

ENERGY EFFICIENCY IN BRAZIL

Industry Sector

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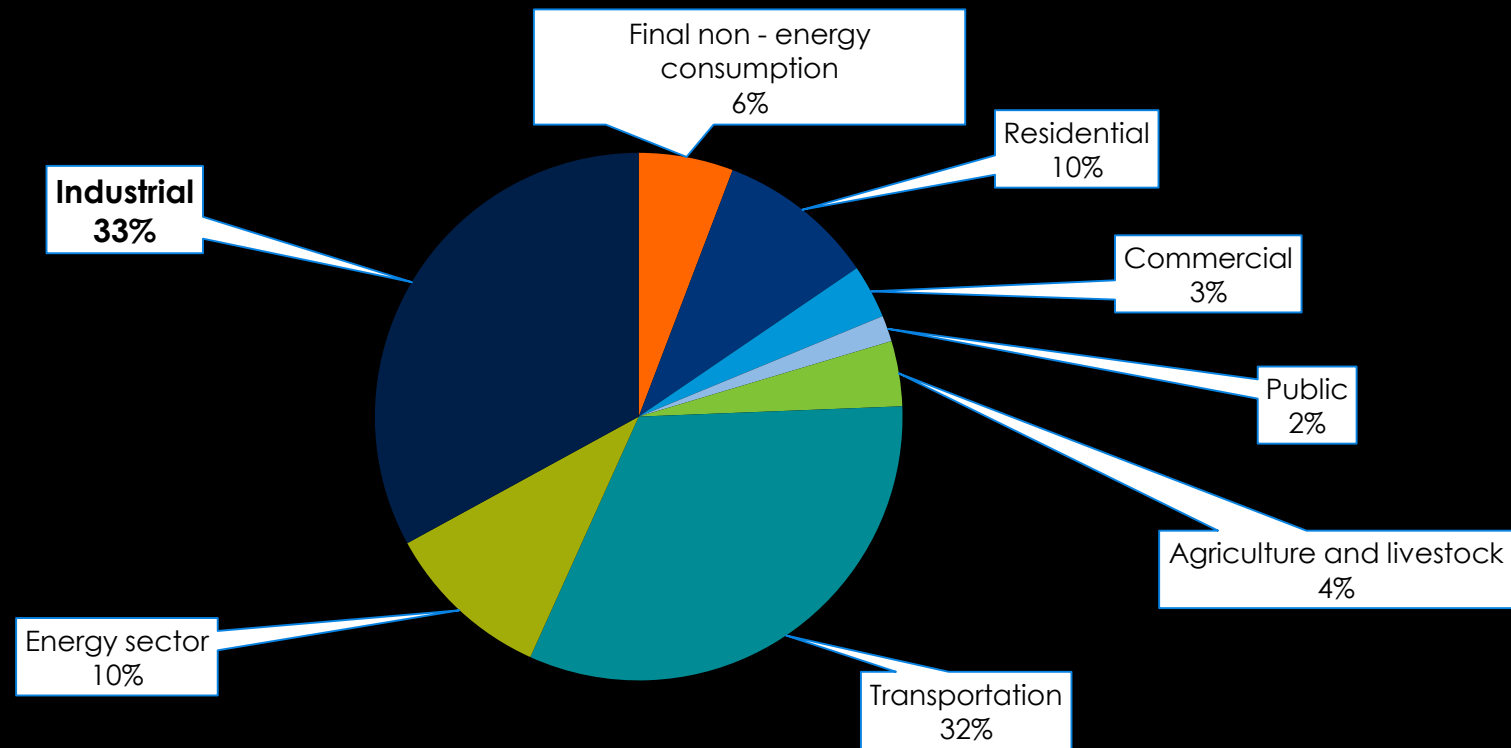
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São Paulo

INDUSTRIES HAVE SIGNIFICANT PARTICIPATION IN BRAZIL'S ENERGY DEMAND, GDP AND GHG EMISSIONS. 48% OF BRAZIL'S EE POTENTIAL LIES WITHIN INDUSTRIES

- Industries are responsible for **~21% of Brazil's GDP**; **~33% of the country's total energy consumption**; and **8% of its GHG emissions**. These shares are expected to remain relatively stable up until 2030.
- **SMEs represent 99% of industrial companies** and contribute to **47% of industrial GDP** (~10% of national GDP). **Industrial SMEs are responsible for 16% of total employment in Brazil**.
- EPE estimates EE can save **~17 Mtoe by 2026**, 48% of which within industrial sector, primarily fuel savings

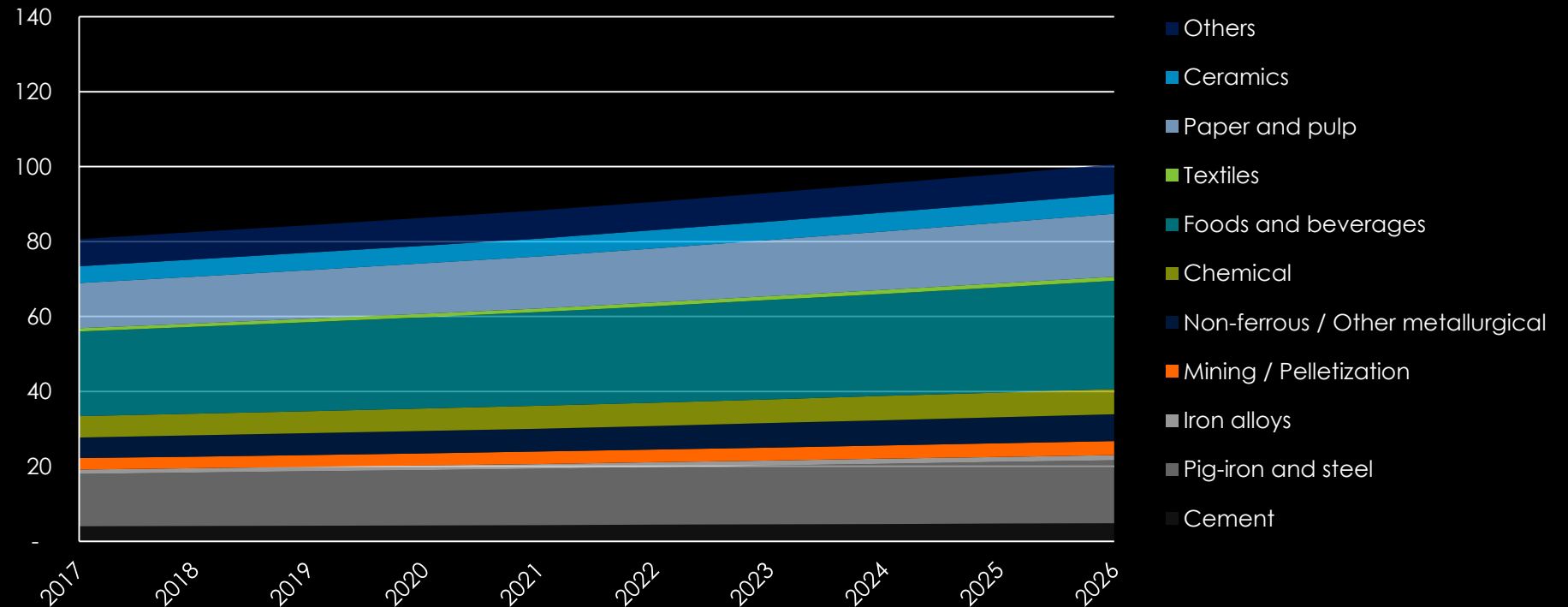
INDUSTRY REPRESENTS ~33% OF BRAZIL'S FINAL ENERGY CONSUMPTION



INDUSTRIAL ENERGY DEMAND UNTIL 2026 – STEADY GROWTH

- Increasing importance of primary export sub-sectors such as paper and pulp and other metallurgic thanks to a low exchange rates.
- Food and beverages pushed by internal demand growth following increasing GDP expectations

Industrial energy consumption per sub-sector (Mtoe)



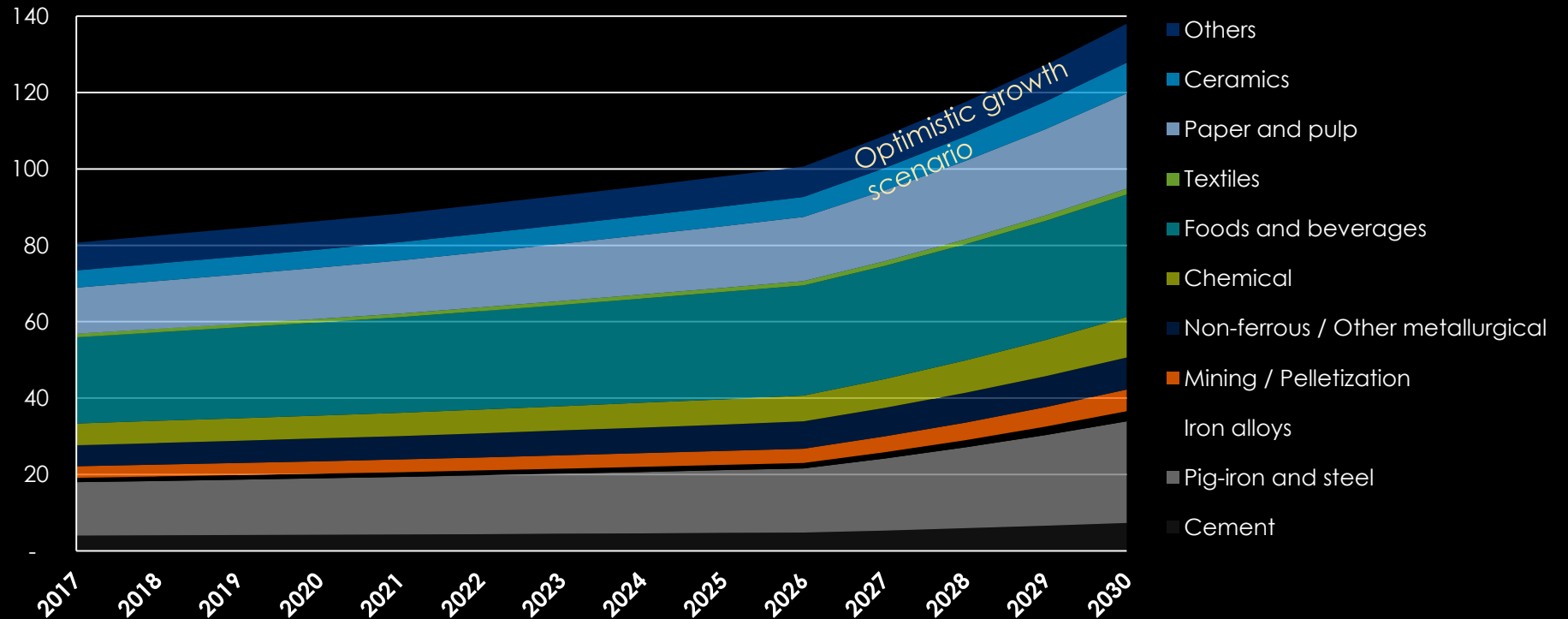
INDUSTRIAL ENERGY DEMAND UNTIL 2030 – STEADY GROWTH

Increasing importance of primary export sub-sectors such as paper and pulp and other metallurgic thanks to a low exchange rates.

Food and beverages pushed by internal demand growth following increasing GDP expectations

2026-2030 growth is based on an optimistic investment scenario once full capacity is reached.

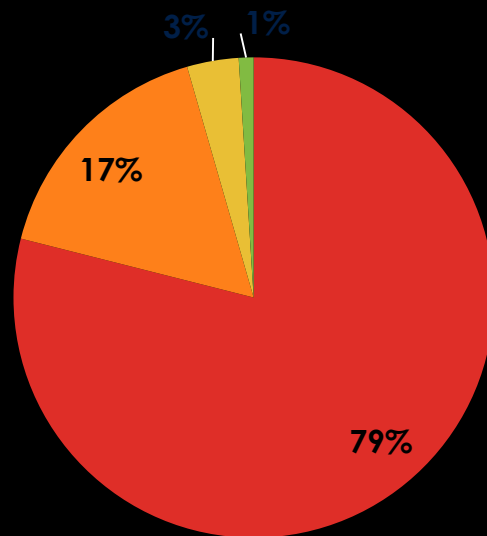
Industrial energy consumption per sub-sector (Mtoe)



SMES REPRESENT 99% OF INDUSTRIAL COMPANIES IN 2011, CONTRIBUTING TO 47% OF INDUSTRIAL GDP (10% OF NATIONAL GDP)

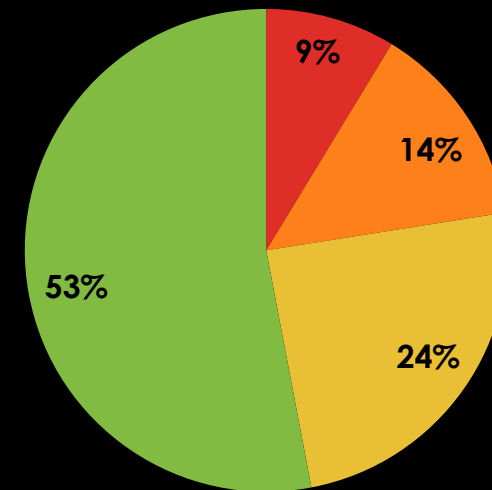
Share of industrial companies
per size (% 2009 - '11)

■ Micro ■ Small ■ Medium ■ Large



Industrial GDP contribution per company size
(% 2009 - '11)

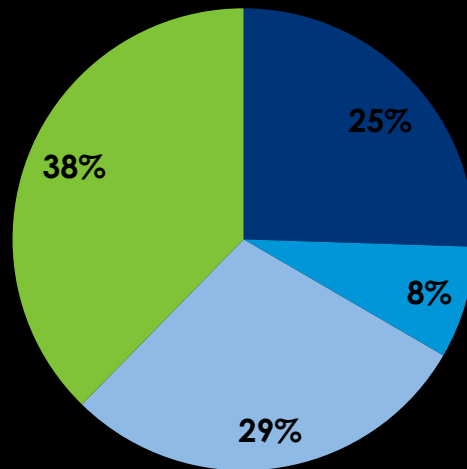
■ Micro ■ Small ■ Medium ■ Large



THE INDUSTRIAL SECTOR ACCOUNTS FOR 25% OF THE COUNTRY'S EMPLOYMENT RATE, 68% OF WHICH IN SMES

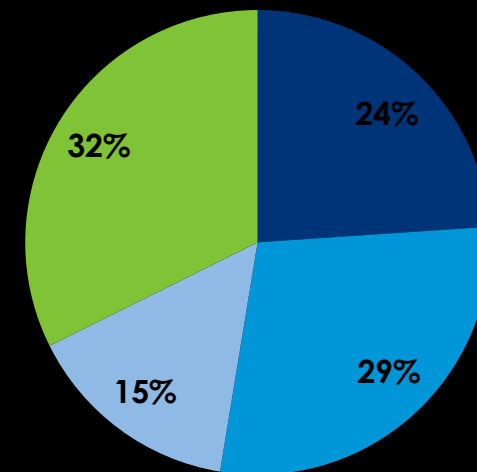
Nr. of employees per sector (2014)

■ Industry ■ Construction



Nr. of employees per company size (2014)

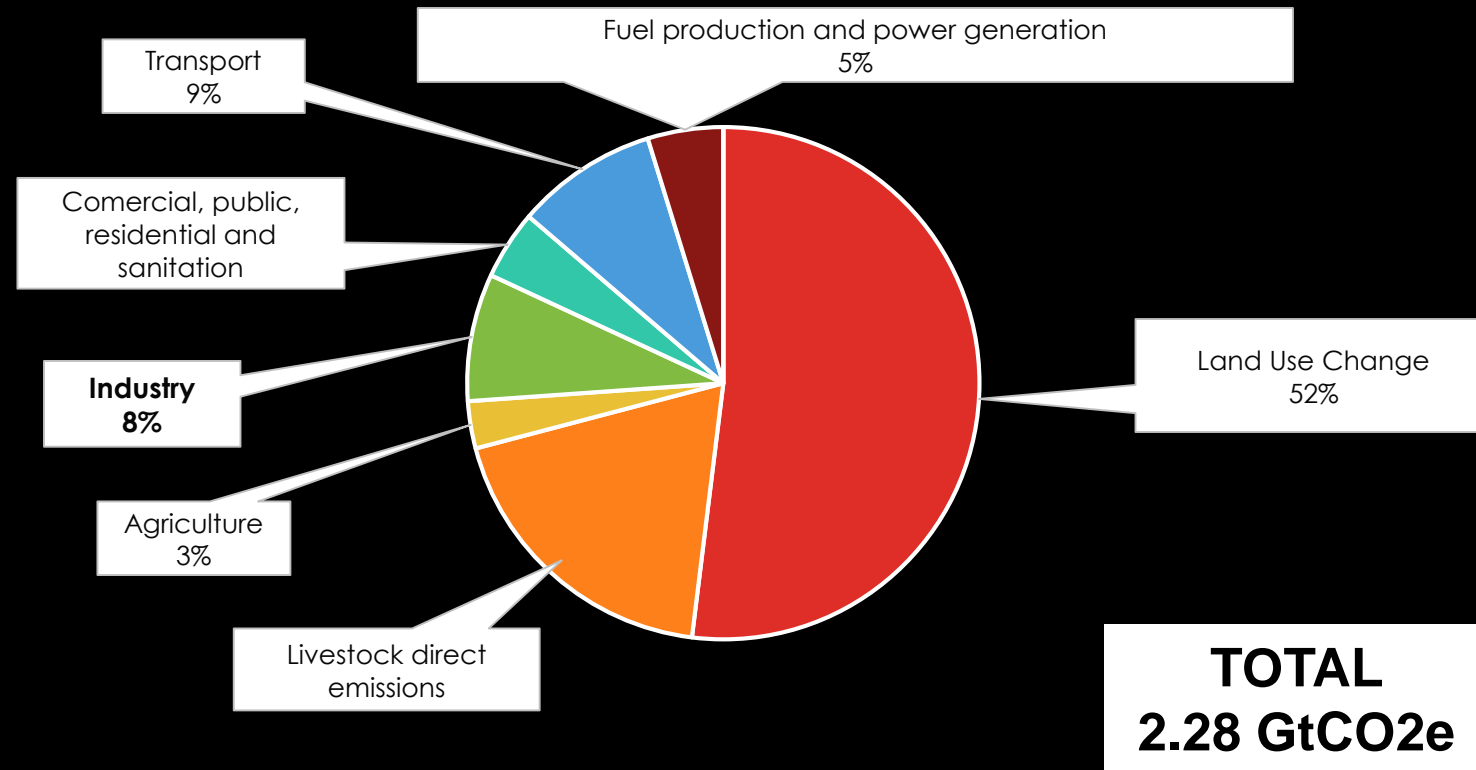
■ Micro ■ Small ■ Medium ■ Large



Industrial SMEs are responsible for ~16% of total employment in Brazil

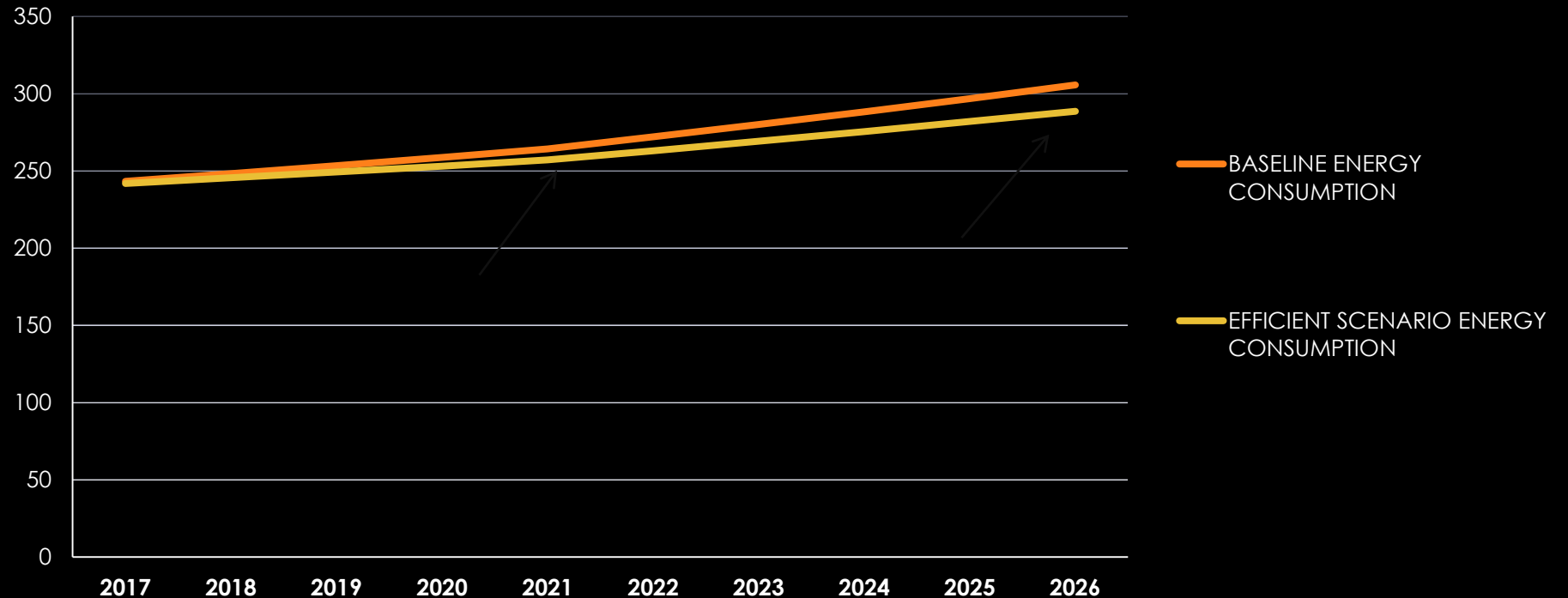
INDUSTRY ACCOUNTS FOR 8% OF BRAZILIAN EMISSIONS

Brazilian GHG emissions per economic activity in 2016.



EPE SEES POTENTIAL TO SAVE 5.6% OF ENERGY DEMAND IN 2026

Brazil's annual energy demand (Mtoe)



• **~17 Mtoe**
• can be saved by 2026

ENERGY EFFICIENCY FRAMEWORK IN BRAZIL

Key Targets / Summary

FEDERAL PLANS

NDC	<ul style="list-style-type: none"> • Mitigate 37% of GHG emissions in relation to 2005 levels by 2025. • Reduce electricity demand by 10% by 2030 against a baseline in line with National EE Plan
National Plan on Climate Change (PNMC)	<ul style="list-style-type: none"> • Mitigate 36% - 39% GHG emissions by 2020 - against a baseline.
National Energy Efficiency Plan	<ul style="list-style-type: none"> • Reduce electricity demand by 10% by 2030 against a baseline.
Plano Brasil Mais Produtivo (P+B Plan)	<ul style="list-style-type: none"> • No targets - TA provided to 48 industrial SMEs to identify EE opportunities, aiming to scale up to 400 SMEs.
Inova Plan	<ul style="list-style-type: none"> • No targets - seeks to accelerate innovation in specific sectors offering credit and grants through periodic public tenders.

CROSS-SECTOR FEDERAL PROGRAMMES

ANEEL's EE Programme (PEE)	<ul style="list-style-type: none"> • No targets - EE obligation scheme mandating electricity distribution utilities to invest 0.5% of their net revenues in end-user EE adding to ~R\$630million/year.
Equipment Labelling Programme (PBE)	<ul style="list-style-type: none"> • No targets - mandatory labels to communicate the relative efficiency of electric equipment to consumers
National Programme for Electricity Conservation (PROCEL)	<ul style="list-style-type: none"> • No targets - awareness raising initiatives around EE in multiple sectors and a flagship labelling award for the most efficient equipment under each category of the PBE.
National Program for the Rational Use of Oil and Gas Products (CONPET)	<ul style="list-style-type: none"> • No targets - mandatory labels to communicate the relative efficiency of fossil-fuel-powered equipment to consumers.
Govt. Sustainable Purchase Programme	<ul style="list-style-type: none"> • No targets - non-compulsory sustainable procurement guidance to federal and state institutions.

CROSS-SECTOR FEDERAL REGULATION

Energy Efficiency Law	<ul style="list-style-type: none"> • Determines minimum efficiency standards for a range of energy consuming product categories
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INDUSTRIAL SECTOR PLANS AND REGULATIONS

Petrobras' operational EE programme	<ul style="list-style-type: none"> • No targets - in-house measures to enhance the efficiency of the company's fossil extraction, refining, distribution, petrochemicals and biofuels - set as a regulation given the company's public status.
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THANK YOU

Carlos Alexandre P. Pires

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21 de novembro – 2018

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