

POWER SECTOR MODERNIZATION

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Power Sector – Key Features



167.9 GW
INSTALLED CAPACITY



As to Nov. 2019
*No imports considered

- ✓ **Brazil has one of the cleanest energy mixes in the world. In 2027, the stake of renewable energy supply will reach 48%.**

154,100 km
TRANSMISSION LINES

> 230 kV.



As to Aug. 2019

84.6 million
METER POINTS

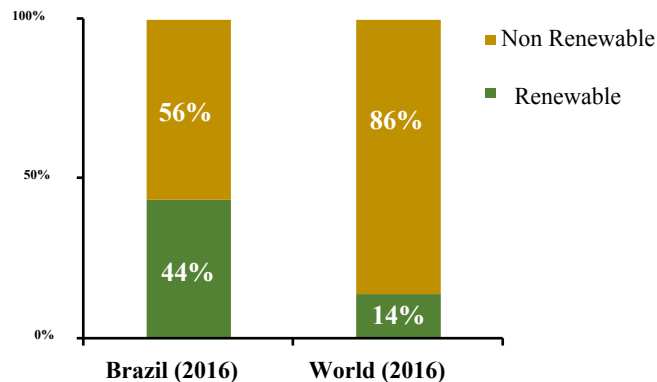


As to Sept. 2019

561,000 GWh
POWER GENERATION
($\cong$ 50% South America)



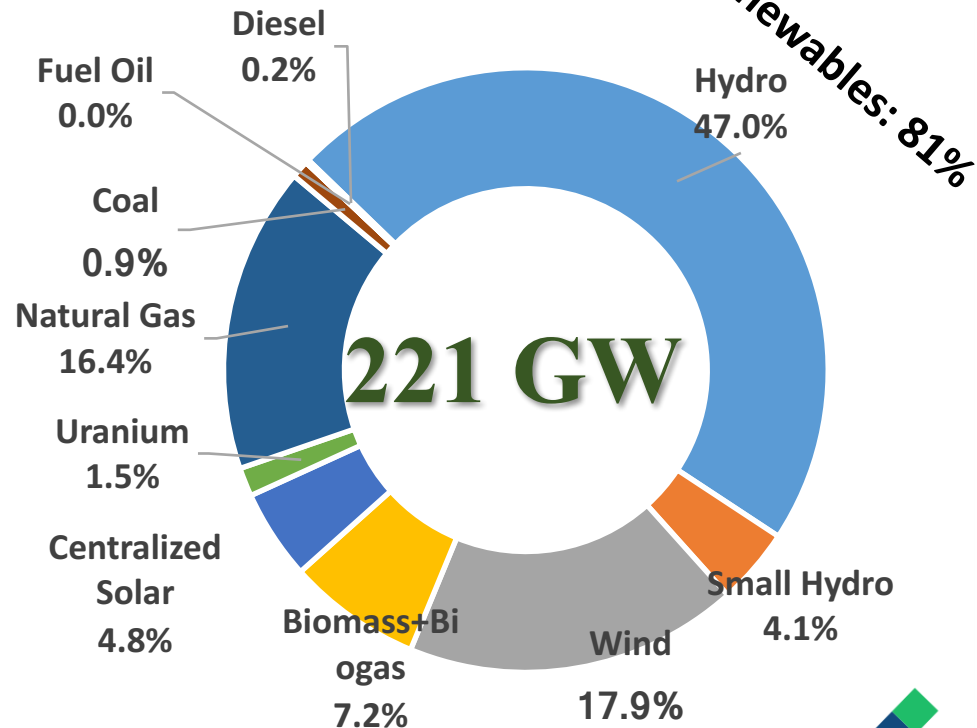
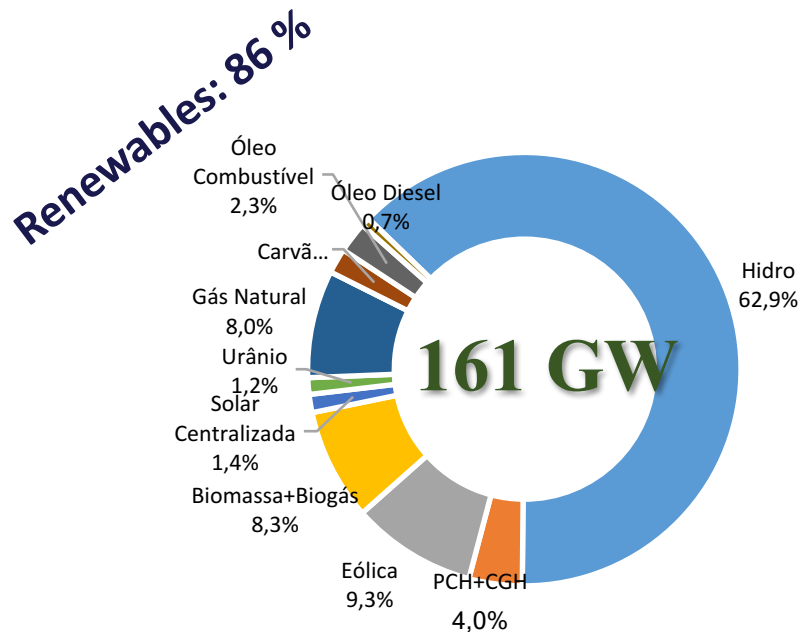
Sept. 18 –Aug. 19



(Fonte: EPE, 2018)



10-Year Energy Plan: PDE 2029 – Installed Capacity



PDE 2029 – Investment in the Power Sector



US\$ 420 billion
em O&G and biofuels

As to
2029

US\$ 102 billion
in power generation and transmission
(does not include distribution)



**CENTRALIZED
GENERATION**



**DISTRIBUTED
GENERATION**



TRANSMISSION



TOTAL

Investment
US\$ 68 billion



Investment
US\$ 11 billion



Investment
US\$ 23 billion



Investment
US\$ 102 billion

The power sector as we knew it does no longer exist



- ✓ **Massive integration of variable renewables:** Wind and Solar PV getting cheaper and cheaper... and driving demand for transmission, storage and flexible generation such as hydro reservoirs and gas-fired power plants
- ✓ **Increasing role of Distributed Energy Resources:** Distributed Generation (DG), energy storage, electric vehicles / recharging station, energy efficiency, demand-side management
- ✓ **Digitalization:** increasing complexity
- ✓ **Profusion of technological solutions and new innovative business models:** Schumpeter's creative destruction is alive, challenging competitive markets and even natural monopolies like distribution utilities
- ✓ **Sector coupling:** transport, industry, telecommunications, electrification, gas...

Flexibility is the key

“The means to achieve a flexible electricity system require adaptation of market signals and arrangements and regulatory framework”



What else?



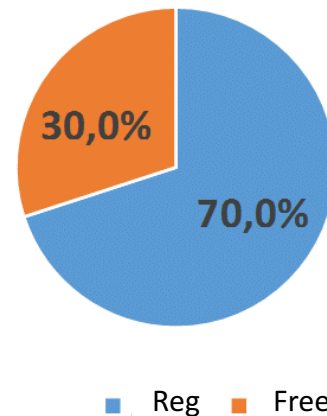
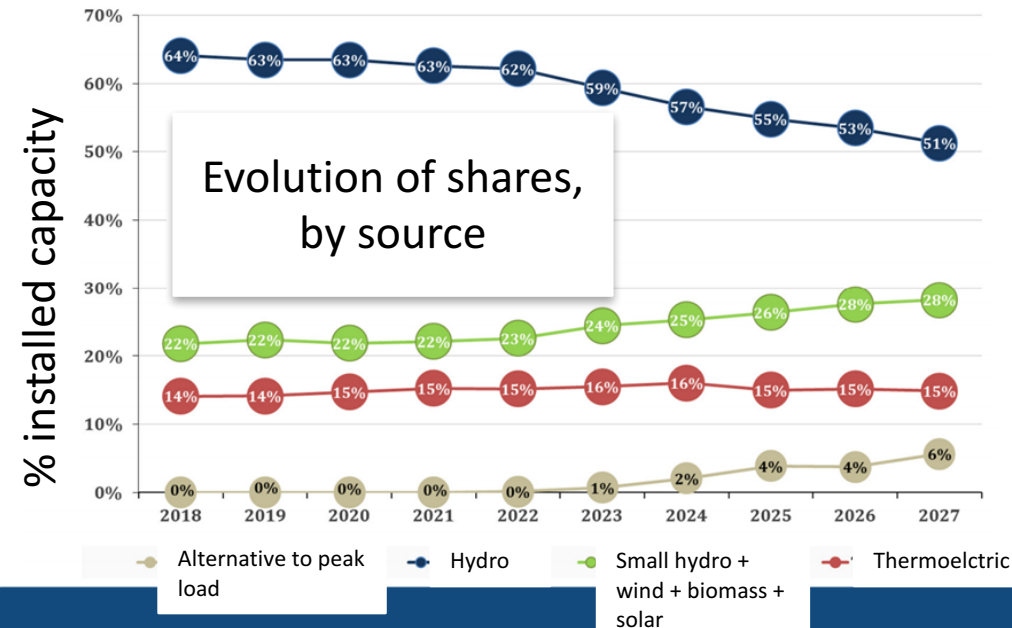
- ✓ **More uncertainty:** the world is more complex and interconnected, harder to model and predict
- ✓ **More data:** untapping potential for efficiency gains, but how to share these gains and governance/privacy issues are challenging
- ✓ **Disruptive changes:** structural transformation will come, but we don't really know when, where from and we cannot model
- ✓ **Decentralization of investment decisions:** command and control is not an option, markets and economic incentives for system optimal to be designed
- ✓ **Digitalization and automation** of energy transactions (DER) and system operation: markets reshaped completely and cybersecurity issues
- ✓ **Infrastructures and sectors more integrated:** transport, industry, telecommunications, electrification, hydrogen...



Where does the need to modernize in Brazil come from?



- Technological evolution
- Changes in the energy mix (↑ non-controllable renewables + ↓ hydropower with storage capacity)



- Regulated environment (captive consumers) paying alone for system security and reliability
- There is a demand for a more active role to be played by consumers

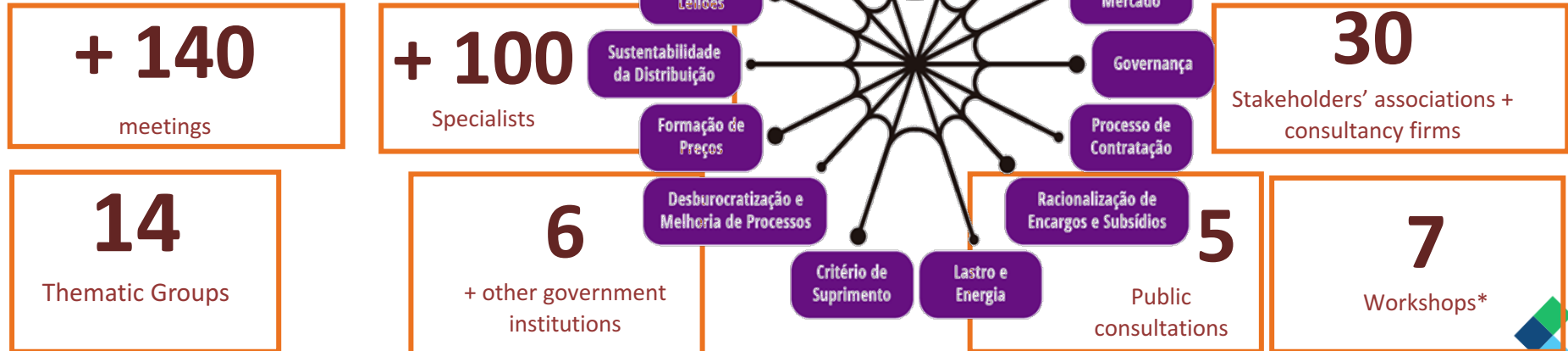


The Working Group for the Modernization of the Power Sector



Ministerial Order nº187 04/04/19

- To develop propositions of modernization
- Integrated work involving the 5 competent institutions
- 180 days to present an **ACTION PLAN**



* With participation of more than **1,500** professionals and interested agents

Goal

“To supply energy to consumers through **competition**, praising for the **sustainability of expansion**, with the promotion of **market opening** and of **efficient allocation of costs and risks**.”

To correct **price signals** is a task with multiple evolution stages

Rationalizing charges and subsidies will lead to a reduction of inefficient investments

To adjust the expansion of energy supply to new **supply criteria**

To differentiate **energy** from the **other system requirements** enables a best allocation of the expansion costs

An orderly **market opening** is important to accommodate new businesses and technologies

The Committee for the Implementation of the Modernization of the Power Sector



FRONTS

15

**Plano
de Ação**

TASKS

88

Energy +
Requirements

Market
Opening

Reduction of
Charges and
Subsidies

Price
Formation

Supply
Criteria

Transition

Risk-sharing
Condominium
for Hydros

Governance

Auction
Design

Procurement
Processes

Sustainability
of DISCOS

Sustainability
of TRANSCOS

New
Technology

Process
Improvements

Gas x Power
Integration

21 tasks to be concluded by 31st March, 2020

* <https://bit.ly/3aTt6Le>





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