



CAETS 2021
ARGENTINA

Engineering a Better World

THE FUTURE OF ENERGY



Buenos Aires, September 17-24, 2021

THE FUTURE OF ENERGY BRAZILIAN CASE

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Brazilian Energy Matrix - BEnM

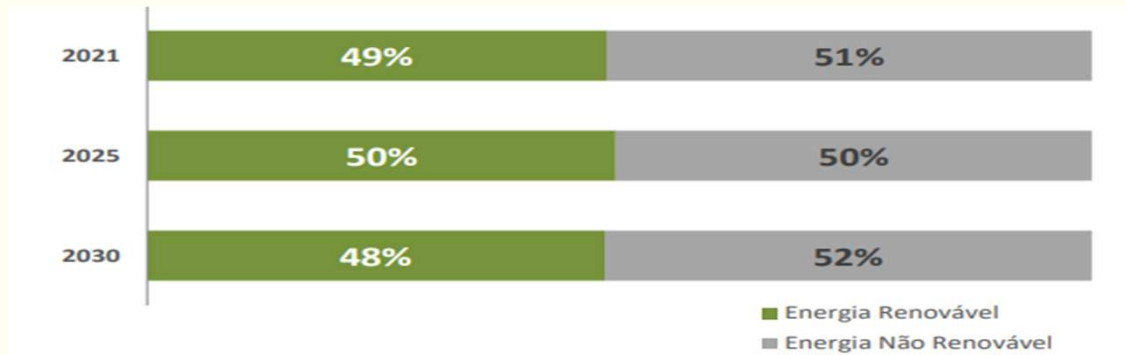
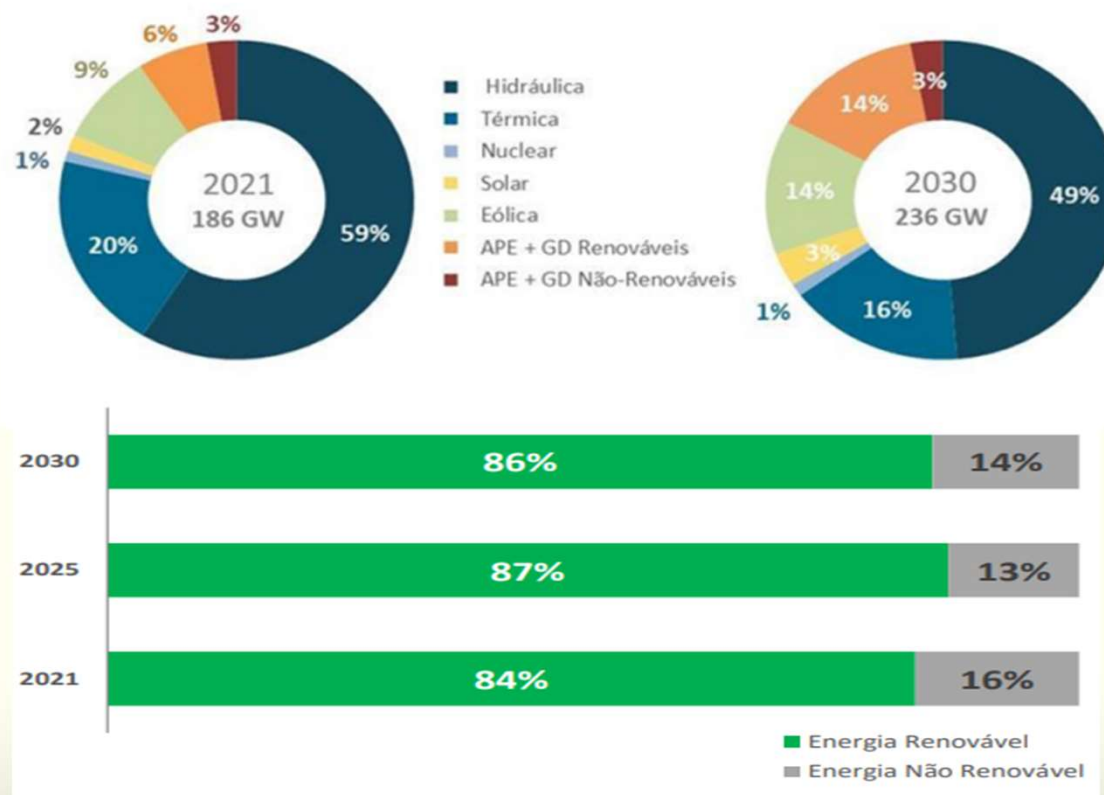


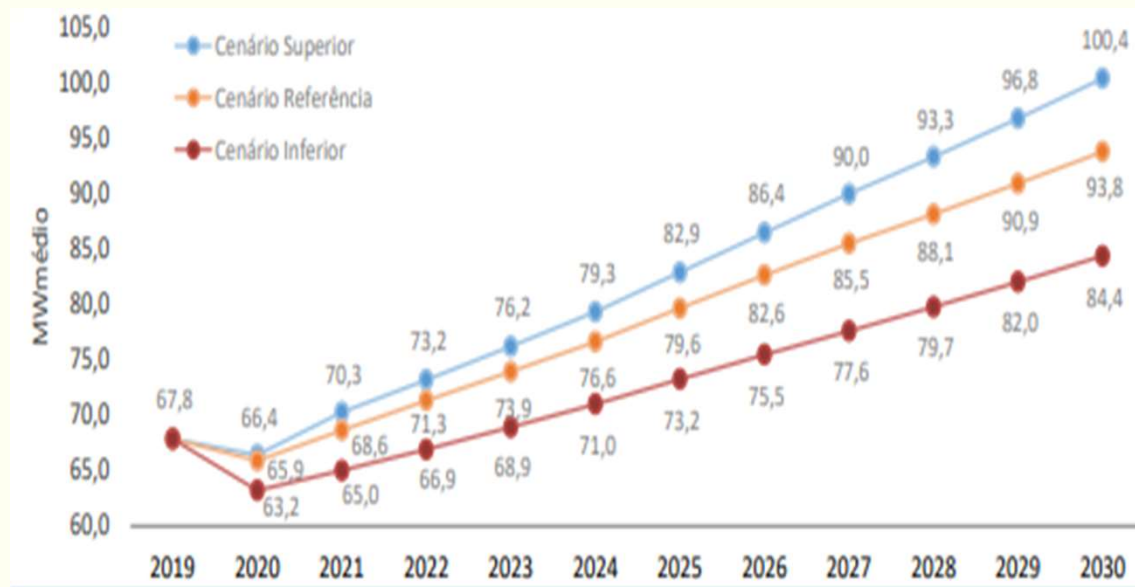
Gráfico 11-3 - Evolução da composição da oferta interna de energia por fonte



BEM – renewable x non renewable (Source EPE)



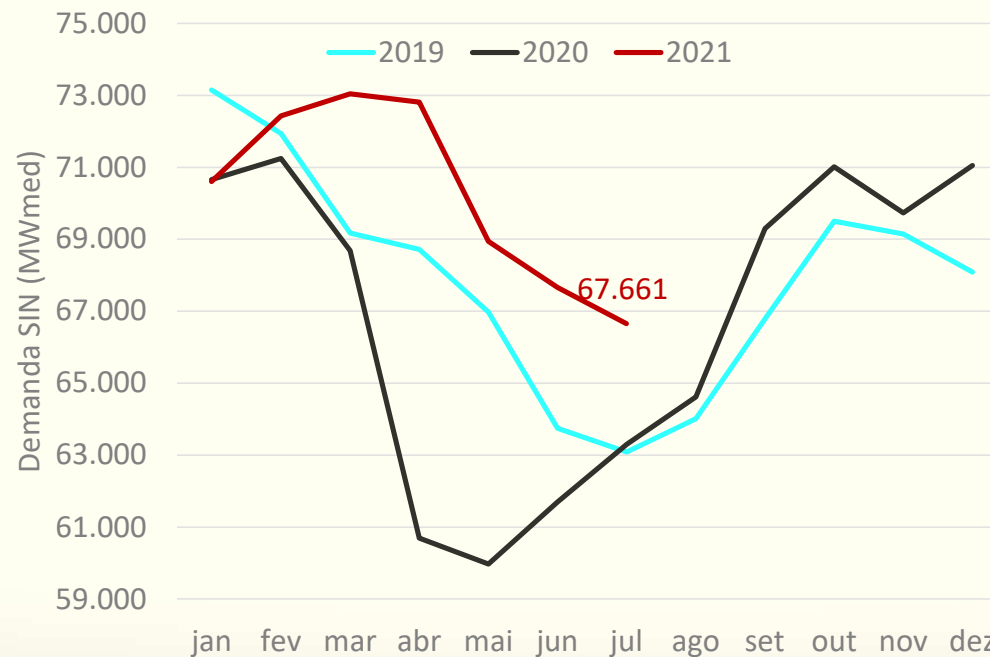
Energy Consumption



Today's situation

Demand Evolution

2019-2021 / COVID

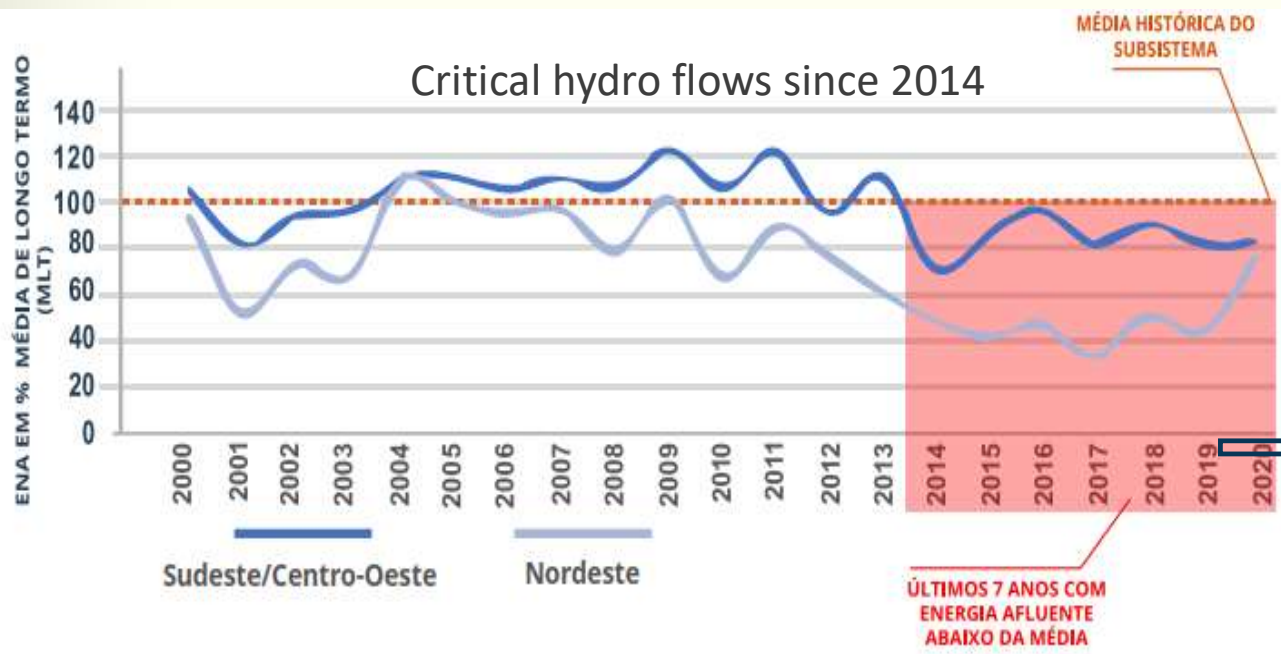


28/06/2021
ONS registra em maio carga positiva de 12,8% ↵

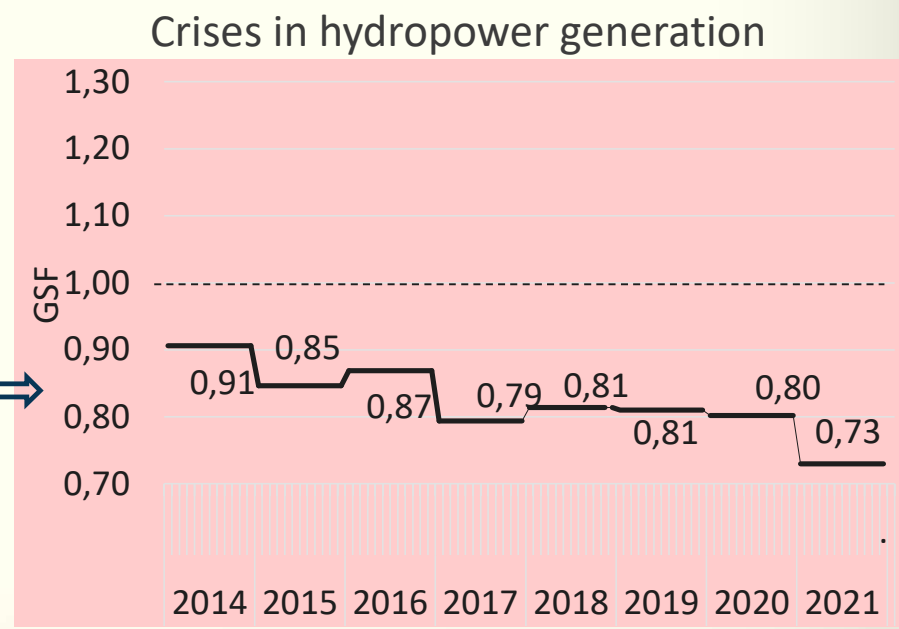
Source: EPE PDE 2030

5 Source: ONS

Today's situation



Source: MME Escassez hídrica junho/2021

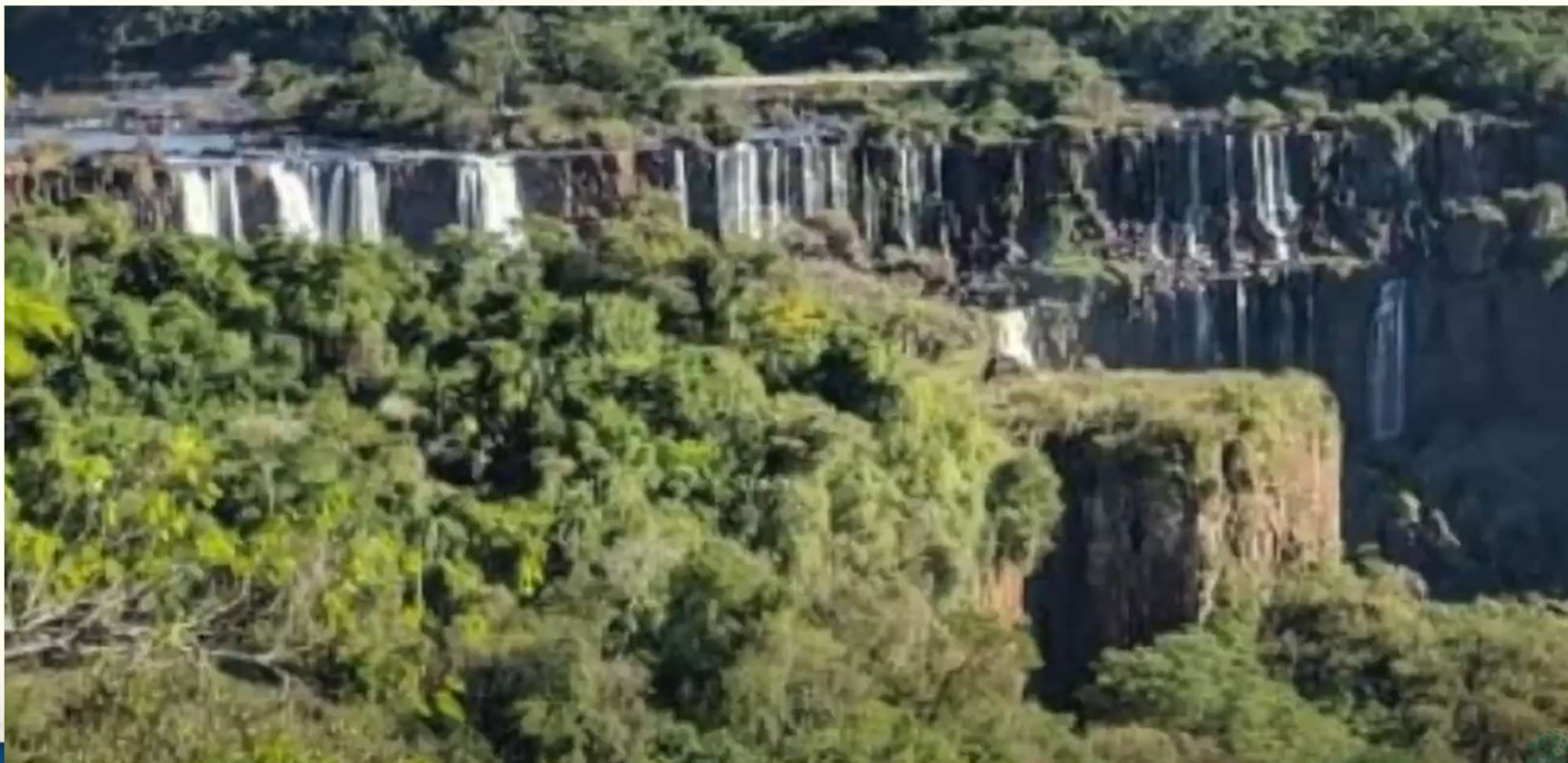


Source: own

Iguaçu Falls



Iguaçu Falls



Brazilian Interconnected System - features

- Transmission System
- Distributed Generation
- Wind Excellence
- Market Opening

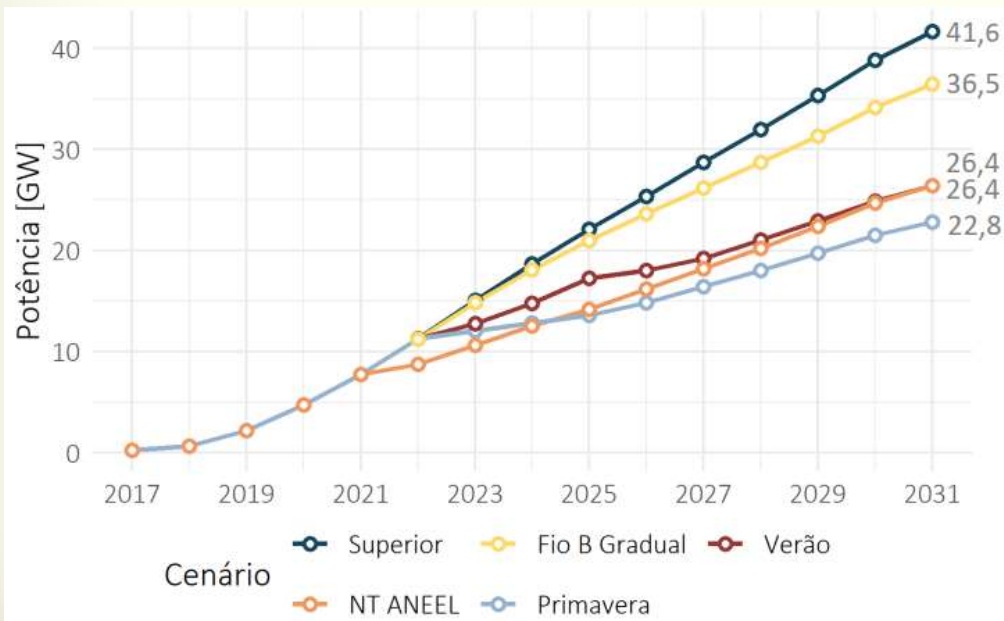
Transmission system



- Transmission Lines: 145,600 km
- After 2001 rationing, the Brazilian grid (SIN) became more robust against regional dry periods by transferring energy between regions
- Long lines connect hydro big power-plant on North (Belo Monte, Santo Antônio e Jirau)

Distributed Generation

Projection of Installed Capacity (GW)

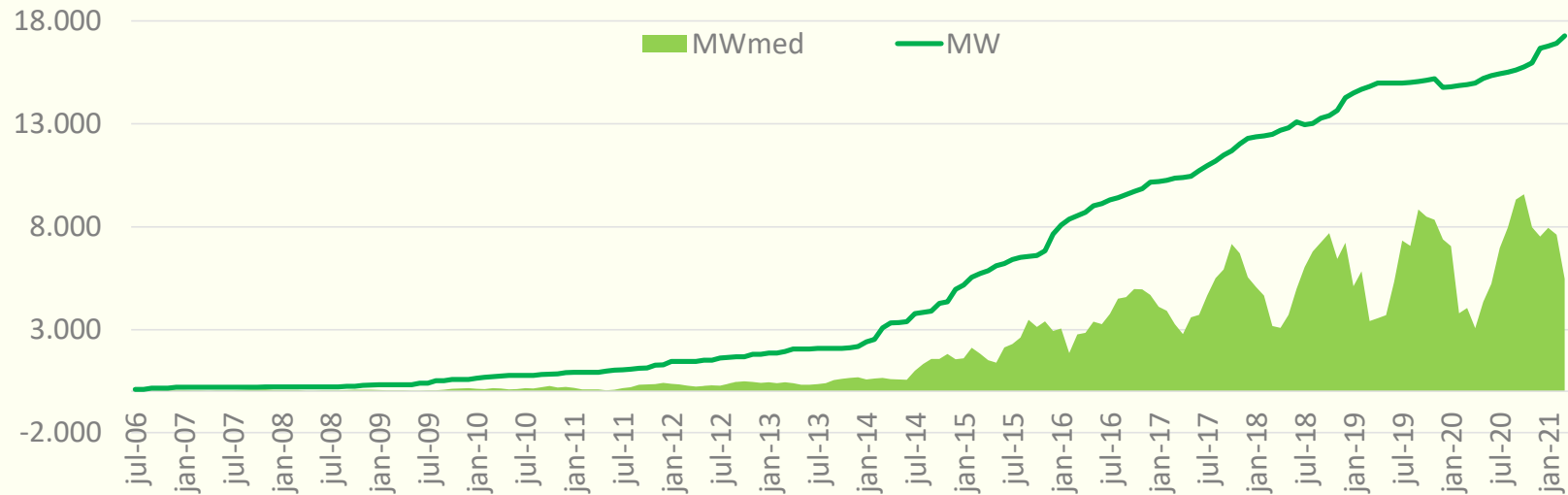


Cenários	Adotantes (2031) Milhões	Potência (2031) GW	Geração (2031) GWméd	Investimentos (2022 a 2031) R\$ bilhões
Superior	4,9	41,6	7,7	138
Fio B Gradual	4,1	36,5	7,0	120
Verão	3,2	26,4	4,3	71
NT ANEEL	3,1	26,4	4,4	70
Primavera	2,7	22,8	3,7	56

- DG's growth depends on regulatory discussion about the incentives (by the Congress)

Source: EPE PDE 2031: Caderno Minigeração Distribuída

Wind Excellence



Brazil is favored by the quality of the winds, which are stable, with adequate intensity and without sudden changes in speed or direction. In 2019, the capacity factor, since it measures wind productivity, was 42.7%. During the “harvest of the winds”, from June to the end of the year, there was an average month of 59%. The world average was 34%.

Source: ONS/Abeólica

Market Opening

- Portaria MME 465/2019, established the schedule of opening market of consumers:
 - jan/2021 → higher than 1.500 kW
 - jan/2022 → higher than 1.000 kW
 - jan/2023 → higher than 500 kW
 - jan/2024 → any (total opening)
- The study regarding the total opening is been prepared by ANEEL (TS 010/2021).

Congress

- Proposed by the law of modernization of electric sector (PL 414) hold in Congress
- Anticipation of opening agenda is possible by others law projects or MP

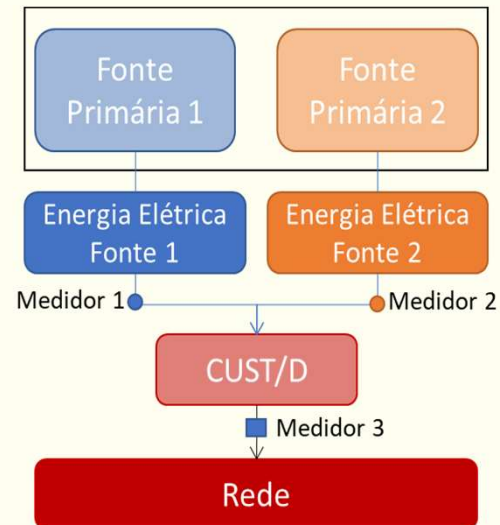
Near future

- Hybrid plants
- Hydrogen
- Smart Grids (cities)

Hybrid plants

- Wind + Sun

Reduction of Costs (conection, maintenance)



Hybrid/Associated Plant

SMART GRIDS - COPEL

Projeto Redes Inteligentes



Fase 1

- Contrato assinado em set/20
- Projetos de rede aprovados fev/21
- Início trabalhos de campo maio/21

1ª Fase

73 municípios
462 mil UCs
R\$ 252 milhões
24 meses

Fase 2

- Licitação publicada em 03/05
- R\$ 335 Milhões
- 500 mil consumidores

Fase 3

- Publicação em junho
- R\$ 385 Milhões
- 600 mil consumidores

FASE 3

FASE 1

FASE 2

Smart Cities

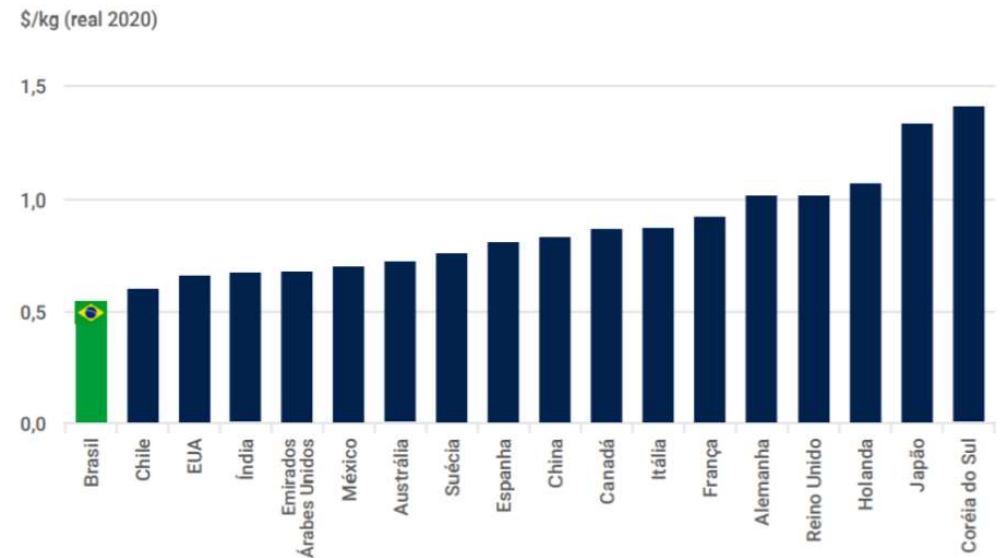


Hydrogen

- Transition vector: blue or grey Hydrogen (from natural gas)
- Green Hydrogen (from renewables)

- **National Hydrogen Plan**

Hydrogen Costs from renewable in 2050



Fonte: BNEF (2021, apud TENGLER (2021)).



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THANK YOU

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