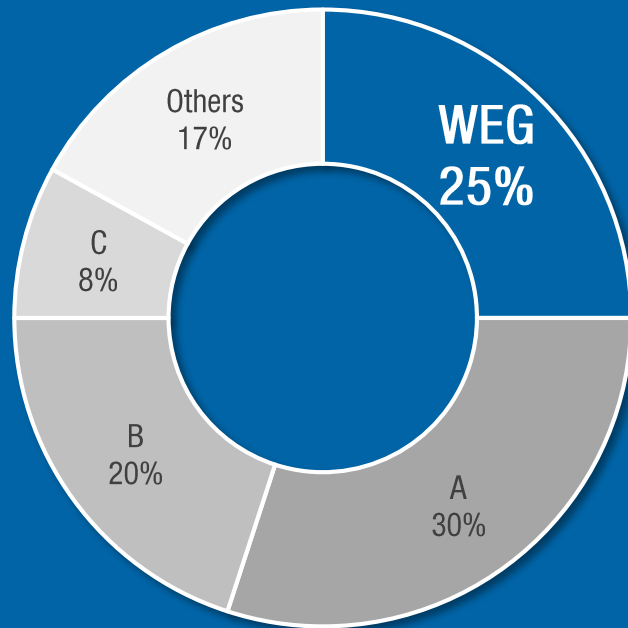


From 50 to  
**155 kits/day**

Installed capacity

# Solar Distributed Generation

The fastest growing segment in our business portfolio in recent years



- 2<sup>nd</sup> largest player in Brazil
- +350 MW delivered in 2019

Set of solar kit's delivered (Number)



\*2019 until October



Innovative projects: floating solar PV in hydro power plants reservoir

- Use of the same infrastructure of the hydro plant (transformers and substation)
- Higher efficiency due to lower cell temperature, increasing energy generation by 8%
- Water evaporation reduction around 80%





## Opportunities to continue expanding solar business outside Brazil

### Mexico

- Fastest growing market after Brazil
- Investments of 100 MM USD in solar DG this year
- Developing integrator partners and local suppliers, similar to the structure in Brazil

### South Africa

- Good opportunities for Solar Generation outside Brazil
- Zest (WEG Group) has already been trained by WEG Brazil to sell and supply Power Stations for Utility Scale
- WEG complies with local content rules

### Colombia

- Establishing alliances with important Power Generation Companies
- Developing partners integrators
- Establishing direct agreements with suppliers of solar inverters and PV modules

### Argentina

- Opportunities to supply Utility Scale Power Stations, Transformers and electrical boards
- WEG complies with local content rules
- Similar business model as Brazil, working as a distributor
- The products are exported from WEG Brazil

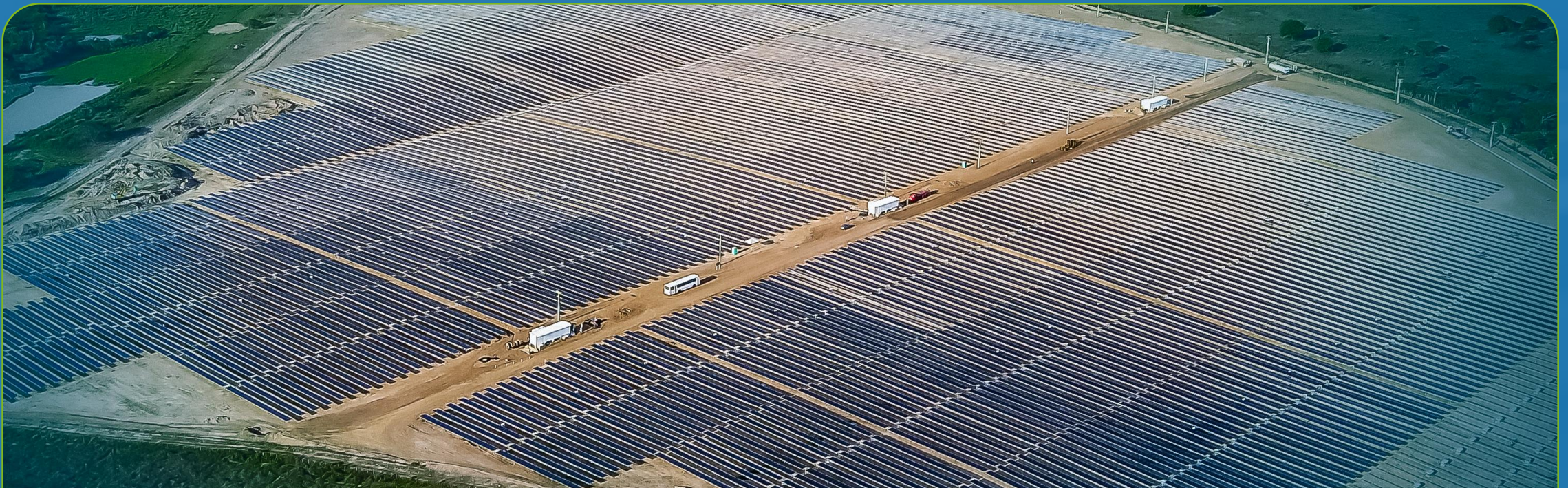


## Key messages

Unique business model  
for solar distributed  
generation

New central inverter  
improves our offer in  
solar power plant

Innovative projects (floating  
solar PV) generates new  
drivers for growth





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# WIND POWER GENERATION

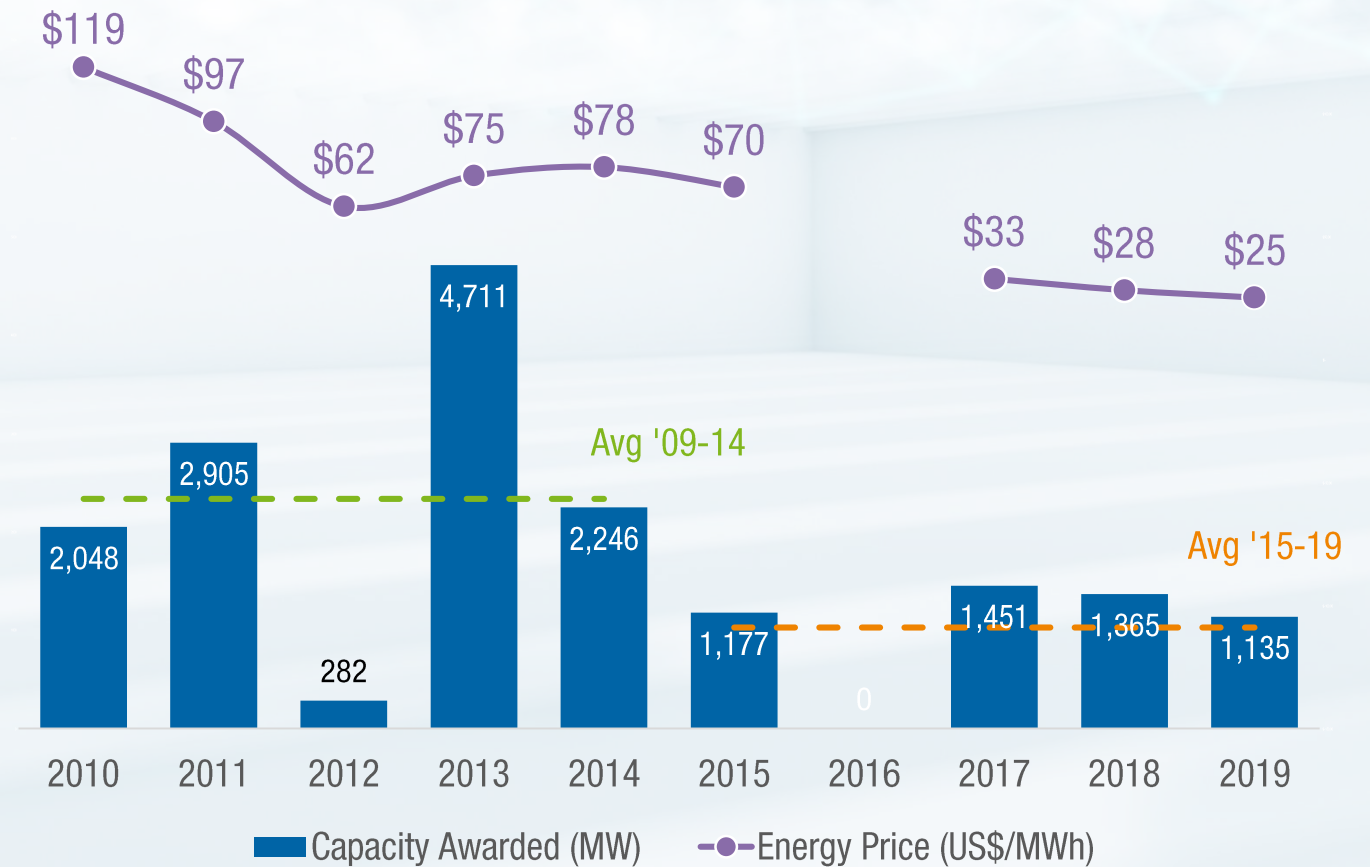




Brazilian Market: federal auctions resumed, yet below historical average

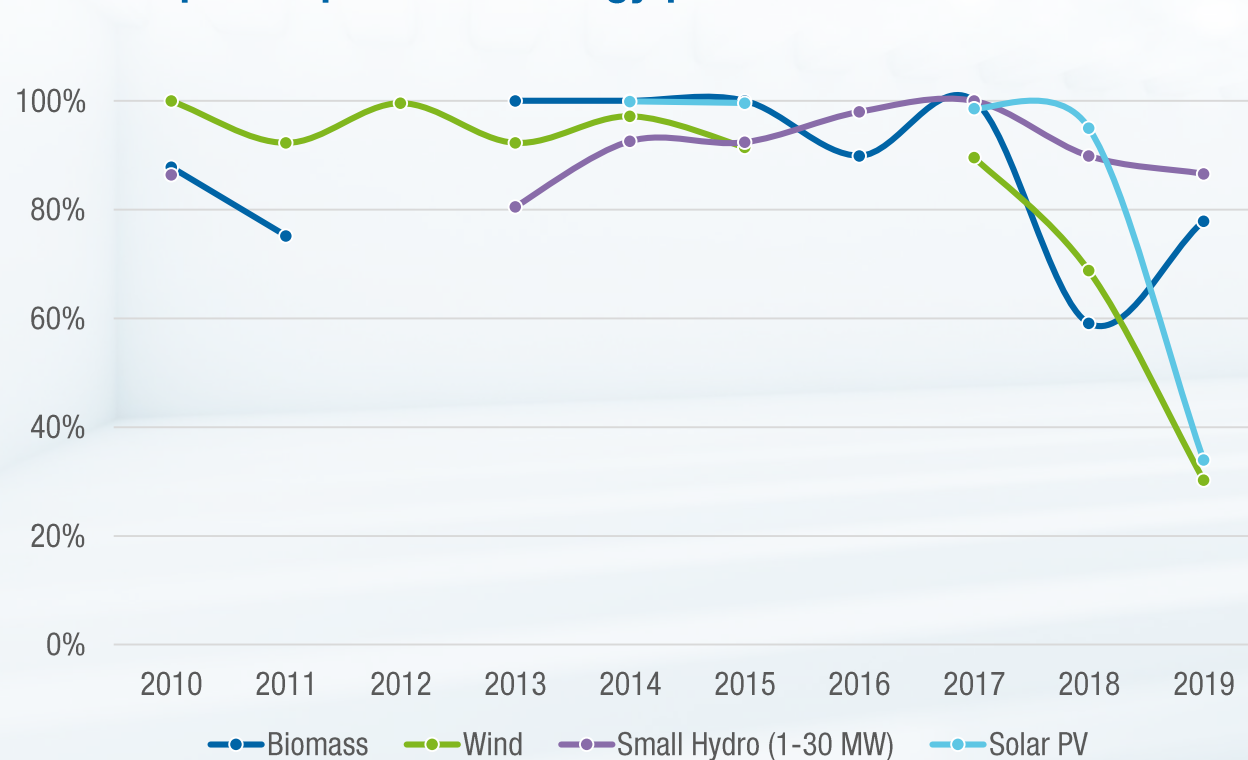


### Brazilian Federal Actions Results



Brazilian Market: free market is the new frontier for expansion

% of power plant net energy production sold in auctions \*



\* the remaining energy produced is sold in the non-regulated market or spot market





## Opportunities to continue expanding wind business outside Brazil



### India

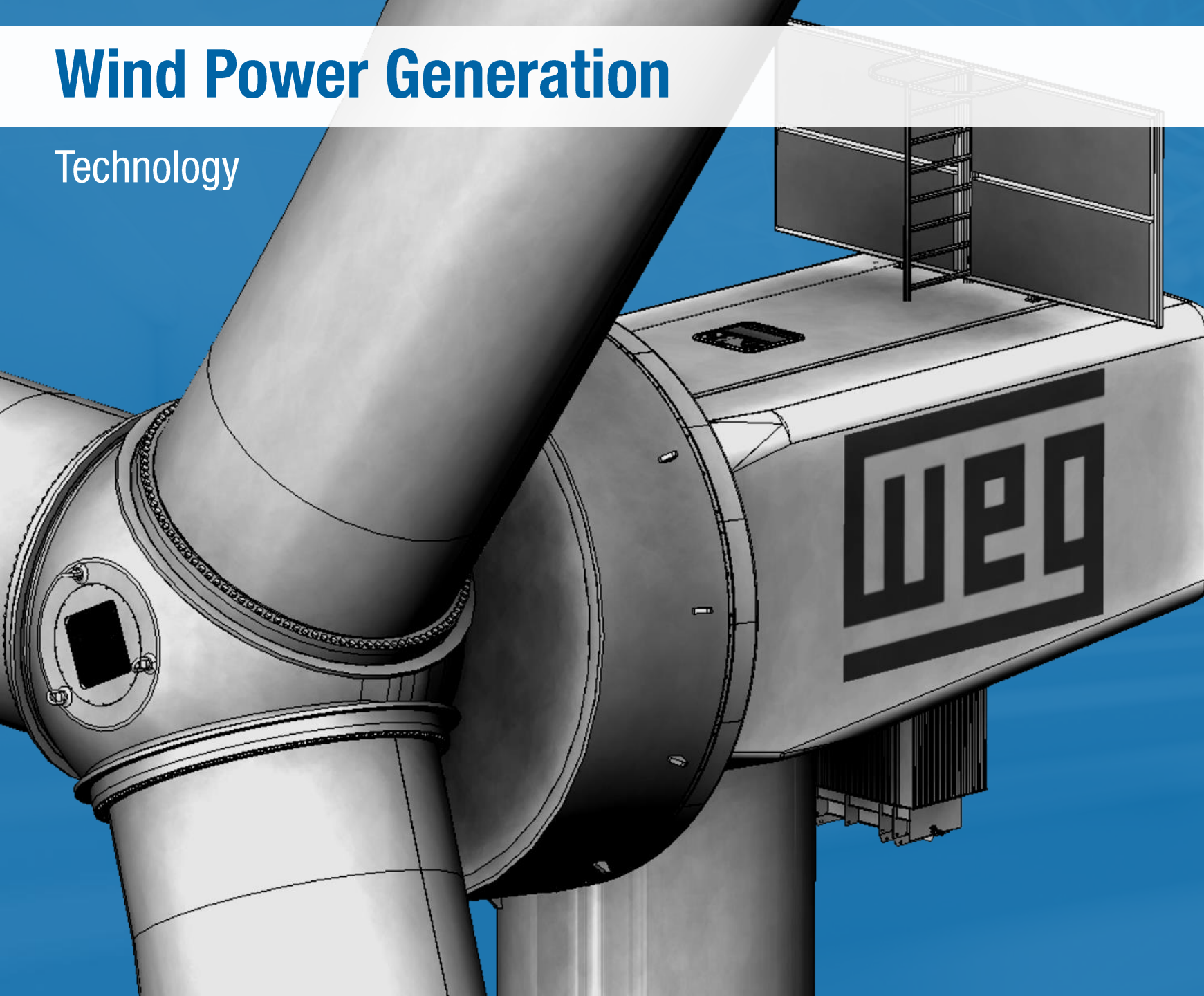
- Third largest market (around 5 GW per year)
- Local-content requirement
- Manufacturing unit in Hosur can be quickly prepared to manufacture wind turbines
- Market signs that a lack of offer may occur in the short term
- WEG is a known brand locally



# Wind Power Generation

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Technology



## New released 4.2 MW

- Technical evolution of the current product, minimizing development risks
- Direct drive, no gearboxes
- Permanent magnet synchronous generator
- Smooth grid interconnection
- Lean and reliable design

# Wind Power Generation

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## Key messages

Solid track record of wind turbines installed in Brazil

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New 4.2MW wind turbine will increase our competitiveness

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Completely solution for operation and maintenance contracts

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# **BATTERY ENERGY STORAGE SYSTEMS**



# Battery Energy Storage Systems - BESS

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We have positioned ourselves to supply this market from the beginning

- A new emerging business in the world
- First company to offer this solution in Brazil

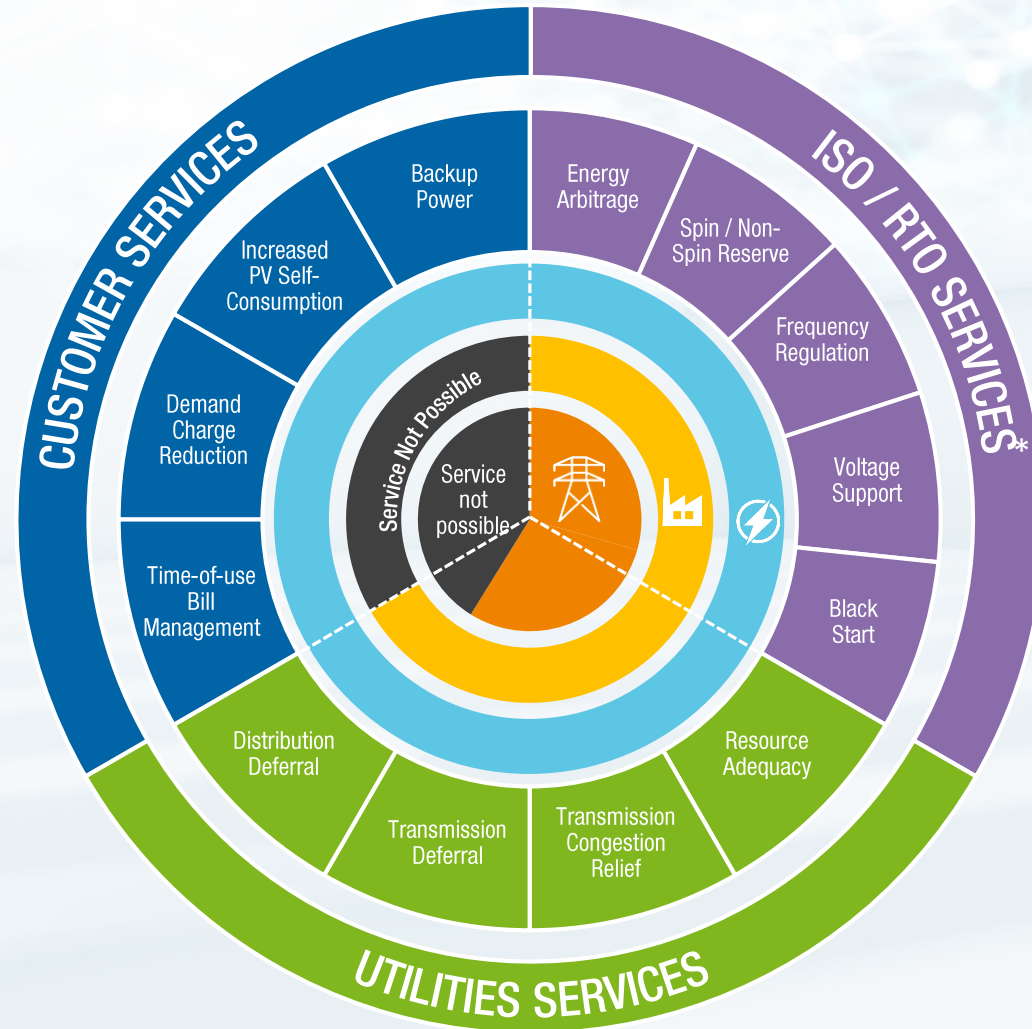
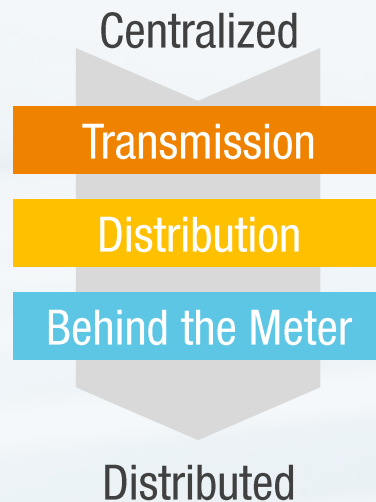




# Battery Energy Storage Systems - BESS

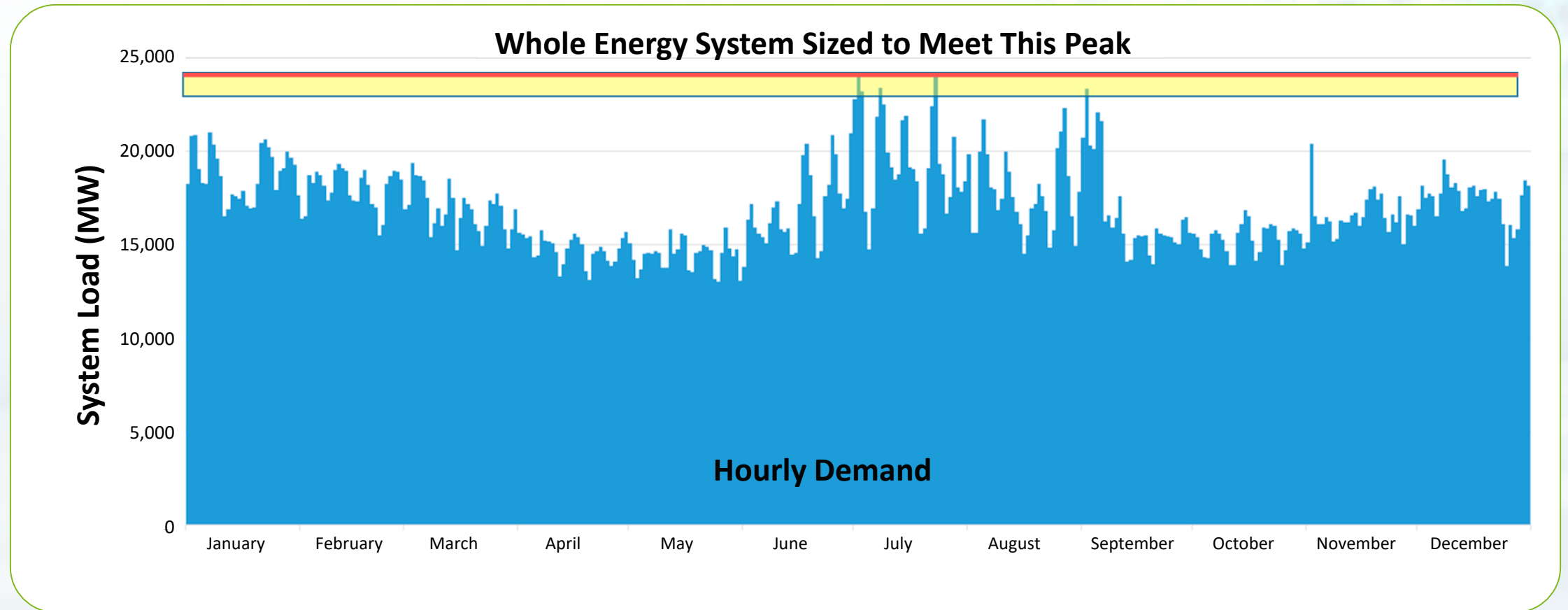
## Energy Storage Across the Power Sector

Batteries can provide  
**up to 13 services**  
to three stakeholder groups



# Battery Energy Storage Systems - BESS

Transmission and distribution system is built for highest demand



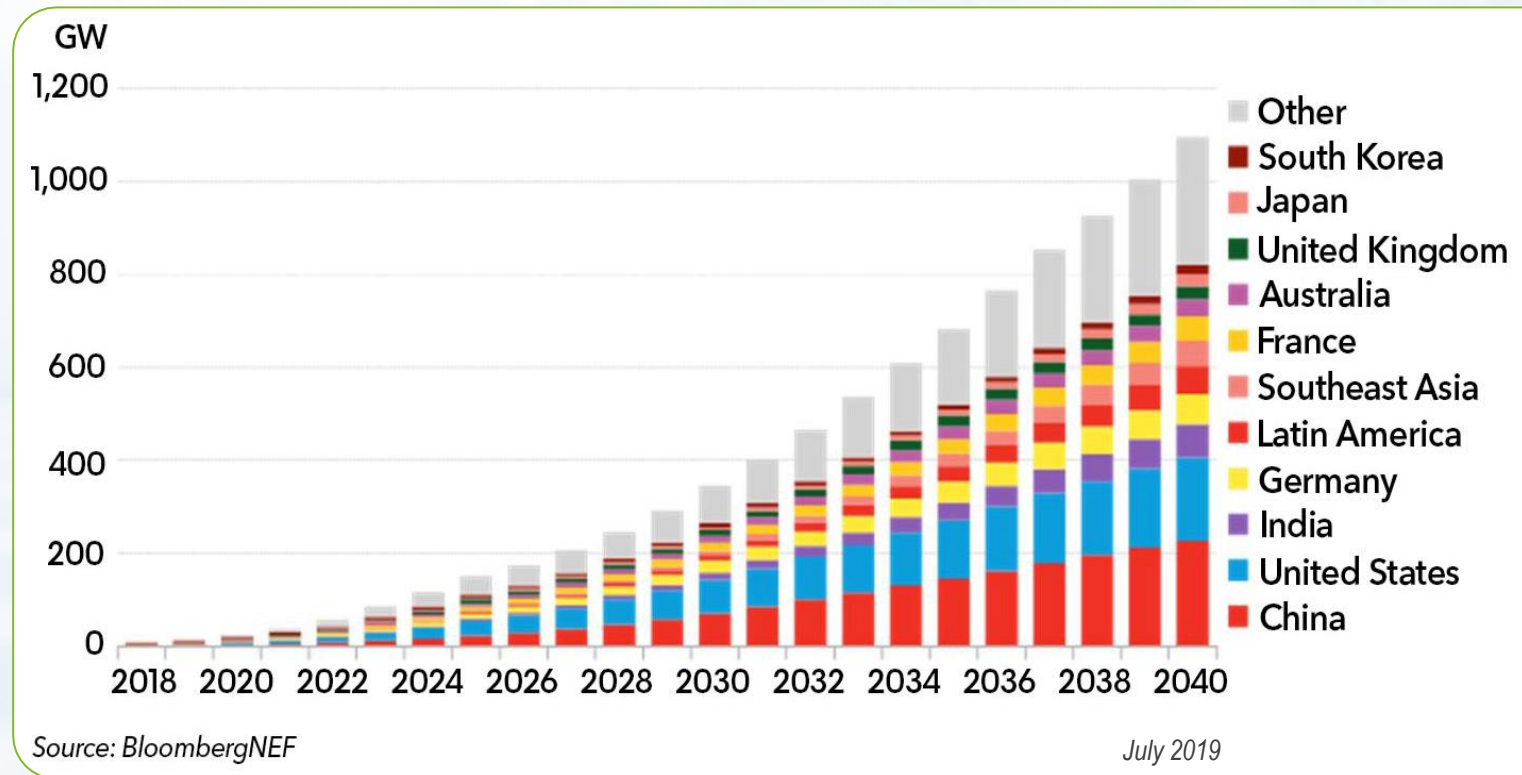
**Note: Highest peaks occur on hot summer days due to air conditioning loads**



## Expectation for global market growth

- 2018: **9 GW**  
2040: **1,095 GW**
- Estimated Global Investment  
**US\$ 660 Bi**
- Concentration in  
**US and China**
- Other important markets will be those where electrical grids are less developed, such as **India, South Africa and Latin America**

### Global energy cumulative storage installations



## ■ Current addressable market

- US
- Canada
- Brazil

## ■ Future opportunities

- Latin America
- South Africa
- India





# Battery Energy Storage Systems - BESS

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## Key messages

Market with good growth prospects in the coming years

Full turnkey solution for different applications

BESS should develop first where WEG already has a strong presence





## Key messages



Great prospects for distributed solar generation, in two different strategies:

- Distribution of equipment kits via partner integrators
- Direct supply of turnkey solutions for solar power plants

Consolidation in the supply of Central Inverters and EPC solution for Solar Plants in Brazil, expanding the business now to Latin America and South Africa

Wind generation is the best alternative for self-production and free market, with the new 4.2 MW wind turbine WEG is prepared to new supplies in Brazil and new markets such as Latin America and India

Full turnkey solution for BESS and strong presence in fast growing regions for this business