

# Japan – Brazil Cooperation on Energy Conservation

METI/ECCJ

## Program-1- Improvement in Standard and Labelling of Electrical Appliances

### Training as the first training of trainers (TOT)

#### Country Report

#### **Ministry of Mines and Energy- MME**

Secretary of Energy Planning and Development- SPE

Department of Energy Development- DDE

#### **Electrical Power Research Center - CEPEL**

Fundão Laboratory Department - DLF

Refrigeration Laboratory - MA7

#### **National Institute of Metrology, Quality and Technology- INMETRO**

Compliance Assessment Department

#### **Brazilian Electricity Centers S.A. - Eletrobrás**

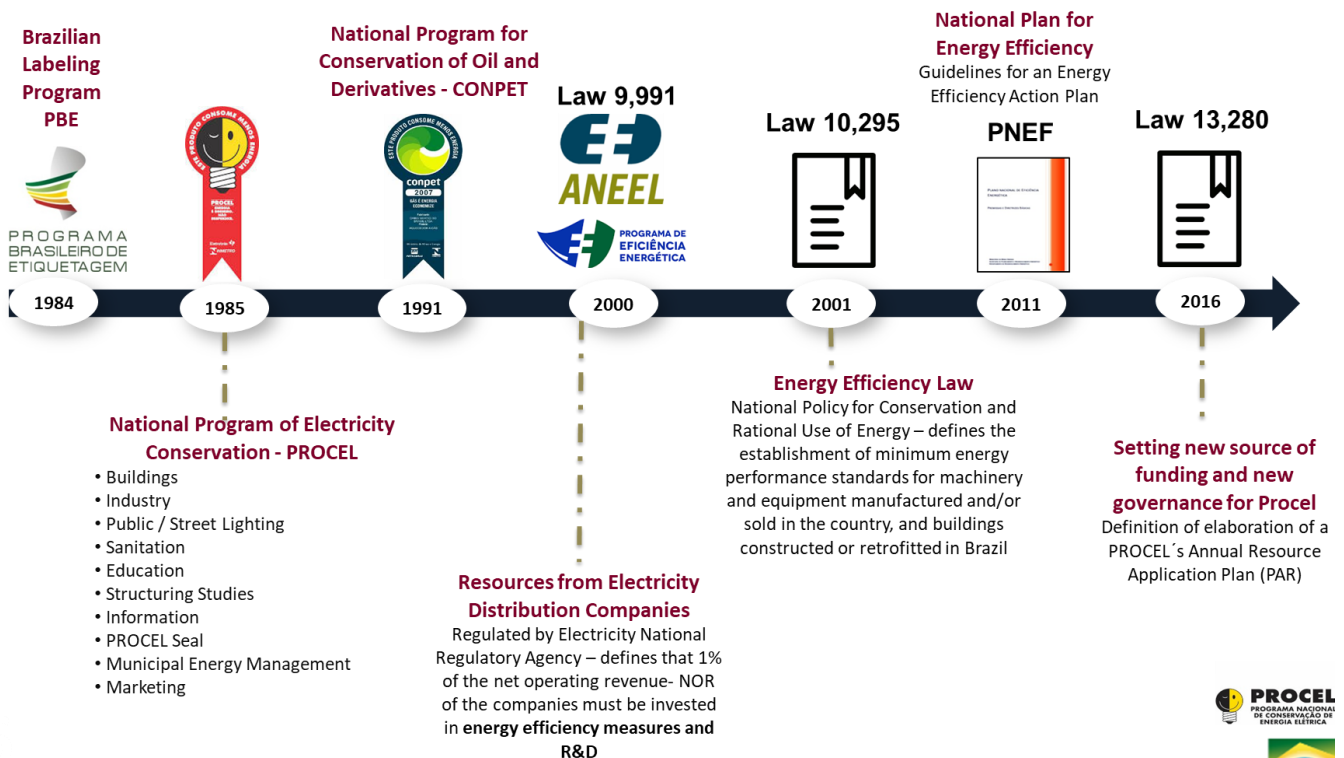
National Program of Energy Conservation- Procel

#### **Brazilian Electricity Centers S.A. - Eletrobrás**

Electricity Research Center- CEPEL

# 1 The Latest Energy Conservation Policy and Progress in Brazil

## 1.1 Energy Efficiency- Main Initiatives in Brazil

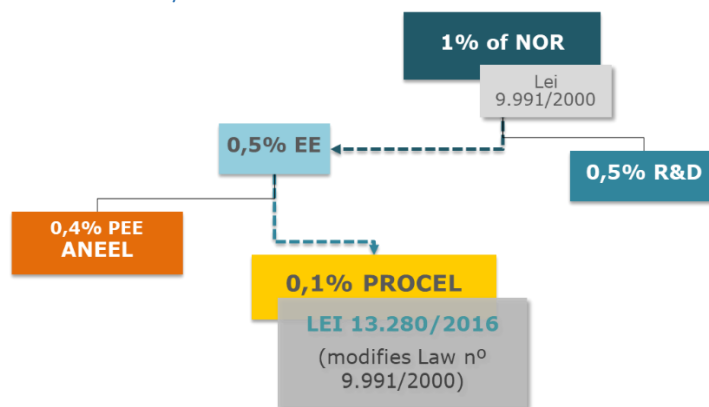


## 1.2 Energy Efficiency- Law 10295/2001

### CGIEE- Steering Committee of Indicators and Levels of Energy Efficiency

This committee defines the minimum energy efficiency levels/standards (MEPS) to domestic appliances and buildings. There are 10 classes of appliances with MEPS established by the ordinances of CGIEE (<http://www.mme.gov.br/web/guest/conselhos-e-comites/cgiee/portarias>).

## 1.3 Resources from Electricity Distribution Companies- Laws 9991/2000 and 13280/2016



Law 9991/2000-

[http://www.planalto.gov.br/ccivil\\_03/leis/l9991.htm#:~:text=L9991&text=LEI%20No%209.991%2C%20DE%2024%20DE%20JULHO%20DE%202000.&text=Disp%C3%B5e%20sobre%20realiza](http://www.planalto.gov.br/ccivil_03/leis/l9991.htm#:~:text=L9991&text=LEI%20No%209.991%2C%20DE%2024%20DE%20JULHO%20DE%202000.&text=Disp%C3%B5e%20sobre%20realiza)

[%C3%A7%C3%A3o%20de%20investimentos,el%C3%A9trica%2C%20e%20d%C3%A1%20outras%20provid%C3%Aancias.](#)

Law 13280/2016- [http://www.planalto.gov.br/ccivil\\_03/\\_Ato2015-2018/2016/Lei/L13280.htm](http://www.planalto.gov.br/ccivil_03/_Ato2015-2018/2016/Lei/L13280.htm)

## 1.4 Domestic priorities

- I. Speed up revisions to minimum energy efficiency ratios of already regulated products:
  - Example: Air Conditioners (Review of testing methods- ISO 16358-1 / Regulatory impact analysis/ New indices in 2020 “Inmetro Ordinance No. 234/2020”
  - Refrigerators (review of testing methods / regulatory impact analysis / new energy efficiency levels in discussion with the stakeholders)
- II. Studies to make some of the voluntary energy efficiency labeling programs compulsory:
  - Example: buildings (ongoing)
- III. Auction of energy efficiency – innovative mechanism of promotion of energy efficiency measures through competition

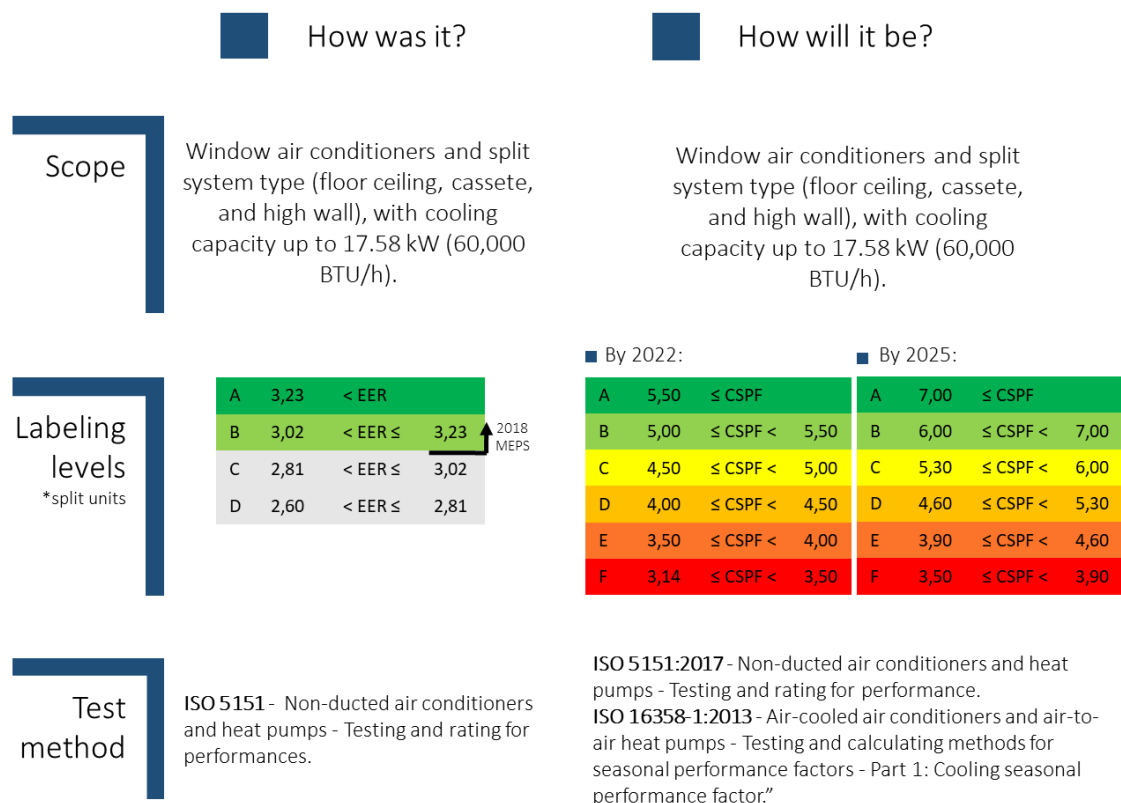
## 1.5 Effective Approaches

- **3E Project (Buildings Energy Efficiency)**
  - Project coordinated by the Ministry of Environment, that structured several different tools for improving the assessment of Energy Efficiency in buildings in Brazil. The publications, reports and tools are currently migrating to the governance of MME.
- **New method of PBE Edifica (Brazilian Labelling Program for Buildings)**
  - Improved assessment methodology for building labeling
  - Different methodologies for public / commercial and for residential buildings
  - Process of implementation ongoing in Inmetro
- **Dissemination of ISO 50.001**
  - Several different activities to disseminate knowledge on Energy Management Systems in different sectors (e.g., industry, public institutions, etc.)
    - Approach with ongoing government programs
    - International cooperation to internalize methodologies, such as the partnership with GIZ to certificate MME headquarters building in ISO 50001 and to support the public calling, estimated to 2021, for PV projects with the ISO 50001 as a counterpart.

- **Aliança Programe (big consumers) and Brasil Mais Produtivo Programe (More Productive Brazil) (small and medium consumers)**
  - Programs supported by Procel for the implementation of Energy Efficiency measures in the industrial sector
- **Energy Efficiency Learning Networks**
  - Implementation of two pilot projects for capacity building and exchange of information on energy efficiency measures (public buildings and industrial sector). Both are currently ongoing and expected to be concluded by the end of 2021.
- **Improved monitoring of the results obtained with energy efficiency actions in the country (2019/2020)**
  - Update and improvement of the EPE database and harmonization of indicators in the new EPE report on EE indicators with a chapter in partnership with the IEA presenting an international benchmarking.
- **Decennial Plan for Energy Efficiency (PDEf)**
  - Identification of energy efficiency potentials in various sectors of the economy and definition of the main actions to be carried out in each sector to enable potential energy savings. The first one is currently under development and expected to be put under public consultation at the first semester of 2021.

## 2 The Latest Plan and Issues to Introduce ISO 16358-1 CSPF in Brazil

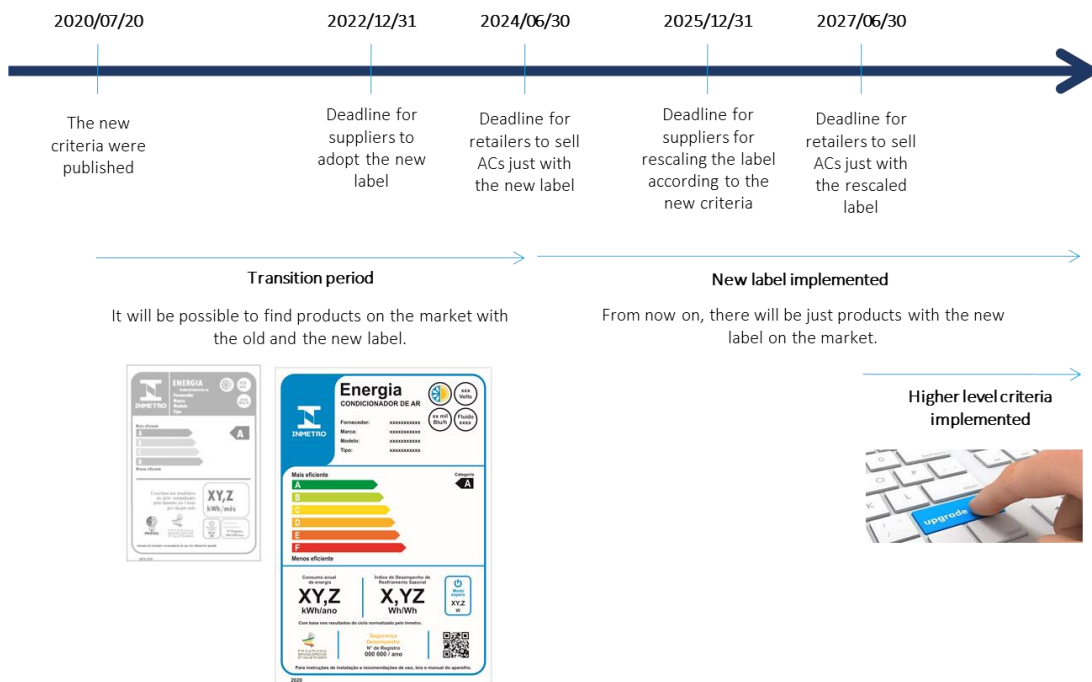
Recently, by the publication of Inmetro Ordinance nº 234, from 2020, important improvements were made to the Brazilian Labeling Program (available at [www.inmetro.gov.br/legislacao](http://www.inmetro.gov.br/legislacao)). First, we highlight the adoption of the international technical standard ISO 16358-1 for the determination of energy efficiency based on the seasonal metric and the partial load test. Then, it was also possible to redefine the levels of energy efficiency classification, making the criterion for classifying the appliance as class A more rigorous, for example. The following figure summarizes the main changes with the recent improvement in the Brazilian Labeling Program for Air Conditioners.



It is worth mentioning that the Brazilian Labeling Program is managed by Inmetro, which is the executive body of the National System of Metrology, Standardization and Industrial Quality. The Brazilian Labeling Program has existed since 1984, when the first label, for refrigerators, was developed in partnership with the industry. Currently, the program covers about 30 different objects, from energy-consuming products, including vehicles, to photovoltaic panels and solar water heaters. The program also includes the energy efficiency of buildings, through voluntary labeling applied to the residential and commercial sectors.

Returning to the specific case of the Brazilian Labeling Program for Air Conditioners, a timetable for the implementation of the improvements was foreseen. Only from December 31, 2022, the adoption of the new label will become compulsory for the manufacturer or importer of the devices. Until then, the supplier can continue using the label from the previous standard. Retailers in their turn have until June 30, 2024, to dispose of inventories produced before the first deadline.

The introduction of even more rigorous energy efficiency classification criteria has specific deadlines. As of December 31, 2025, products will be compulsorily labeled based on the new criteria, with the retailer being able to sell the remaining stock until June 30, 2027. The following figure summarizes the schedule.






The labeling of air conditioners allows the use of first-party laboratories that have performed an inter-laboratory comparison with laboratories accredited by Inmetro. The annual supervision, however, must always be carried out by accredited third party laboratories. Currently, there are two laboratories with capacity for tests in the ISO 16358-1, but only Labelo is already accredited. The other laboratory - Cepel - is still making minor adjustments to obtain accreditation from Inmetro, which is also the official accrediting body in Brazil.

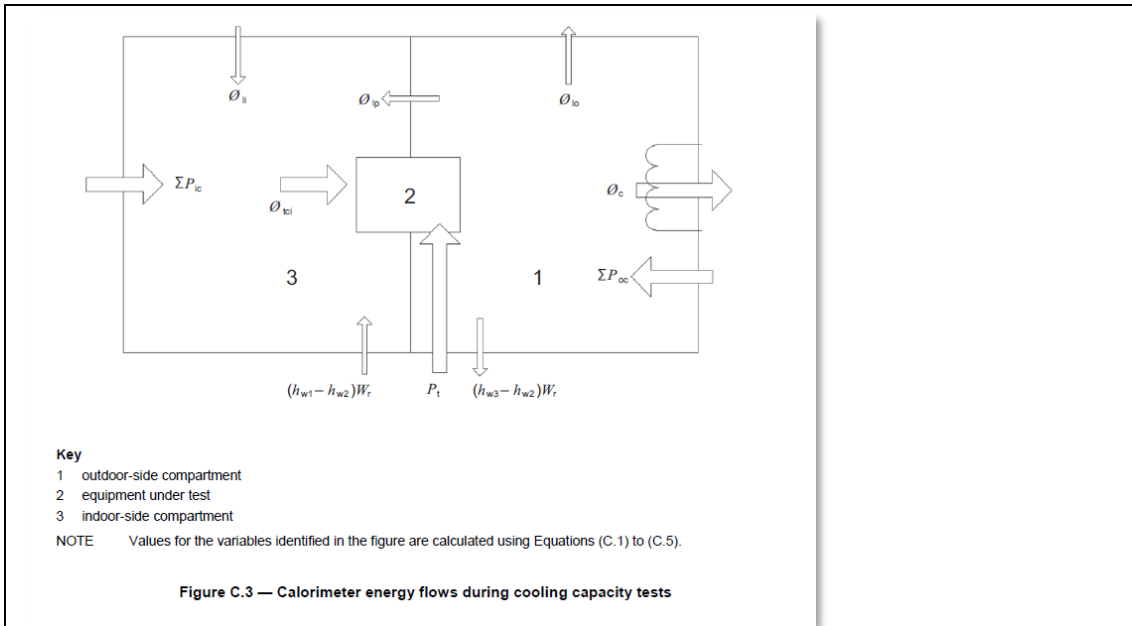
As long as Cepel does not obtain accreditation, the sector will be restricted to the use of Labelo. This situation can generate, at some point, a lot of waiting for the tests to be carried out. Another problem concerns the tests on the cassette-type air conditioner. Labelo has no structure to test these devices, which can only occur after accreditation by Cepel.

Another important challenge concerns round robin tests. We are in the process of finalizing an intercomparison between Labelo and Cepel. Nevertheless, efforts to monitor the performance of the laboratories must continue, including involving the laboratories of the industry itself.

### 3 Progress and Issues to Improve Testing Facility and Capability of Training Staffs of CEPEL under the “Inmetro Ordinance No. 234, June 29th 2020”




#### 3.1 Outline of the laboratory to test air conditioners

The existing facilities / equipment with main specifications	
 <p>Front view</p>	<ul style="list-style-type: none"> <li>• A calibrated room-type calorimeter located in a 25°C room.</li> <li>• Up to 60,000 BTU/h cooling capacity test.</li> <li>• 380 V, 220 V and 127 V, 60Hz</li> <li>• Indoor-side compartment measurements only</li> <li>• Dimensions of each compartment: 4,2 x 3,3 x 3,0 meters</li> </ul>
 <p>Indoor- side compartment</p>	 <p>Outdoor- side compartment</p>



M16							
	A	B	C	D	E	F	G
1	<b>LABORATÓRIO DE REFRIGERAÇÃO</b>						
2	Determinação da capacidade de refrigeração/Calorímetro do tipo calibrado						
3							
4	Data do ensaio	09/09/2020					
5	Intervalo de ensaio	13:52:19 15:06:19					
6							
7	<b>Dados declarados pelo cliente/fabricante</b>						
8	Marca						
9	Modelo						
10	Capacidade refrig. nominal	24000	BTU/h		7032	W	
11	Potência (W)	1939	W				
12	Coef. de eficiência energética	12.38	BTU/Wh		3.27	W/W	
13							
14	<b>Medições efetuadas no ensaio</b>						
15	<b>Valores médios/ Nº leituras</b>						
16	<b>Temperaturas</b>		75				
			°C	°F	máxima	mínima	delta max delta min
17	TBS_INT	26.75	80.15		26.83	26.68	0.13 0.02
18	TBU_INT	19.47	67.05		19.53	19.38	0.13 0.02
19	TBU_CA	12.64	54.75		12.71	12.54	
20	TBS_EXT	34.88	94.78		34.93	34.84	-0.07 0.16
21	TBU_EXT	24.05	75.29		24.14	23.92	0.24 -0.02
22							
23	<b>Grandezas elétricas</b>			<b>incertezas k</b>			
24	Tensão (V)	220.55		u(V)= 2.2E-01 2.00	221.08	219.69	
25	Corrente (A)	10.71		u(A)= 3.0E-02 2.00	10.77	10.62	
26	Potência consumida (W)	2359		u(W)= 6.3E+00 2.00	2370	2341	
27	Fator de potência	1.000					
28	Frequência (Hz)	60					
29							
30	<b>Outras informações</b>						
31	Água consumida (ml/h)	2605					
32							
33	<b>Valores médios/ Nº ensaios</b>		15				
34	Capacidade de refrigeração (W/h)		7261		7272	7239	9 0.12%
35	entalpia(hw1), em BTU/lb, Tcorr(°F)=	83.68	51.73				
36	entalpia(hw2), em BTU/lb, T(°F) =	54.75	22.82				
37	dif entalpia(hw1-hw2), em BTU/lb		28.91				
38	Quantidade de água consumida(Wr), em lb/h		5.7				
39	(hw1-hw2)*Wr		165				
40			48				
41							
42							
43	<b>Resultados obtidos</b>						
44	Capacidade de refrigeração	BTU/h	24945			103.9%	
45		W	7309	u(W)= 1.2E+01 2.00			
46							
47	Coef. de eficiência energética	BTU/Wh	10.57				
48		W/W	3.10	u(W/W)= 1.0E-02 2.00		94.8%	
49							
50							



The existing facilities / equipment with main specifications	
	<ul style="list-style-type: none"> <li>• Temperature measurement (dry bulb and wet bulb)</li> <li>• Data acquisition Fluke model NetDAQ 2640A</li> <li>• And</li> <li>• 4-wire Resistance-Temperature Detector (RTD)</li> </ul>
	
	<p>Electrical measurement:</p> <ul style="list-style-type: none"> <li>• - Multifunction Yokogawa UPD 600 model 2480E-009 / 073</li> <li>• Accuracy: <ul style="list-style-type: none"> <li>• Voltage and current <math>\pm (0,1</math> of reading + <math>0,05\%</math> of FS)</li> </ul> </li> </ul>
<ul style="list-style-type: none"> <li>- West 6100 Digital Temperature Controller</li> <li>- Voltage stabilizer 25 kW 220 V 3-phases</li> </ul>	

### 3.2 The current issues toward introduction of CSPF

#### Preparation to ISO 16358-1 Test

The Staff has already read the ISO 16358-1 test conditions and tested some samples, in a special condition.

The facility needs improvements in order to test according to ISO 16358-1, specially, the indoor-side compartment wet bulb temperature control.

In a calibrated room-type calorimeter, all the energy input to the indoor-side compartment is computed in order to evaluate the cooling capacity of the sample.

Our calorimeter is not supposed to draw the humidity out of the indoor-side compartment itself. Instead, the sample draws the humidity out while tested in full capacity.

But, while the sample is tested in half capacity, it may not be able to draw the humidity out. This is because the air is not cooled down enough inside the evaporator to condense the environment humidity.

#### **Matters related to the national “S&L” system**

The Cepel Laboratory is accredited by CGCRE / INMETRO to carry out tests on air conditioners, according to ISO 5151: 2010.

The data obtained in the tests contribute to the maintenance of the Brazilian Labeling Program - PBE. After adapting the laboratory to carry out the tests in accordance with ISO 16358-1: 2013, it will be necessary to apply for accreditation with CGCRE / INMETRO.

### **3.3 Improvements in the testing facilities, toward introduction of CSPF under the “Inmetro Ordinance No. 234”**

#### **Ongoing improvements (items and the targeted timing to complete)**

In order to be able to carry out tests according to ISO 16358-1, it is necessary to improve the humidity control system in the indoor-side compartment of the calorimeter.

The adjustment of the calorimeter is in progress, being financed by an agreement between Cepel and Eletrobras / Procel.

Targeted timing to complete the improvement May 31st, 2021.

#### **Improvements under planning or studying (items and the targeted timing to complete)**

Continuous training in ISO 16358-1, especially with regard to the calculation of the CSPF.

Repeated test runs for training purposes

## 4 PROCEL – Electric Energy Conservation National Program

Procel, established on December 30th, 1985, is a Brazilian Government Program, coordinated by the Ministry of Mines and Energy - MME to promote the efficient use of electric energy and manage its waste. The Program runs effectively in order to accomplish its goals, executing projects of the nation's interest, making use of important partnerships that help it to achieve its results.

Created in 1993 by the Federal Government, the purpose of Procel Eletrobras Seal is to be a simple and efficient tool, so consumers are able to identify the most efficient equipment and home appliances available in the market. Also, the Seal encourages the technological development and improvement of such products. The subprogram management counts on the partnership with Inmetro, under PBE scope.

Therefore, Eletrobras Procel qualifies labs and research centers, provides assistance to set maximum consumption rates of electric energy in equipment, according to the Energy Efficiency Law (10295/2001), and provides subsidies to the creation of technical standards for energy efficiency testing.



In September 2020 Procel presented to manufacturers and associations the new Procel Seal criteria for air conditioners. Discussions about the new criteria continue until the end of October, when a seminar will take place. By November, after consolidating all the contributions from society, PROCEL intends to define the criterion. The new Procel Seal criteria is using ISO 16358-1 as standard for tests.

The tables below show the new proposed criteria:

## NEW CRITERIA FOR PROCEL SEAL

Date	Until 01/11/2021	From 03/11/2021	From 03/11/2023
<b>Split</b>	EER ≥ 3,24	IDRS ≥ 6,0	IDRS ≥ 7,6
<b>Window</b>	* Window – EER	IDRS ≥ 4,0	IDRS ≥ 4,5

Capacity	*Window – EER
≤9.000Btu/h	2,93
≥9.001 to ≤13.999Btu/h	3,03
≥14.000 to ≤19.999Btu/h	2,88
≥20.000	2,82

	From 03/11/2023
<b>Standby power</b>	≤ 6,00 W

Refrigerant aspects	From 03/11/2023
<b>ODP(Ozone Depletion Potential)</b>	0
<b>GWP (Global Warming Potential)</b>	675

PROCEL Seal Gold

Date	Until 01/11/2021	From 03/11/2021	From 03/11/2023
<b>Split</b>	EER ≥ 3,24	IDRS ≥ 7,6	IDRS ≥ 8,2
<b>Window</b>	* Window – EER	IDRS ≥ 4,5	IDRS ≥ 5,0

PROCEL Seal Gold will be only digital, it will not be fixated on air conditioners.

Only Procel Seal will be fixated on the equipment, as it is currently done.