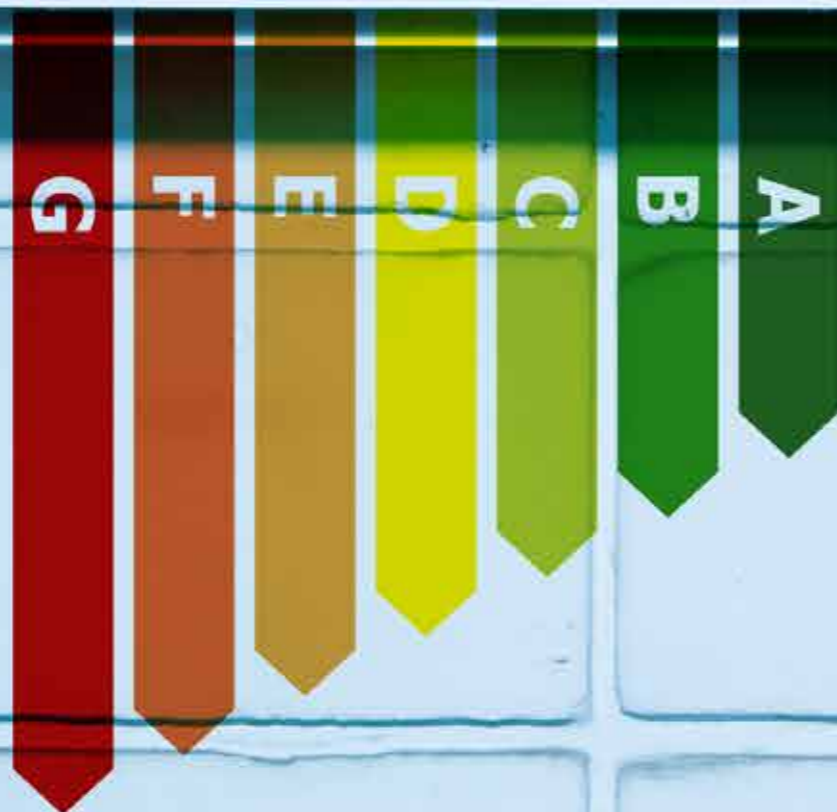
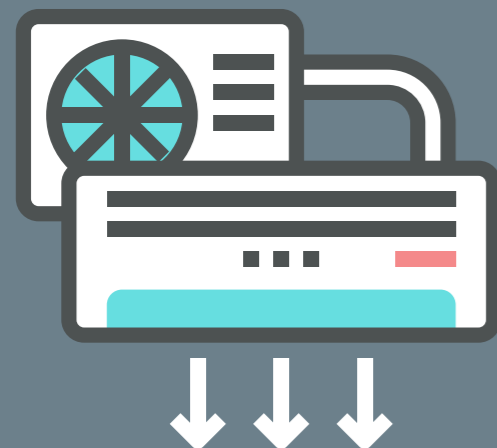


The economy is in the air:  
What would Brazil gain with  
more efficient air conditioning?





## The economy is in the air: What would Brazil gain with more efficient air conditioning?

Study carried out by Instituto Escolhas

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**Instituto Escolhas**

São Paulo, august, 2020

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INSTITUTO ESCOLHAS CARRIES OUT  
STUDIES AND ANALYSES OF THE  
ECONOMY AND THE ENVIRONMENT  
SO AS TO MAKE SUSTAINABLE  
DEVELOPMENT POSSIBLE.

Main results:  
By 2035

87.9  
TWh

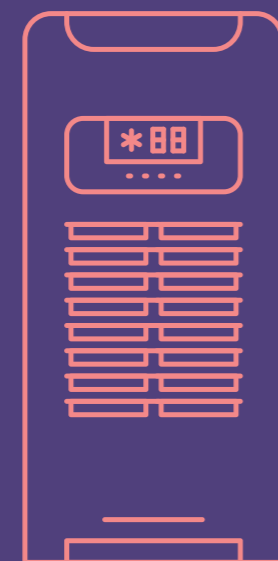
in energy savings



Equivalent to

64%

of all  
residential  
consumption  
in Brazil  
in 2019



consumption by

56

million homes – or

3.8

times the energy saved by  
all initiatives by the National  
Program for Electrical Energy  
Conservation (Programa Nacional  
de Conservação de Energia  
Elétrica - PROCEL) in 2018

6.7 million tonnes of CO<sub>2</sub>e – equivalent CO<sub>2</sub> emissions avoided,  
corresponding to the emissions by

2.3 million vehicles  
in one year



R\$ 68.5

billion – the value of avoided energy  
– that is not used due to consumption  
reduction



240.94  
TWh

of expected additional demand due  
to the use of such equipment

Notes:

- For the calculations, samples with the 40 most efficient AC models were used (devices with fixed or variable rotation), collected from a recent study by INMETRO, which incorporated the new methodology for calculating the proposed energy efficiency set to be implemented starting in 2022.
- Figures above take into account the scenario executing both industrial policies as well as the energy efficiency policy.

## Scenarios



### INDUSTRIAL AND INTEGRATED ENERGY EFFICIENCY POLICIES

Gains in energy efficiency through the simultaneous and complementary effects of changes in Basic

Productive Project (Projeto Produtivo Básico), or BPP, along with the conversion of equipment to new classes.

Result: maximum energy efficiency. The cost reduction in production and improved access to more efficient components would encourage companies to pursue more ambitious goals, equivalent to those of developed countries.



### ENERGY EFFICIENCY POLICY

Efficiency gains through the conversion of equipment to new labeling classes that approach international criteria, such as those defined through Decree # 234<sup>1</sup> issued by Brazil's standards body, Inmetro.

Thanks to enhancements made by the

Brazilian Labeling Program (Programa Brasileiro de Etiquetagem – PBE) to air conditioners, criteria to label a unit as “A” – with the least electrical energy consumption – became stricter.

<sup>1</sup>Definition of classes established through Decree # 234 (29 July 2020), available at: <https://www4.inmetro.gov.br/sites/default/files/media/file/portaria-234-29-de-junho-de-2020.pdf>



### INDUSTRIAL POLICY

Industrial policy for reducing the current rigidity of the B PP. For instance, through inclusion of criteria by points in the components, and through a weighting process favoring those with higher energy efficiency.

The efficiency gains of new units would be encouraged by these changes and by the purchase of more efficient components.



Reduction in production costs, with expansion of the range of suppliers.

Encouraging them to convert their equipment into classes of more rigorous efficiency, with the goal of seeking maximum efficiency.



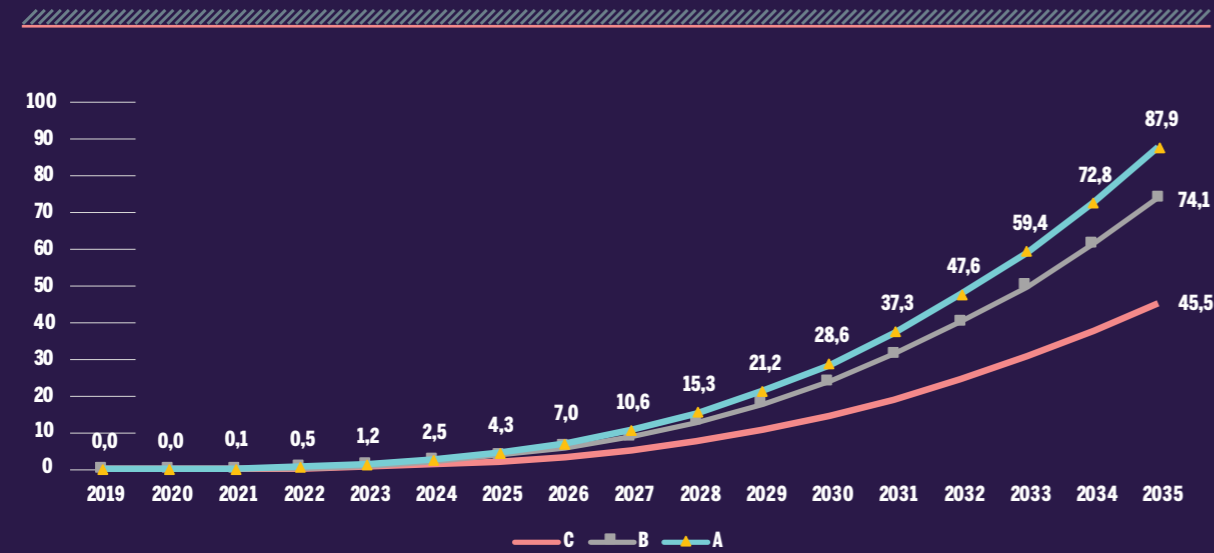
Note - Currently, energy efficiency gains in new AC units occur only through actions that have already been approved by the Brazilian Congress, through the so-called autonomous growth.

## Changes to the BPP

TYPE	CURRENT MODEL	CHANGES IN THE BPP
<p>Mini Split</p> 	<p><b>30%</b> of rotating and reciprocating compressors under <b>18,200 Btu/h</b> from a local manufacturer*.</p>	<p><b>1. Establishment of a point system:</b> the purchase of a specific component from a national supplier will grant the manufacturer a number of points in order to attain the minimum number of points needed in order to receive fiscal incentives.</p>
<p>Window</p> 	<p><b>50%</b> of compressors should come from local manufacturers.</p>	<p><b>2. Inclusion of efficiency criteria:</b> lesser requirement of local content for components that contribute to units' greater energy efficiency.</p>

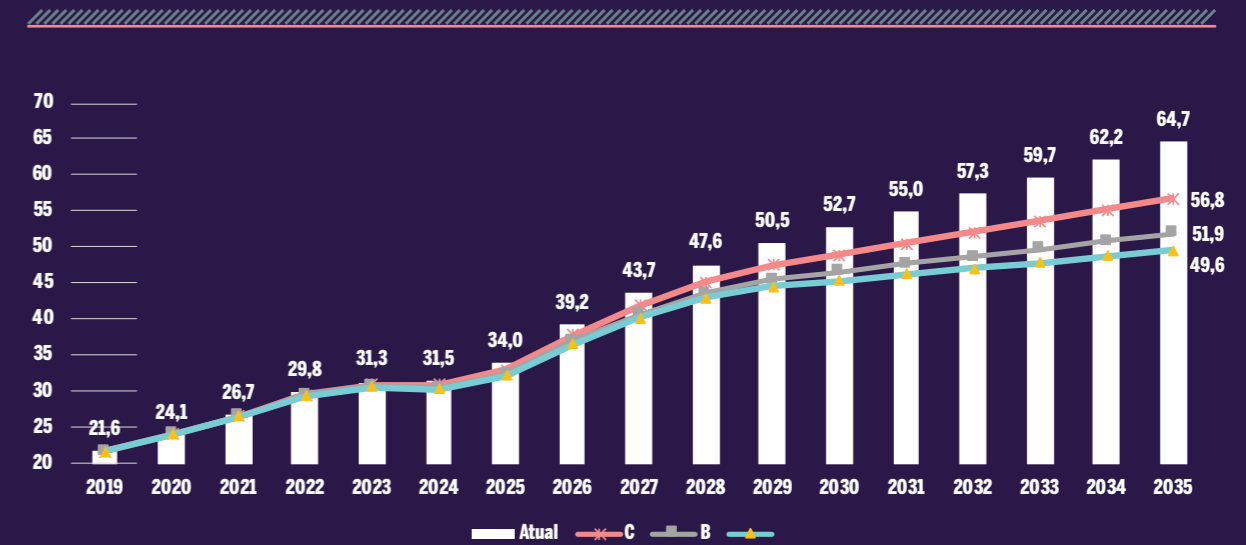
Note: \*There is one exception. Companies that only produce ACs with inverter compressors are not required to acquire local compressors, but they should allocate 3% of sales revenues to R&D.

## Accumulated avoided energy (TWh) by 2035



Source: Instituto Escolhas.

## Consumption over time (TWh)



Source: Instituto Escolhas.

## Effects considering high growth saltes (3.0% a.a.)

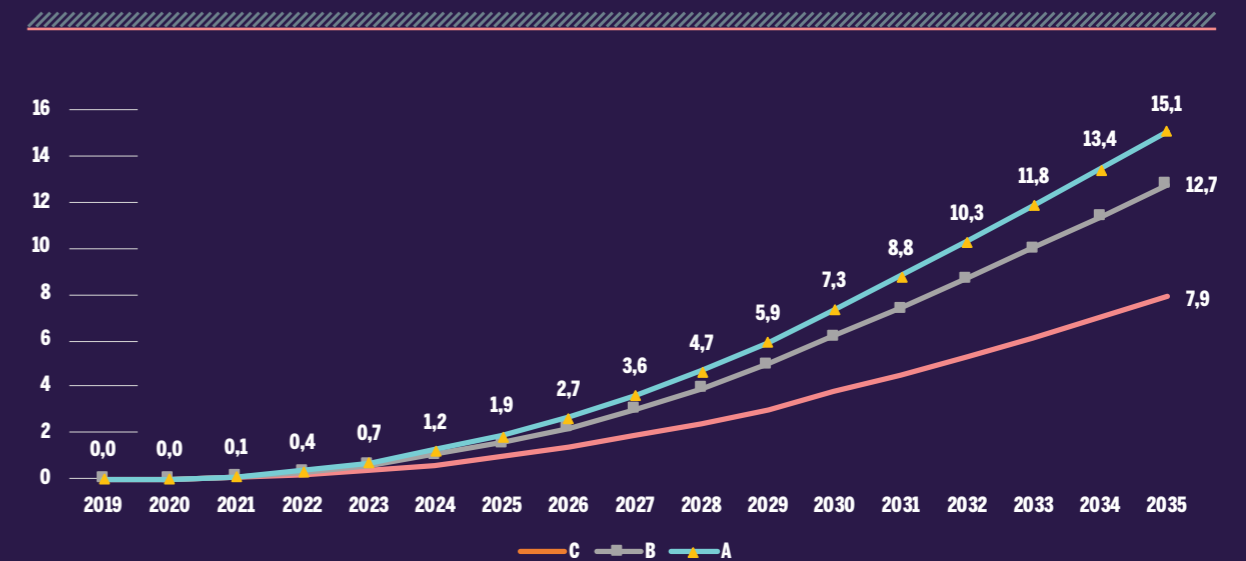
The A, B, and C efficiency scenarios were determined by the annual growth rate of AC efficiency, so as to reach the higher classes in the efficiency scale by 2035:

**a** (annual growth rate equals **2.00%**)

**b** (annual growth rate equals **1.75%**)

**c** (annual growth rate equals **1.25%**)

## Energy avoided annually (TWh)



Source: Instituto Escolhas.

## Introduction

In the study **“The economy is in the air: what can Brazil gain with more efficient air-conditioning?”** Instituto Escolhas offers socioeconomic analysis of the current production and sales model for air conditioners, as well as arguments and the impacts of scenarios of changes in the industrial and energy efficiency policies. The work makes two key points. First, it estimates the savings that would accrue by 2035 from energy and from the effects to the electricity sector--for both consumers and the environment--resulting from the joint implementation of changes in industrial policy and energy efficiency policy for air conditioning. Second, it provides business arguments and proposes a model for changing the sector’s industrial policy.

In one of the paths offered, with the adoption of changes in the industrial and energy efficiency policies<sup>2</sup>, Brazil stands to save 87.9 TWh in electrical energy with air-conditioning--the equivalent to 64% of all residential consumption in 2019--or R\$ 68.5 billion in

avoided energy by 2035, considering 3% annual growth in the sales of units, in addition to avoiding the emission of 6.7 million tons of CO<sub>2</sub>, which corresponds to the emissions issued by 2.3 million vehicles during one year.

The growing use of air conditioning and the sales of equipment that are mostly low in energy efficiency-- if we consider the technologies, trends, international standards, and environmental needs--are generating an overload in the national electrical system during peaks of energy consumption<sup>3</sup>. Between 2005 and 2017, electricity consumption in the residential sector grew 61.0%; the consumption motivated the use of air conditioning grew by 237.0%. By 2035, an additional demand of 240.94 TWh caused by the use of that equipment is expected. These numbers show that improving the energy efficiency of air conditioning manufactured in Brazil is essential so that future demand for cooling environments does not incur great economic, social, and environmental costs.

The main measure for reaching high levels of efficiency has to do with changes to the Basic Productive Project (Projeto Produtivo Básico), or BPP, of the Manaus Free Zone (Zona Franca de Manaus - ZFM), a region that concentrates nearly the entire production of air conditioning units. The study offers solutions for this, through the use of industrial policy to reduce the BPP’s current rigidity, with the inclusion of criteria using points in the components so that companies can obtain the tax benefits offered by the ZFM. Manufacturers would thus need to accumulate a certain number of points by meeting parameters such as the use of higher efficiency compressors.

Discussions and changes foreseen for air conditioning energy efficiency generate positive economic and social effects. This becomes even more relevant given the challenges imposed by the pandemic. Energy efficiency will become even more necessary in a country with tropical climate and rising temperatures, and

at a moment in which the use of air conditioning is being debated, with a constant search for thermal comfort alongside the need to protect people’s health.

<sup>2</sup>A recent Inmetro decree shows some advances, such as improvements to the Brazilian Labelling Program (Programa Brasileiro de Etiquetagem - PBE) for air conditioning equipment, which makes criteria for classifying an equipment as “A” --lower electrical energy consumption. However, greater efficiency gains depend on altering industrial policy, through changes to the BPP.

<sup>3</sup>Peak periods: in residential class (5PM-10PM) and, in the commercial class, 2PM-5PM.

Note: The current industrial policy leads assembly plants that are installed in the ZFM--almost all of them multinationals attracted by compensatory tax incentives--to purchase compressors with local content-- even with restricted supply of high efficiency domestic compressors--with the goal of fomenting the domestic production chain. The only supplier in the country has made available a less efficient compressor, not only in terms of the technology used, but also with respect to the price, in comparison to international competitors.

- The results of the study do not capture the effects of the socioeconomic crisis resulting from the Covid-19 pandemic on the consumption of air conditioning units.

The study only considered the air conditioner models evaluated by Inmetro and currently in use by the industry, excluding alternatives that might exist in the country but do not fulfill these criteria.

# Economic impacts of air conditioning production and sales

## COST AND BENEFITS - CURRENT MODEL

### MAIN COSTS

Consumer dissatisfaction: quality gap between national products and imported product, as well as gap in the cost of energy consumption;

The country faces difficulties in meeting international energy efficiency agreements: effects on electrical and environmental systems;

AC use burdens electrical system peak hours, increasing the need for energy generation and distribution to meet the demand;

Smaller stimulus for development - AC engineering and research are carried out abroad, which requires costs for adaptation to the local BPP.

### MAIN BENEFITS

Preservation of recent investments;

Maintenance of industrial and management processes;

Absence of need for investments.

Source: Instituto Escolhas.

## COSTS AND BENEFITS - CHANGES IN INDUSTRIAL POLICY

### MAIN COSTS

Loss of jobs and income in the local productive chain. Reduction in local purchases can affect suppliers' revenue. This effect can be reduced if the local manufacturer manages to recover part of the lost demand, or if there is an increase in sales due to the higher efficiency of the units, which benefits the local chain;

New investments are required: a certain amount may be necessary to update industrial processes to the new components;

Political conflicts over the definition of points: stronger interest groups may determine the new sector configuration, presenting hurdles to the performance of smaller companies, not only manufacturers but also suppliers.

### MAIN BENEFITS

Greater energy efficiency and their corresponding effects;

Reducing production costs (costs of primary materials), and, with some [repassé dos fabricantes], lowering of consumer prices. This effect can be reduced through the efficiency gain reached, which would encourage an increase in consumer prices;

Greater technological absorption;

Improved conditions for design and R&D areas;

Productivity increases: the purchase of components with greater energy efficiency and lower costs.

Source: Instituto Escolhas.



## COSTS AND BENEFITS - CHANGES IN THE ENERGY EFFICIENCY POLICY

### MAIN COSTS

Costs of adapting companies to higher energy efficiency classes;

Political environment; the regulator can stop efficiency standards from reaching the international levels of developed countries;

Resistance from some manufacturers faced with the lowering of their products' classes;

Loss of recent investments by some manufacturers -- the lack of legal security for the adoption of measures may have led some companies to pick different commercial strategies;

Rise in consumer price (part of the adaptation cost may be passed on to consumers).

### MAIN BENEFITS

Energy efficiency: relationship between rising competitiveness and environmental protection;

Labeling changes: incentive to produce AC with higher energy efficiency;

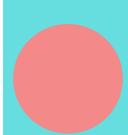
Innovation gains: companies want their products to be defined in the new A class;

Enhancement of product quality

Reduction of consumer prices (savings generated through rising productivity).

Source: Instituto Escolhas





View the complete study:

<http://escolhas.org/biblioteca/estudos-instituto-escolhas/>

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