Energy Efficiency
Brazilian Public Policies and Programs
Top runner concept potentials

Dialogue 2

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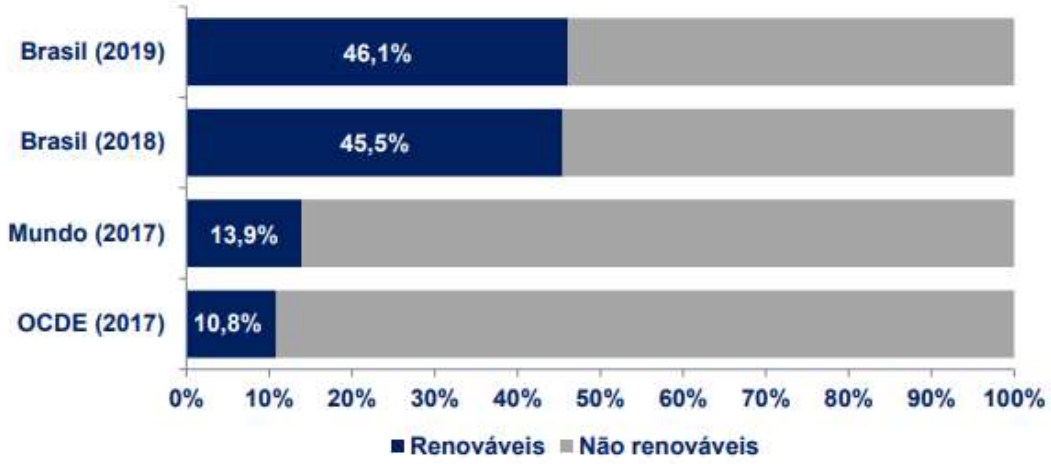
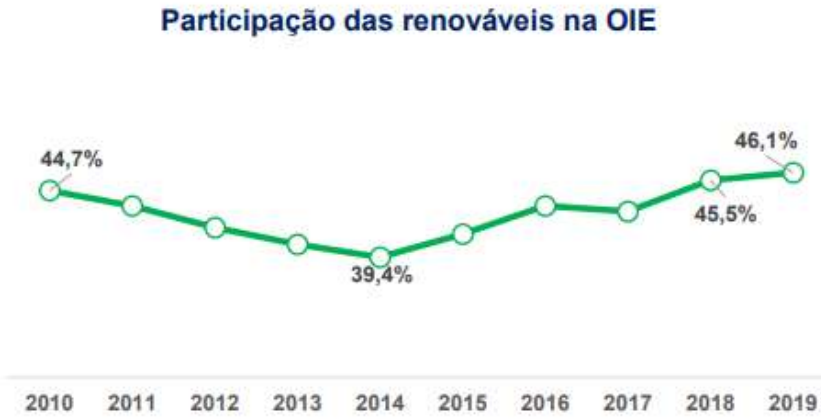
Renewables´ participation in Brazilian Matrix





Energy consume by sector

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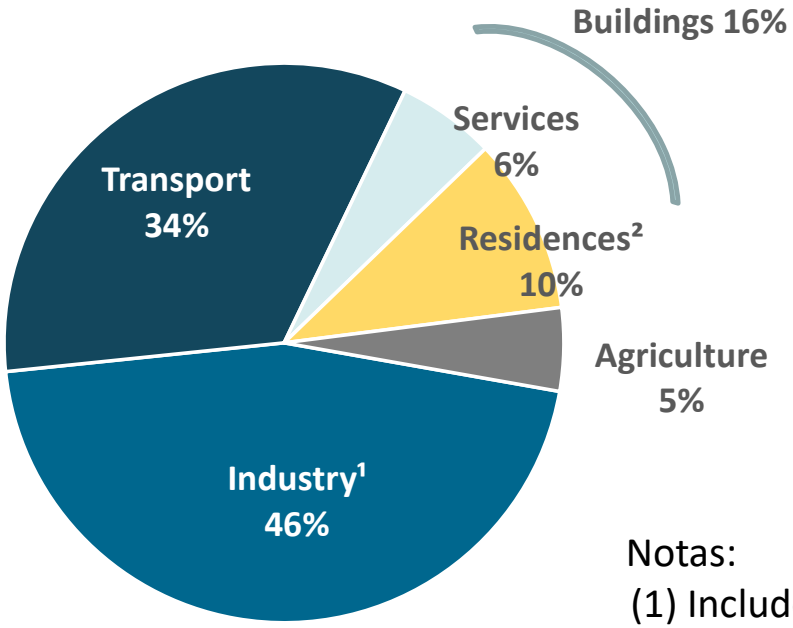
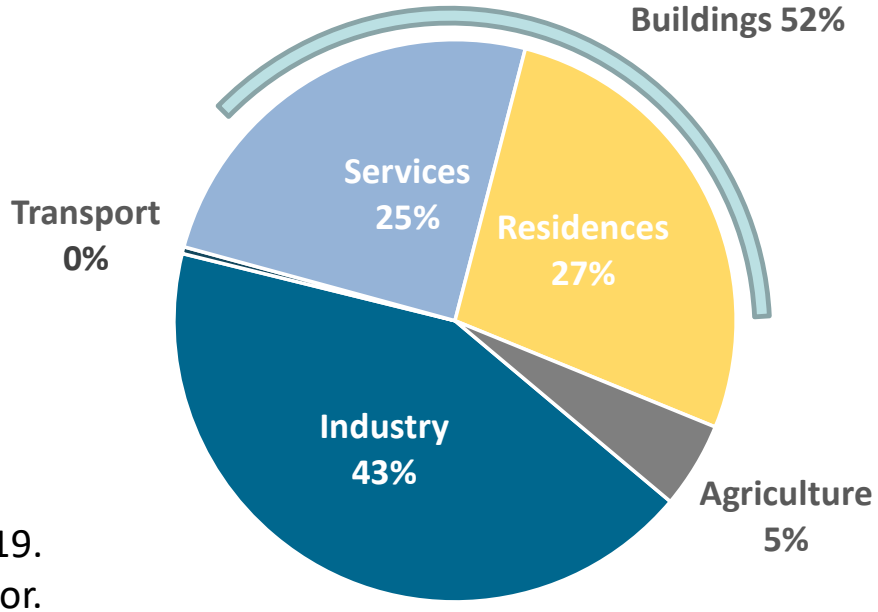
PDE 2030 | Where is the potential for energy and electric efficiency?

Participation in energy consume by sector in 2030



Participação do Consumo Elétrico Setorial em 2030



Notas: Base year 2019.
(1) Includes energy sector.
(2) Includes energy consume of urban residences and rural

Energy Efficiency decreases 17 thousand tep in 2030, equivalent to 5% of Brazilian energy consume.

Electric efficiency decreases 32 TWh in 2030. Industry (12 TWh) and Services (12 TWh) represent 73% of the saved eletric energy.

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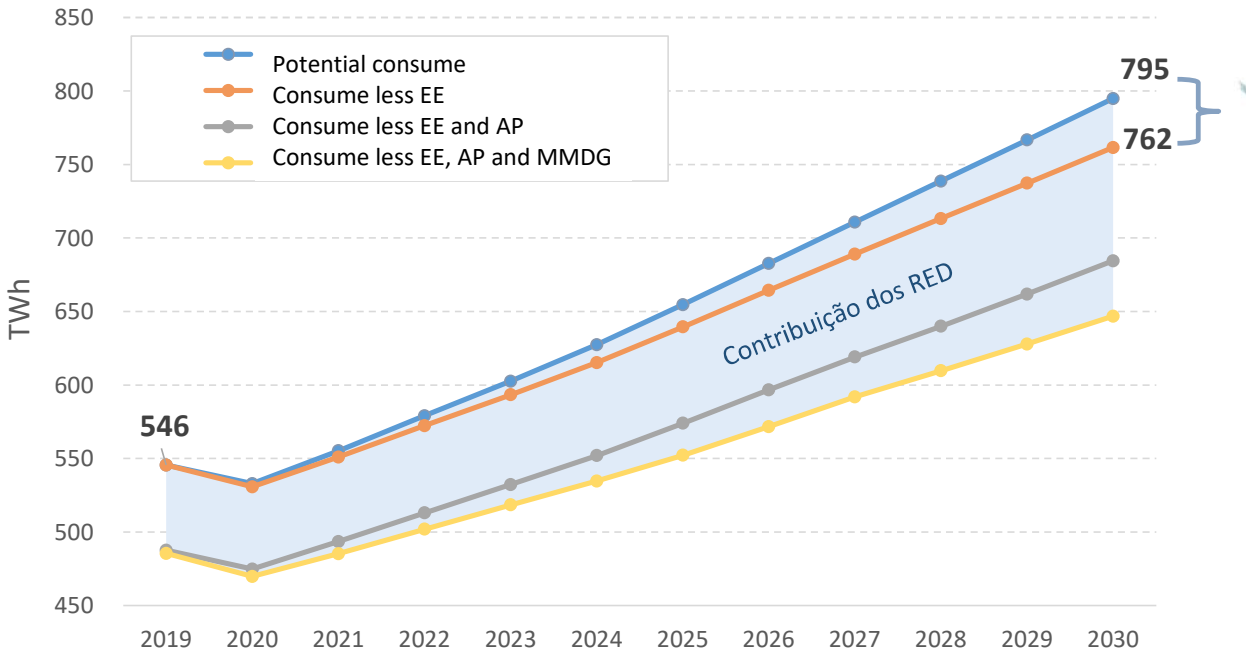
PDE 2030 | Brasil: Energy efficiency contribution



(1) Eficiência energética inclui parcela incremental de Sistemas de Aquecimento Solar (SAS) em relação a 2019.
(2) EE: eficiência elétrica
(3) AP: autoprodução não-injetada na rede.
(4) MMGD: Micro e minigeração distribuída, cenário "verão".
(5) RED: Recursos energéticos distribuídos.

Decrease of

32 TWh

in 2030 due to EE

4% of potential electric consume in **2030**

Electric efficiency = potential electric consume, in case habits and technological standards are maintained in base year – Consume adding electric efficiency gains with technological substitution due to the end of life cycle and available policies.

It estimated that EE achieves 32 TWh, while residential solar termal 1 TWh in 2030.
Saved electricity is equivalent to UHE Itaipu power (Brazilian side).

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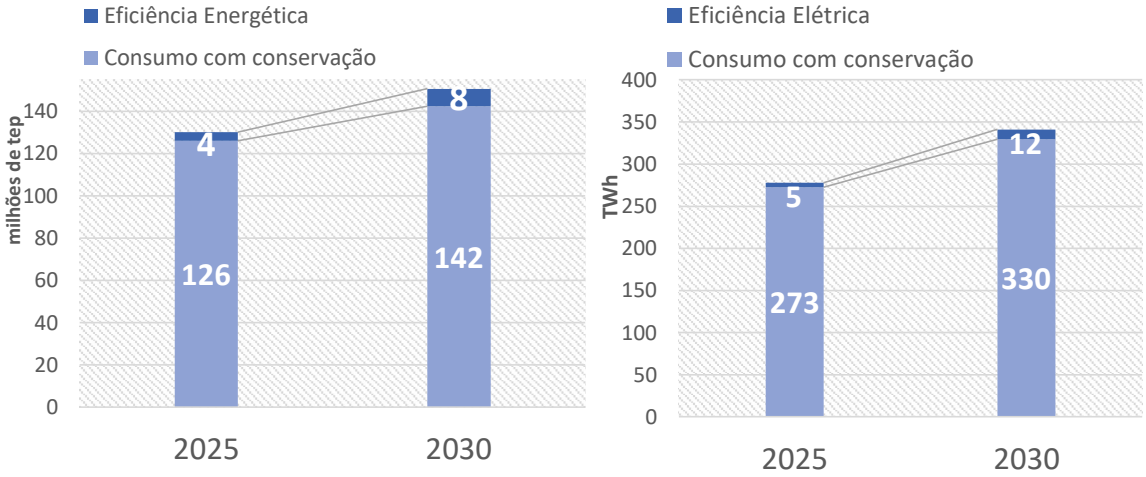
PDE 2030 | Energy efficiency in industry

Industrial Electric and energy efficiency *
[Millions of tep and TWh]

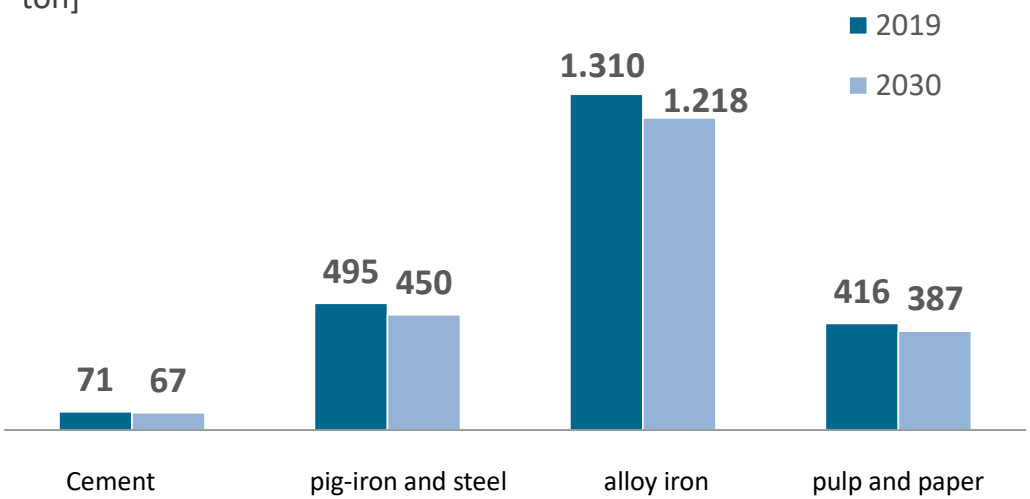


Nota: Year base 2019.
*includes energy sector

Energy efficiency decreased 17 mil tep of potencial consume of industry in 2030.

- The electric efficiency promotes the decrease of 3% of industrial consume in 2030, or 12 TWh, similar to the observed in mineration and pelletizing in 2019;
- Highlight for pig-iron and steel, which represent 9% reduction fo specific consume.

Evolution on specific consumes on selected segments [tep/10^3 ton]



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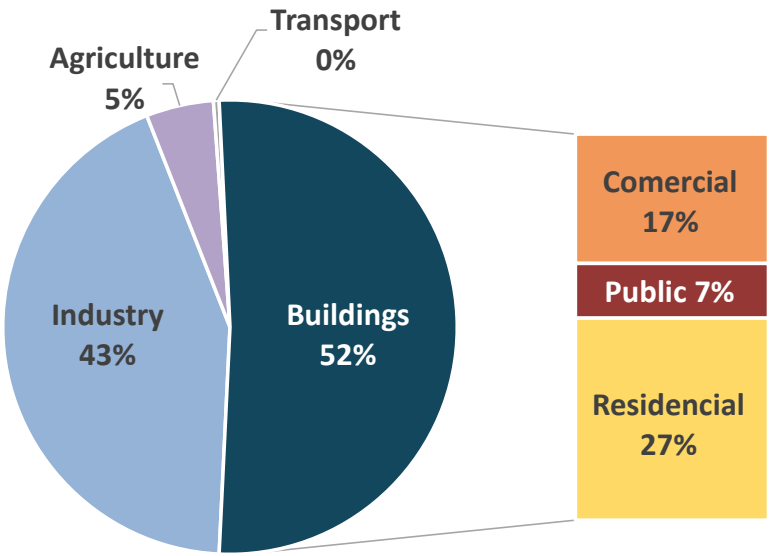
PDE 2030 | Electricity in building sector

Distribution of electricity consume in 2030



Nota: (1) Inclui consumo relativo a iluminação pública e saneamento.

Electricity consume in Buildings in 2030

- In 2030, the Buildings will represent 52% of Country´s electricity consume;
- Buildings represent **72% of Country´s saved electric energy in 2030**, contributing with 23 TWh of decrease.

Electricity 2030 (TWh)	Consume with efficiency	Efficiency gains*
Residencial	205	7
Comercial	131	9
Public	56	7
TOTAL	**392**	**23**

Nota: *Ano base 2019.

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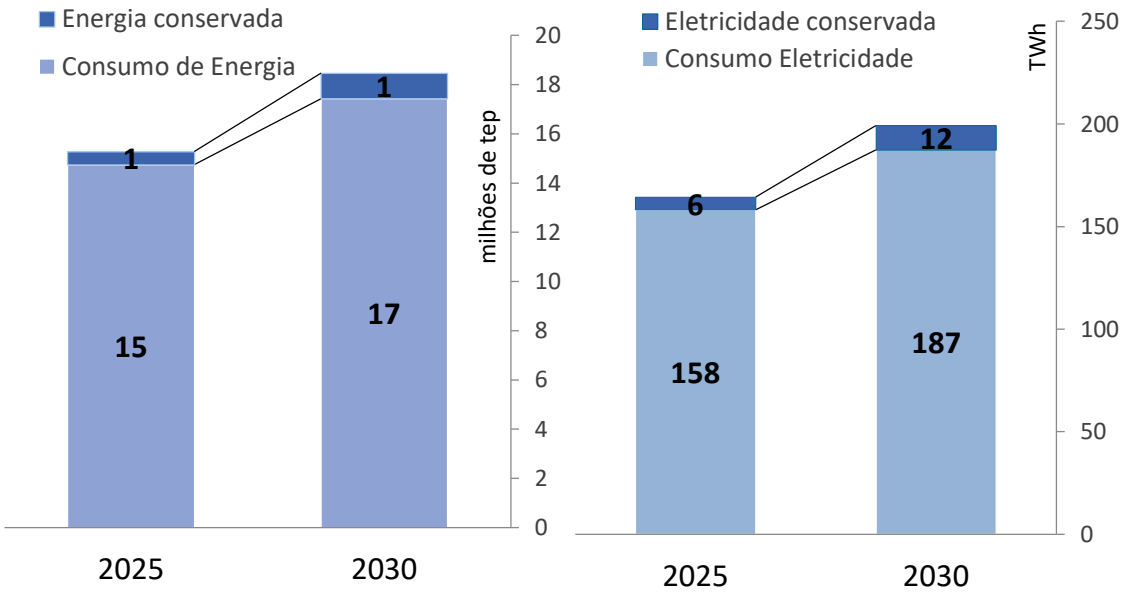
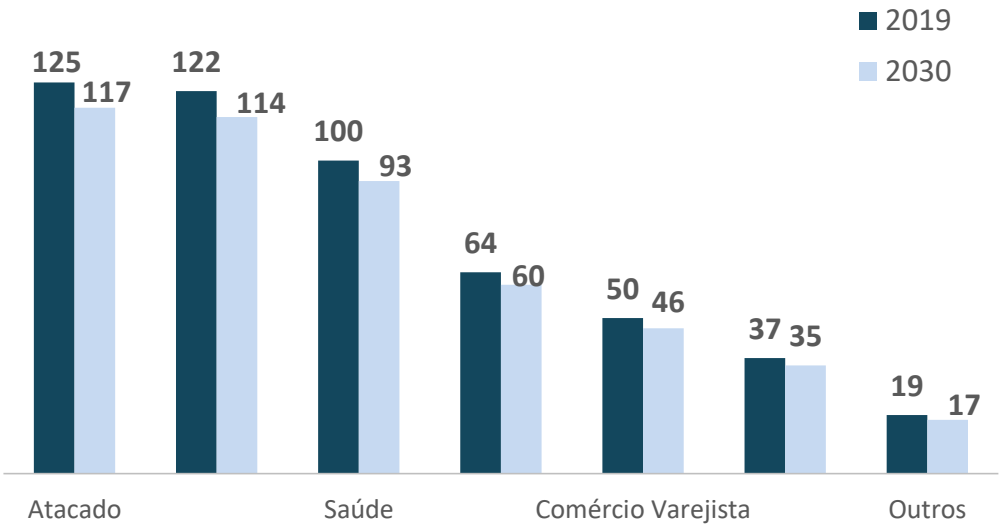
PDE 2030 | Efficiency in Services



Nota: Ano base 2019.
*Inclui os setores comercial e público.

- Saved energy in services sector is 6% in 2030 in terms of electric and energy efficiency.

Specific consume of selected segments of comercial sector
[kWh/m²]



- Segments of retail business, offices, hotel and restaurants are responsible for 50% of electricity consume of comercial sector.

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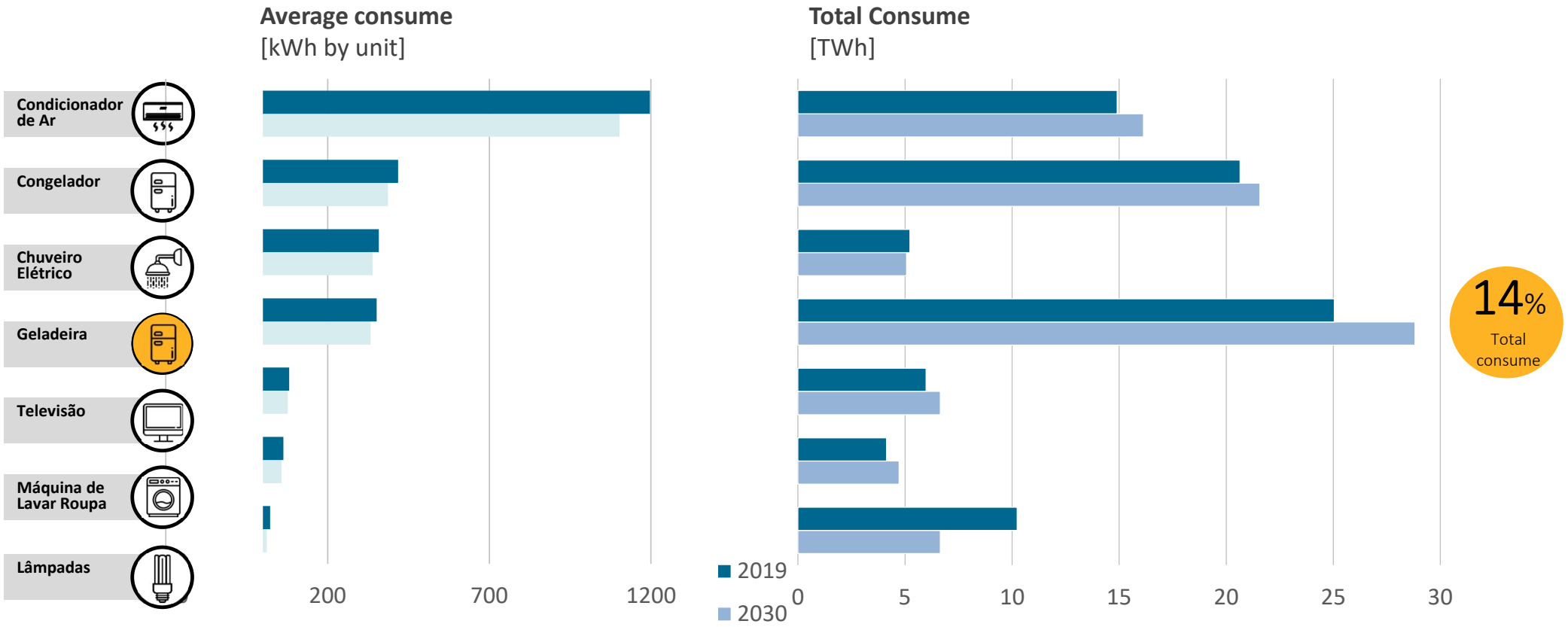
PDE 2030 | Electric efficiency in dwelling sector



Saved electric energy in Brazilian dwelling achieves 7 TWh in 2030, corresponding to 3,3% of consume.

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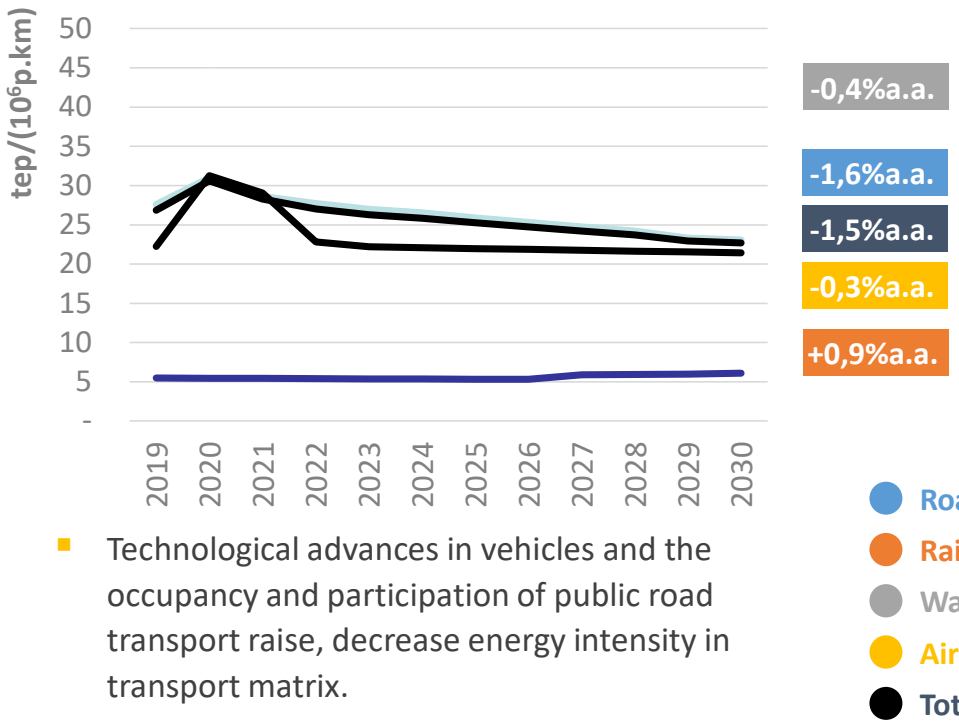
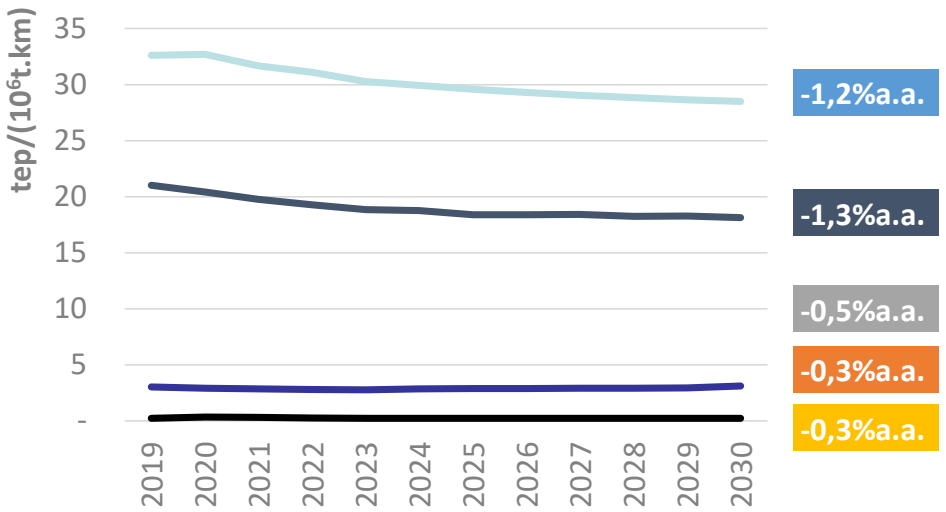
PDE 2030 | Efficiency evolution in Transport Sector

Energy intensity - passenger transport



- Technological advances in vehicles and the occupancy and participation of public road transport raise, decrease energy intensity in transport matrix.

Energy Intensity - cargo transport

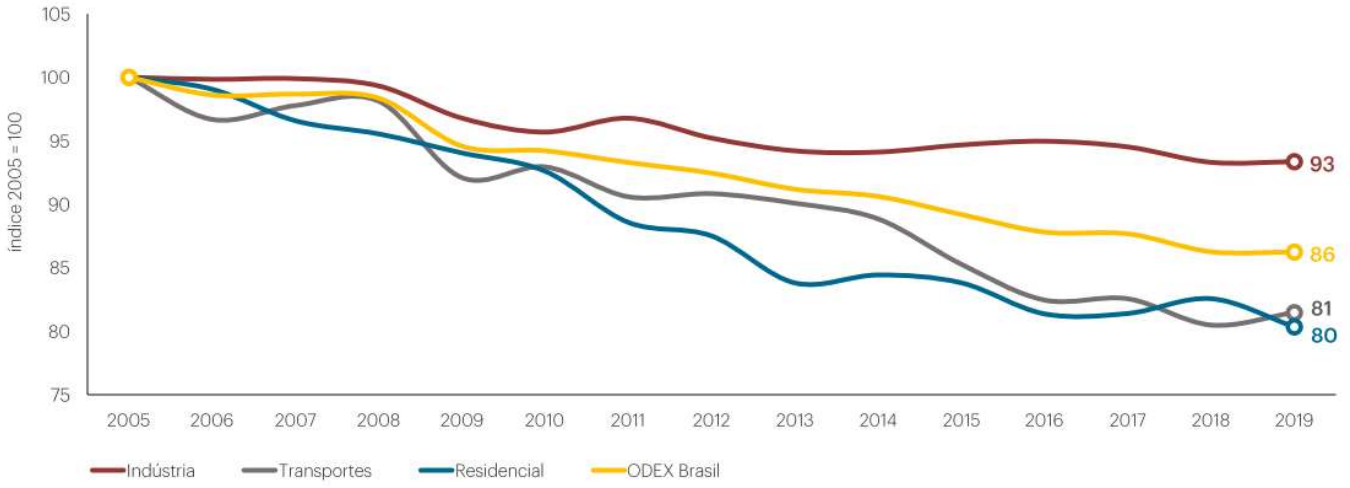


- The reduction of idleness in the truck fleet and the increasing participation of the railroad in cargo transportation reduce the energy intensity of the transport matrix.

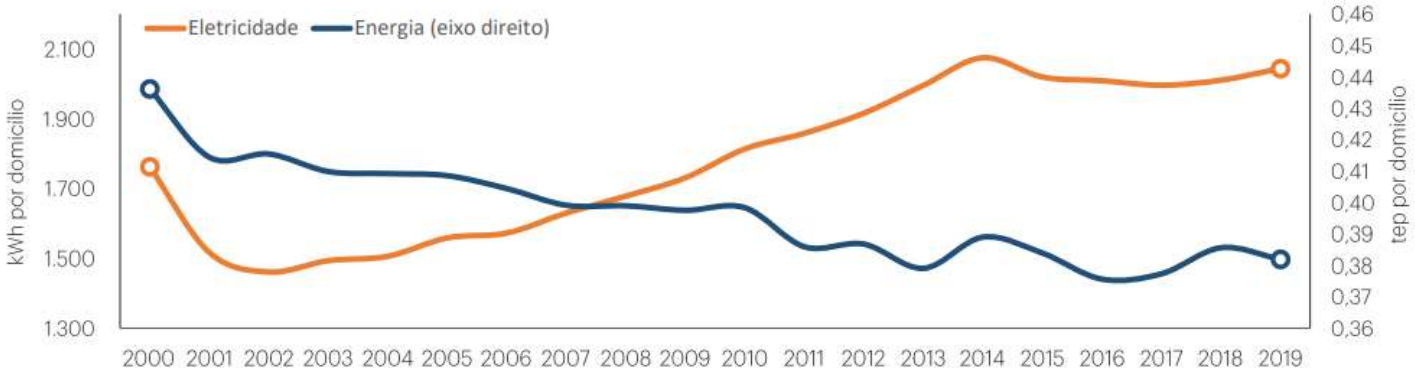
The individual gainf of efficiency are highlighted due to the adoption of light and heavy vehicles and airplanes. Furthermore, although the transport matrix keep mostly by road, the expansion of public transport and rail transport also improve the sistemic efficiency of transport sector.

ODEX Brasil

Residencial sector 20% more efficient
Transport 16% more efficient



Energy and Electricty consume by dwelling



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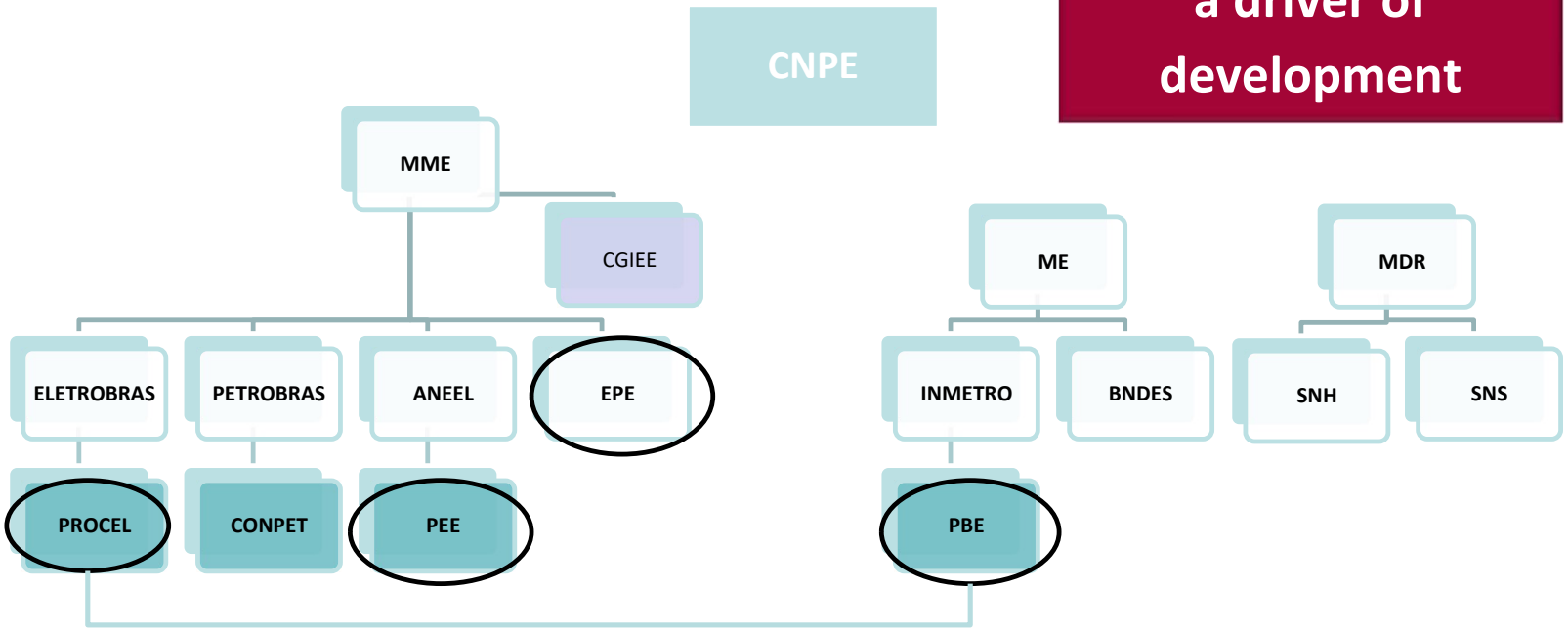
Energy Efficiency

Energy Efficiency – Institutional Framework

Energy Efficiency as a driver of development



Other ministries involved according to the policy or sector: Education, Foreign Affairs, Housing, Sanitation, Buildings, etc.

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Energy Efficiency – Main Initiatives in Brazil

Brazilian Labeling Program PBE

PROGRAMA BRASILEIRO DE ETIQUETAGEM

1984

1985

National Program of Electricity Conservation - PROCEL

- **Buildings**
- Industry
- Public / Street Lighting
- Sanitation
- Education
- Structuring Studies
- Information
- PROCEL Seal
- Municipal Energy Management
- Marketing

National Program for Conservation of Oil and Derivatives - CONPET

1991

2000

Law 9,991

ANEEL

PROGRAMA DE EFICIÊNCIA ENERGÉTICA

Energy Efficiency Program of Electricity Distribution Companies

Regulated by Electricity National Regulatory Agency – defines that 0.5% of the net operating revenue of the companies must be invested in **energy efficiency measures**

2001

Law 10,295

Energy Efficiency Law

National Policy for Conservation and Rational Use of Energy – defines the establishment of minimum energy performance standards for machinery and equipment manufactured and/or sold in the country, and **buildings constructed or retrofitted in Brazil**

2011

National Plan for Energy Efficiency

Guidelines for an Energy Efficiency Action Plan

PNEF

2016

Law 13,280

Setting new source of funding and new governance for Procel

Definition of elaboration of a PROCEL´s Annual Resource Application Plan (PAR)

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Energy Efficiency – Law 10,295/2001

CGIEE

- **Steering Committee on Energy Efficiency Indicators and Levels**
  - Minimum energy efficiency levels should be set according to specific regulations

Buildings Working Group

- Discuss procedures for the assessment of the energy efficiency of buildings constructed or retrofitted in Brazil

- Ministry of Science, Technology, Innovation and Communication/ Ministry of Economy/ Energy Research Institute – EPE/ Research Center of Electricity- CEPEL/ Procel/ CONPET/ Brazilian Building Construction Union/ Regional Council of Architecture/ Federal Council of Engineer and Architecture/ Academy Representative- Expert in Buildings and Energy

Energy Efficiency – CGIEE Regulated Equipment

PI - Interministerial Regulation

Three Phase Induction Electric Motors
Decree nº 4,508/2002 (Specific Regulation)
PI nº 553/2005
PI nº 01/2017

Compact Fluorescent Lamps
PI n° 132/2006 (Reg. Específica)
PI nº 1008/2010 (Programa de Metas)

Refrigerators and Freezers
PI n° 362/2007
PI nº 326/2011
PI nº 01/2018

Gas Stoves and Ovens
PI n° 363/2007
PI nº 325/2011

Air Conditioners
PI n° 364/2007
PI nº 323/2011
PI nº 02/2018

Gas Water Heaters
PI n° 298/2008
PI nº 324/2011

Electromagnetic Reactors for Sodium and Metal Steam Lamps
PI nº 959/2010

Incandescent Light Bulbs
PI nº 1007/2010

Distribution Transformers
PI nº 104/2013
PI nº 03/2018

Ceiling Fans
PI nº 02/2017

Brazilian Labeling Program

1-GAS WATER HEATERS
2-CENTRIFUGAL PUMPS AND MOTOR PUMPS
3-AIR CONDITIONERS
4-VERTICAL FREEZERS, FROST-FREE VERTICAL FREEZERS AND HOR FREEZERS.
5-BUILDINGS
6-HOME GAS STOVES AND OVENS
7-COMMERCIAL ELECTRIC OVENS
8-MICROWAVE OVENS
9-DECORATIVE LAMPS - INCANDESCENT LINE - 127V AND 220V
10-LAMPS FOR HOUSEHOLD USE - INCANDESCENT LINE - 127V AND 220V
11-COMPACT FLUORESCENT LAMPS 12Vdc
12-COMPACT FLUORESCENT LAMPS WITH INTEGRATED BALLAST (127V)
13-COMPACT FLUORESCENT LAMPS WITH INTEGRATED BALLAST (220V)
14-HIGH PRESSURE SODIUM STEAM LAMP
15-SEMI-AUTOMATIC CLOTHING WASHERS
16-AUTOMATIC CLOTHING WASHERS TOP OPENING (TOP LOAD)
17-AUTOMATIC CLOTHING WASHERS FRONT LOAD
18-AUTOMATIC CLOTHING WASHERS AND DRYER WITH UPPER OPENING (WASH AND DRY)
19-AUTOMATIC CLOTHING WASHERS AND DRYER WITH FRONT OPENING (WASH AND DRY)
20-THREE-PHASE ELECTRIC MOTORS
21-PBE VEHICLE
22-REFRIGERATORS, REFRIGERATORS, COMBINED, COMBINED FROST-FREE
23- PHOTOVOLTAIC ENERGY SYSTEM
24-Systems and equipment for solar water heating (PBE Solar - collectors and reservoirs)
25-TELEVISORS - STANDY-BY
26-INSULATING LIQUID DISTRIBUTION TRANSFORMERS
27-TABLE, WALL, PEDESTAL AND CIRCULATOR FANS.
28-CEILING FANS 127 V
29-CEILING FANS 220 V

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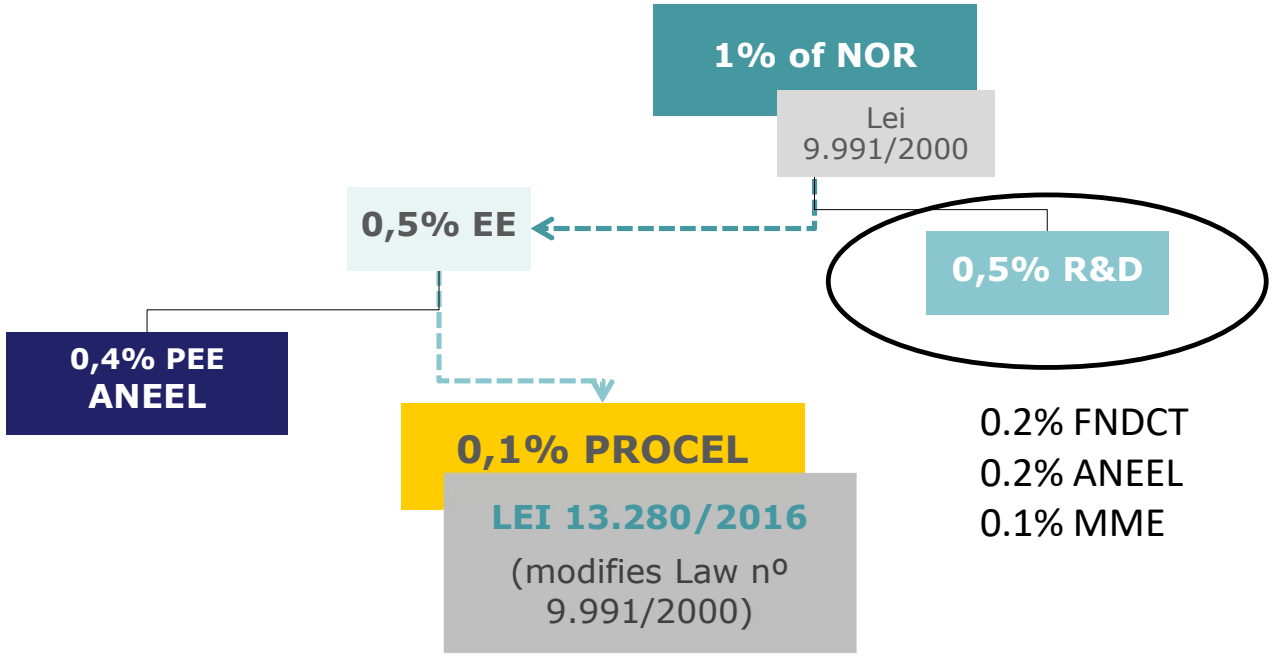
Supports programs and projects in the area of energy, especially in the area of end-use energy efficiency

- Universities
- Research Institutes

Supports EE projects focused on equipments, processes and energy end-uses (inovation, new Technologies, new habits and best practices)

- Eletric Sector (Power utilities)

Supports the Research Center of Eletric Energy- CEPEL and the studies to the expansion planning of the energy system, as well as the inventory and feasibility necessary to harness the hydroelectric potentials

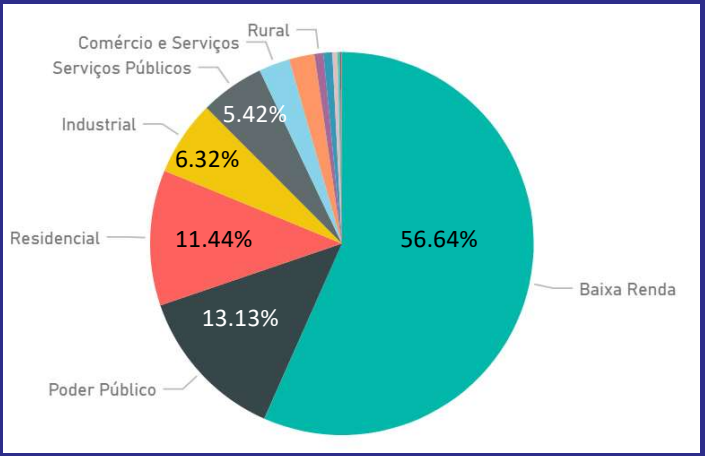


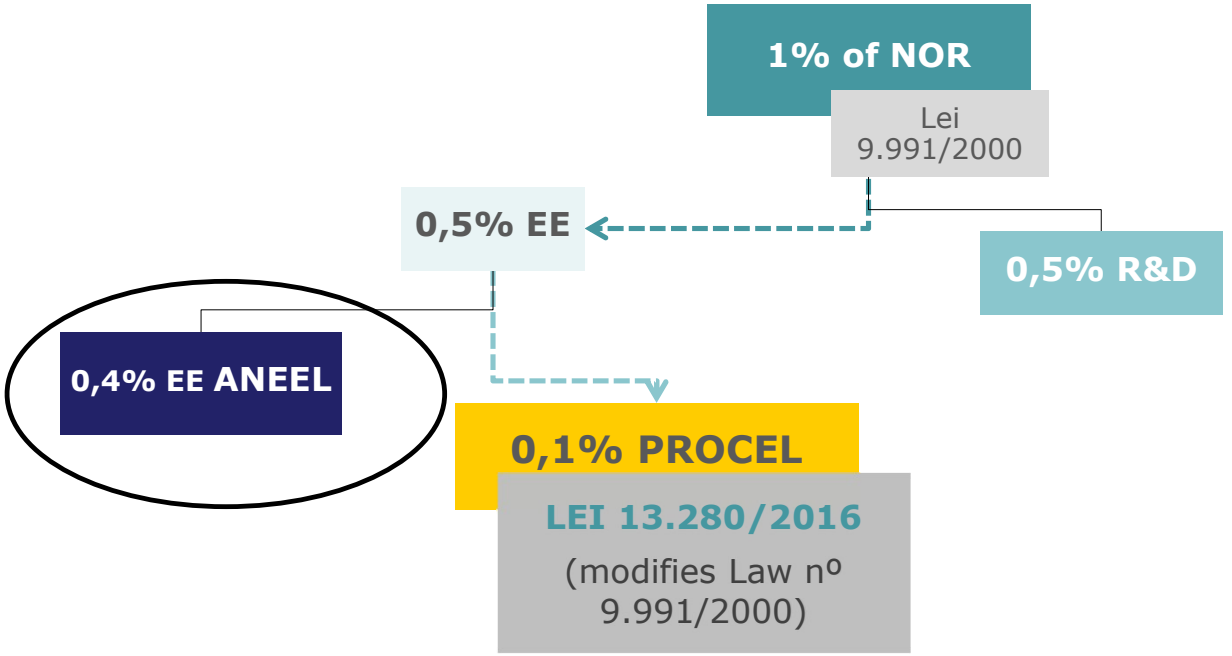
ANEEL
AGÊNCIA NACIONAL DE ENERGIA ELÉTRICA

PROGRAMA DE EFICIÊNCIA ENERGÉTICA

Supports EE projects focused on equipments, processes and energy end-uses

- inovation,
- new technologies
- new habits and best practices





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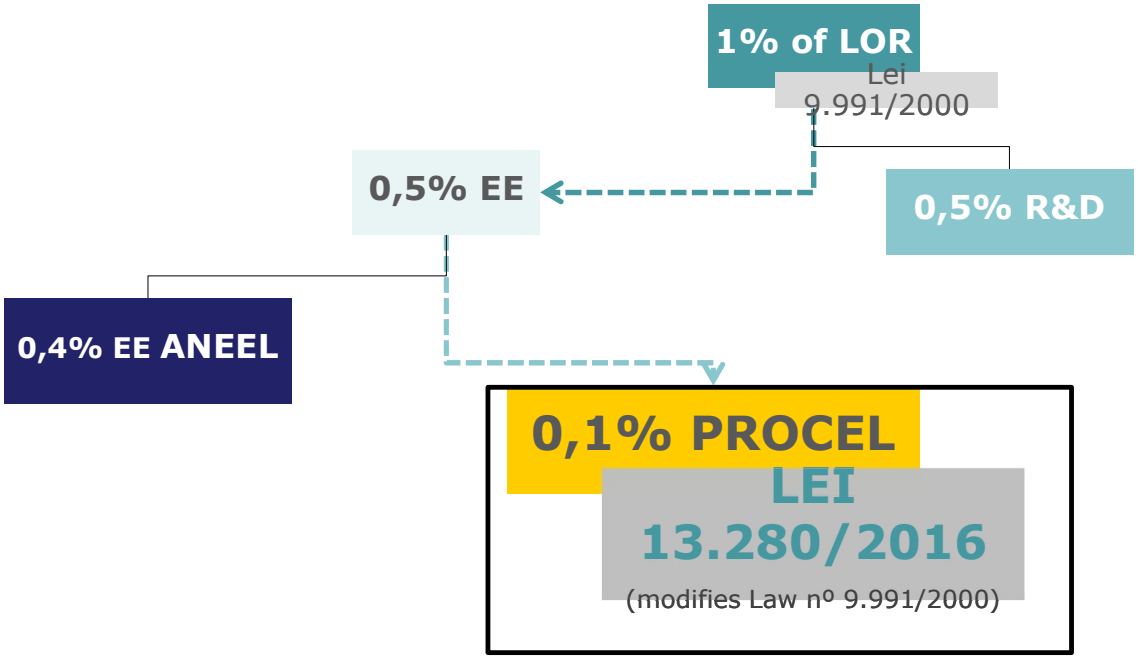
RAP

Resources Allocation Plan

Directs the use of the financial resources to be destined to energy efficiency projects, under Procel's administration.

- The Plan is valid for 12 months, in consonance with the commitment of resources (~ U$ 35 million);
- Actions can be multiannual and are annually evaluated;
- For each project, performance indicators and targets are established.



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1º PAR 2017/2018 — US$ 20 million

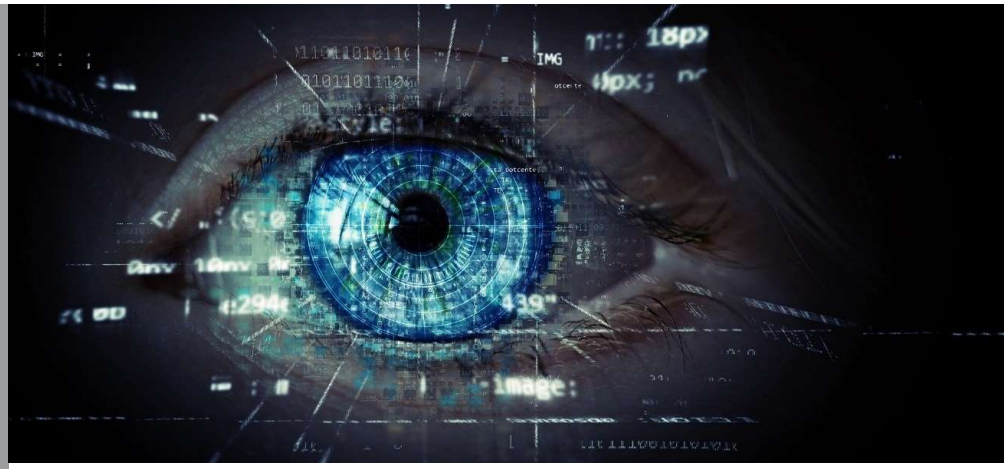
Firt Resources Annual Plan

20 contracts of services provision	6 agreements	2 public callings = 28 terms of technical cooperation

2º PAR 2018/2019 — US$ 26 million

Second Resources Annual Plan

22 contracts of services provision	10 agreements	2 public callings = 71 terms of technical cooperation



3º PAR 2020/2021 — US$ 67 million

Third Resources Annual Plan

~ 18 contracts of services provision	~ 7 agreements	~ 7 public callings

- *Resources from Law Lei 13.280/16.*
- *RAPs and its accountability are submited to ANEEL´s public consultation*

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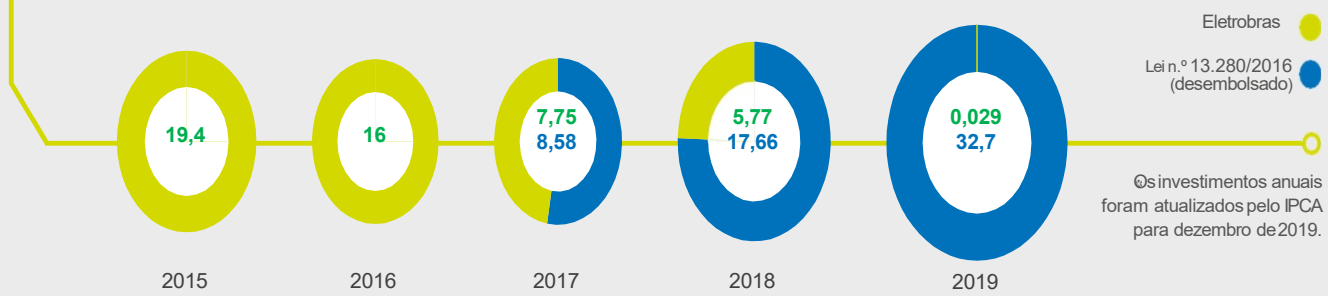
RESULTADOS PROCEL 2020
ANO BASE 2019

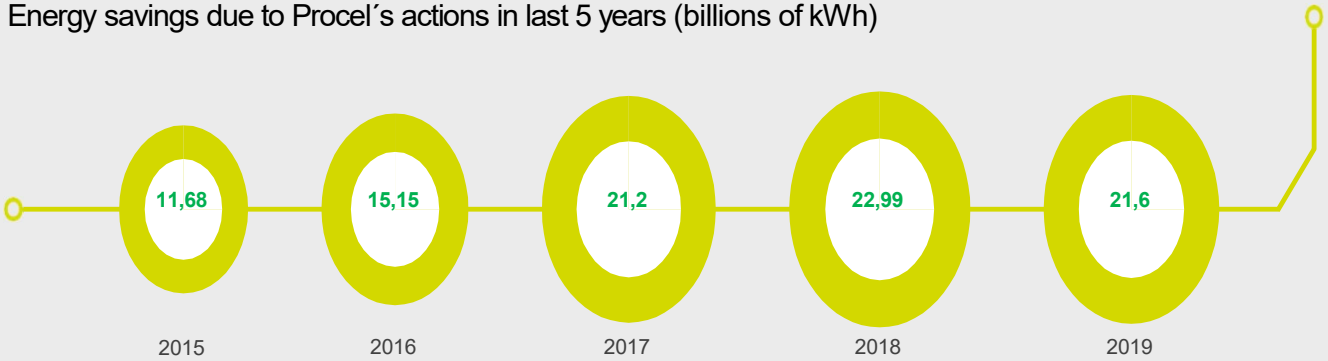
*Since 1985 Procel has invested **US$ 652 million**, what has resulted in cost reduction on electric system of about **7,9 billion kWh**. To each invested Real, society had 14 as a benefit!*

Annual investment on Procel in last 5 years (millions of reais) *



*Os investimentos anuais foram atualizados pelo IPCA para dezembro de 2019.

Energy savings due to Procel´s actions in last 5 years (billions of kWh)



Investments in EE actions from 1986 a 2019

US$ 652 million

Energy savings from 1986 to 2019

7,9 Billion of kWh

*Savings in 2019 was 6,0% lower than in 2018, due to the update of possession of light lamps in the country, according to **PPH 2019**. Without the update, the savings would have being 3,9% higher than in 2018.*

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PROCEL

PROGRAMA NACIONAL DE CONSERVAÇÃO DE ENERGIA ELÉTRICA

Since 1985

AREAS OF EXPERTISE

- Buildings
- Municipal Energy Management
- Public Lighting
- Sanitation
- Education
- Industries
- Structuring Studies
- Information Dissemination
- Procel Seal
- Marketing

Energy Efficiency – Present priorities and activities in progress

- Speed up revisions to minimum energy efficiency ratios of already regulated products
  - Example: Air Conditioners and Refrigerators
    - Review of testing methods
    - Regulatory impact analysis
    - AC- New indices launched in 2020
    - RF- New indices in 2021

  } Coordination with all the involved stakeholders

- Studies to make some of the voluntary energy efficiency labeling programs compulsory
  - Example: buildings (ongoing) and vehicles (expectation)

- Ten-year Plan of Energy Efficiency (PDEf)
  - Provide energy efficiency potentials in several different economy sectors
  - Define the main actions to be conducted in each sector to enable the potential energy savings


Thank you!
Ministry of Mines and Energy
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