

# Geotermia



# Pesquisas:

- Estudo da Terra Sólida - Reologia e Isostasia
- Geotermia Básica: Gradiente Geotérmico, Condutividade Térmica, Fluxo de Calor
- Recursos Energéticos - Energia Geotérmica
- Variação do Calor na Crosta Terrestre - Tectonismo
- Termomagnetismo
- Mudanças Climáticas
- Colaboração entre áreas associadas: Hidrogeologia, tectonismo/magmatismo, geologia estrutural, geofísica aplicada, prospecção mineral e hidrocarbonetos, entre outros.



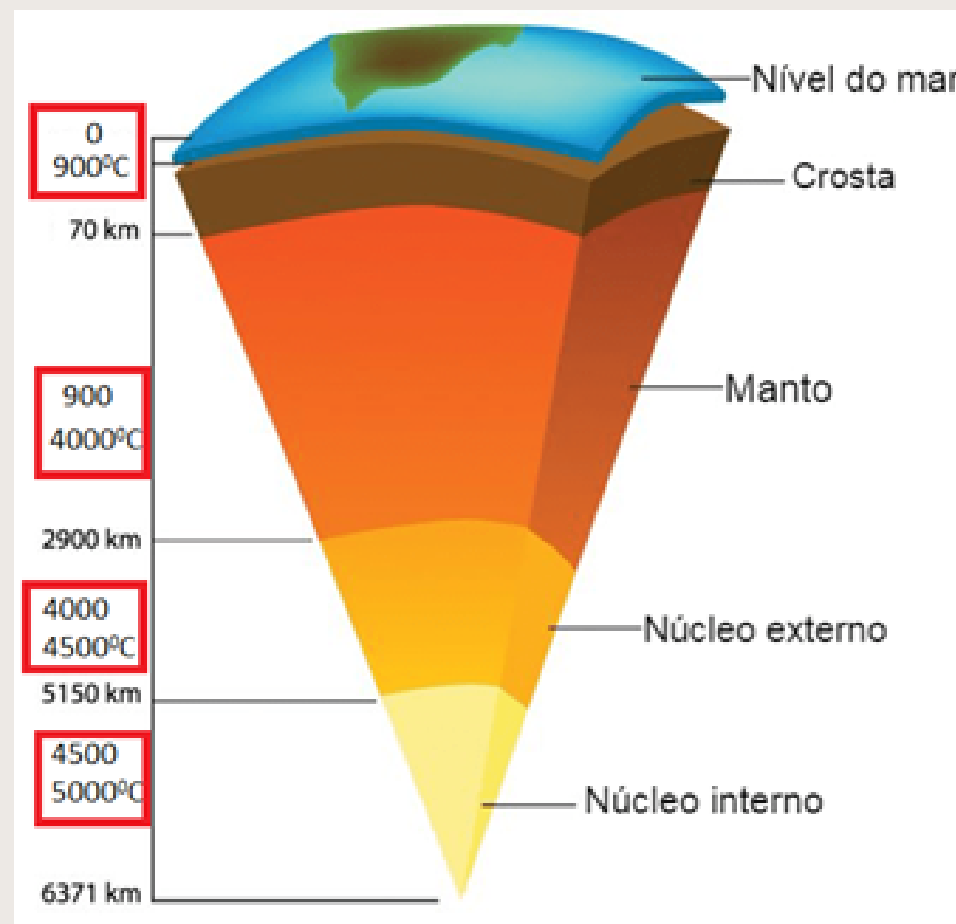
"Geothermal energy, potentially the largest - and presently most misunderstood - source of energy" - Al Gore "Our Choice"

# Overview

Geotermia significa literalmente o estudo do calor da Terra, que é estimado em  $5.500^{\circ}\text{C}$  na parte mais interna do núcleo terrestre - quase tão quente quanto a superfície do Sol.

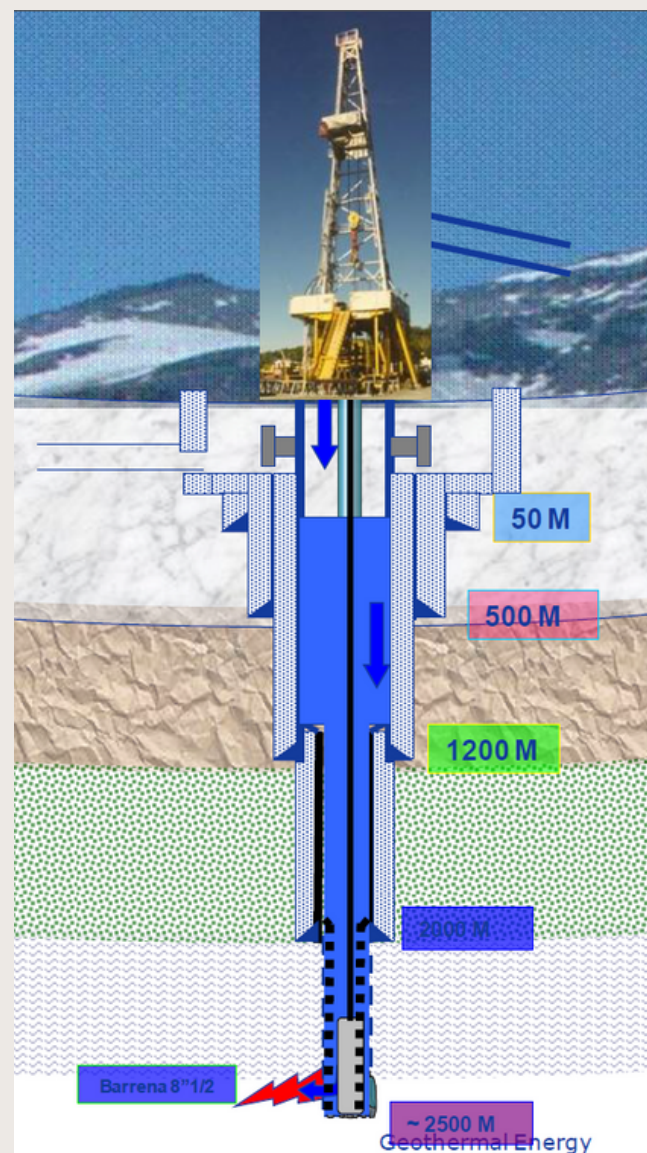
Energia geotérmica é um recurso limpo e renovável que pode ser aproveitado por muitos países ao redor do mundo localizado em locais geologicamente favoráveis. Essa energia pode ser aproveitada de reservatórios subterrâneos, contendo rochas quentes umidas ou até mesmo secas (com a técnica de injeção de fluidos para extração do calor)

Variação da Temperatura em profundidade.



Grand Prismatic Spring in Yellowstone Park (US)

A perfilagem geotérmica é um mecanismo de medidas térmicas diretas utilizadas para estimar o comportamento do gradiente térmico nas primeiras camadas da Terra e assim gerar modelos para o fluxo de calor terrestre, uma vez que conhecemos o comportamento físico-químico do interior da Terra advindo de estudos diversos como ondas sísmicas.



Os poços utilizados para extração de energia geotérmica, considerados economicamente viáveis, possuem geralmente uma profundidade máxima de 2km, e a temperatura atingida deve ser maior que 150°C.

Exemplo de um poço exploração de energia geotérmica



Perfilagem geotérmica em poço de água subterrânea jorrante - Palmeirante - TO - Brasil



Perfilagem geotérmica em poço de água subterrânea - Humaitá - AM - Brasil

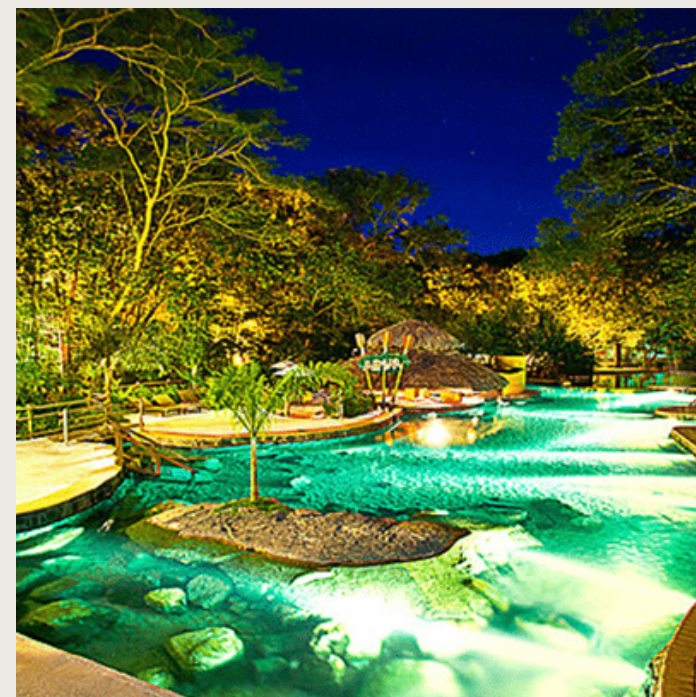
# Utilização de Recursos Geotérmicos

A energia geotérmica pode ser utilizada para geração de eletricidade e para vários outros tipos de aplicação de uso direto de calor como por exemplo, para fins de climatização de ambientes, piscicultura, balneoterapias, indústrias em geral, etc.

Em comparação com outras tecnologias de energia renovável, a geotérmica é única pois fornece uma alternativa de carga básica para a geração de eletricidade com base em combustíveis fósseis, mas também pode substituir as usadas para fins de climatização.



Green house - Sistema de climatização geotérmica implantada - Euskadi



Complexo Turístico de Águas Termais, Rio Quente - Goiás - Brasil



Poço de com vapor aflorante, usina de Larderello, Italia..



Usina Geotérmica em exploração - Nesjavellir Geothermal Power Plant in Iceland.

# A Terra "Quente"





## Geophysical Research Letters

RESEARCH LETTER  
10.1029/2020GL092119

### Key Points:

- We use novel paleo-seafloor age grids covering the past 400 Myr to quantify spatial and temporal variations in mantle heat loss
- The time-averaged oceanic heat flow

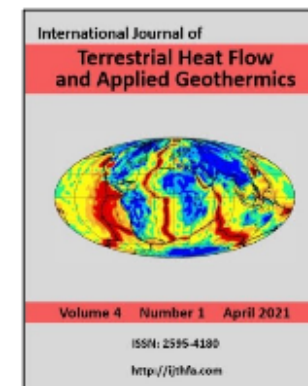
## Spatiotemporal Variations in Surface Heat Loss Imply a Heterogeneous Mantle Cooling History

Krister S. Karlsen<sup>1</sup> , Clinton P. Conrad<sup>1</sup> , Mathew Domeier<sup>1</sup> , and Reidar G. Trønnes<sup>1,2</sup> 

<sup>1</sup>Centre for Earth Evolution and Dynamics, University of Oslo, Oslo, Norway, <sup>2</sup>Natural History Museum, University of Oslo, Oslo, Norway

International Journal of Terrestrial Heat Flow and Applied Geothermics  
VOL. 4, NO. 1 (2021); P. 15-25.  
ISSN: 2595-4180  
DOI: <https://doi.org/10.31214/ijthfa.v4i1.61>

IJTHFA  
<http://ijthfa.com/>



## Geothermal Sustainability or Heat Mining?

Ladislav Rybach<sup>1,2</sup>

<sup>1</sup>Department of Earth Sciences, ETH Zurich, Institute of Geophysics, Zurich, Switzerland

<sup>2</sup>GEOWATT AG, Zurich, Switzerland

### Email address

[rybach@ig.erdw.ethz.ch](mailto:rybach@ig.erdw.ethz.ch) (L. Rybach)  
Corresponding author

### Abstract

"Heat mining" is a term used to describe the extraction of geothermal energy from the Earth's crust for use in various applications. This paper discusses the sustainability of heat mining and the potential for heat mining to become a significant source of energy.

## Rocznik Ochrona Środowiska



Volume 23 Year 2021 ISSN 1506-218X pp. 42-64

<https://doi.org/10.54740/ros.2021.003> open access

Received: 20 January 2021 Accepted: 15 April 2021 Published: 06 December 2021

## Numerical Modeling and Experimental Studies of the Operational Parameters of the Earth-To-Air Heat Exchanger of the Geothermal Ventilation System



### Primeiro edifício brasileiro climatizado com energia do solo está em construção

Nomeada CICS Living Lab, a edificação é desdobramento de uma pesquisa de doutorado conduzida na USP de São Carlos com apoio da FAPESP. Prédio será usado pela Escola Politécnica para testar novas tecnologias sustentáveis

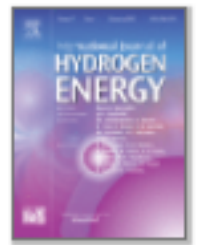
AGÊNCIA FAPESP / Jul 2




## International Journal of Hydrogen Energy

Available online 25 December 2021

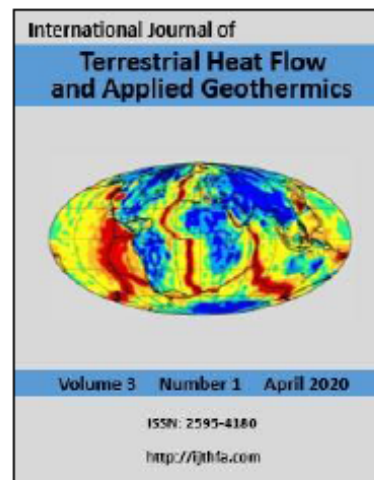
In Press, Corrected Proof



# Application, comparative study, and multi-objective optimization of a hydrogen liquefaction system utilizing either ORC or an absorption power cycle

Yan Cao <sup>a</sup>, Hayder A. Dhahad <sup>b</sup>  , Hussein Togun <sup>c</sup>, Ayman A. Aly <sup>d</sup>, Bassem F. Felemban <sup>d</sup>, A.S. El-Shafay <sup>e, f</sup>, Shima Rashidi <sup>g</sup>, Babak Farhang <sup>h</sup>

Show more 



## Heat flow variations in the Antarctic Continent

Suze Nei P. Guimarães, Fábio P. Vieira, Valiya M. Hamza

<sup>1</sup> Department of Geophysics, National Observatory, Rio de Janeiro, Brazil.

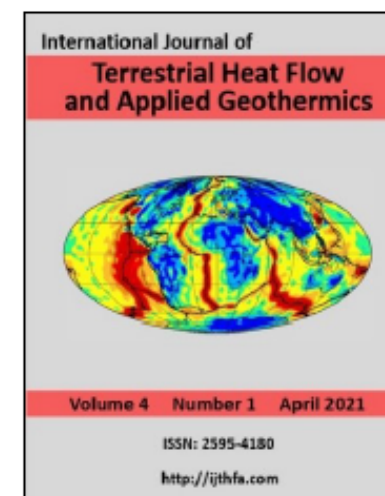
### Email address

suze@on.br (S.N.P. Guimarães)

Corresponding author

### Abstract

The present work provides a reappraisal of terrestrial heat flow variations in the Antarctic continent, based on recent advances in data analysis and regional assessments. The data used in this study were obtained from the IAGLR (1990-1995) and the IAGLR (1990-1995) data set.



## Inversion results appended with estimates from vegetation changes in assessment of Ground Surface Temperatures for the Amazon Region, Brazil

Valiya Hamza<sup>2</sup>, Fabio Vieira<sup>2</sup>, Suze Guimaraes<sup>2</sup>, Elizabeth Pimentel<sup>1</sup>

<sup>1</sup> Department of Physics, Federal University of Amazonas, Humaita, Brazil.

<sup>2</sup> Department of Geophysics, National Observatory, Rio de Janeiro, Brazil.

### Email address

hamza@on.br (V. Hamza)

Corresponding author



**Thermomagnetic Features of Central Brazil, between regions of Trans-Brazilian Lineament (TBL) and São Francisco Craton (SFC)**

Suze Nei Pereira Guimaraes, Fabio Pinto Vieira, Valiya M. Hamza  
National Observatory – ON/MCTIC – Department of Geophysics – Geothermal Laboratory (LabGeot)

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This paper was prepared for presentation during the 16<sup>th</sup> International Congress of the Brazilian Geophysical Society held in Rio de Janeiro, Brazil, 19-22 August 2019.

region between 48°W and 51°W (longitude) and between of 12°S and 14°S (latitudes).

Palavras-chave: Termomagnetismo, Brasil Central, Trans-Brazilian Lineament (TBL) and São Francisco Craton (SFC).



**Evaluations of thermal field in the Brasiliano mobile belts of southeastern Brazil.**

Nina da Silva Rocha\*<sup>1</sup>, Fábio Pinto Vieira<sup>1</sup> and Suze Nei Pereira Guimarães<sup>1</sup>

<sup>1</sup>Department of Geophysics, National Observatory – ON/MCTI

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This paper was prepared for presentation during the 17<sup>th</sup> International Congress of the Brazilian Geophysical Society held in Rio de Janeiro, Brazil, 16-19 August 2021.

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**Thermostructural Analysis of the Muriaé Hydrographic Basin**

Hellen Rosa Barboza<sup>1</sup>, Suze Nei Pereira Guimarães<sup>2</sup>, Fabio Pinto Vieira<sup>2</sup>

<sup>1</sup> Universidade Federal Fluminense – Instituto de Geociências

<sup>2</sup> Observatório Nacional – ON/MCTIC – Departamento de Geofísica – Laboratório de Geotermia (LabGeot)

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O rio Muriaé é o último afluente do rio Paraíba do Sul antes de sua foz no Oceano Atlântico. A bacia hidrográfica do rio Muriaé, está localizada nos estados de Minas Gerais e Rio de Janeiro. Possui uma área aproximadamente de



**Thermomagnetic Study of Different Brazilian Geostructural Contexts and Curie Surface Mapping**

Jesus, B.L.<sup>1</sup>, Guimarães, S.N.P.<sup>2</sup> and Vieira, F.P.<sup>2</sup>

<sup>1</sup>Department of Geology and Geophysics, University Federal Fluminense (DGG/UFF)

<sup>2</sup>Department of Geophysics, National Observatory (ON/MCTI)

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**Heat Flow Terrestrial and Geothermal Resources on the Western Parnaiba Basin**

Guimarães, S.N.P.<sup>1</sup> and Vieira, F.P.<sup>1</sup>

<sup>1</sup>Department of Geophysics, National Observatory (ON/MCTI)

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### Updated mapping of terrestrial heat flow in Brazil

Suze Nei Pereira Guimarães <sup>a,\*</sup>, Elias Martins Guerra Prado <sup>b</sup>, Fábio Pinto Vieira <sup>a</sup>, Christian Michel Lacasse <sup>b</sup>, Nina da Silva Rocha <sup>a</sup>, Beatriz Lessa de Jesus <sup>a,c</sup>, Oderson Antônio de Souza Filho <sup>d</sup>

<sup>a</sup> National Observatory (ON/MCTI), Department of Geophysics, Geothermal Laboratory (LabGeot/ON), Rio de Janeiro, RJ, Brazil

<sup>b</sup> Geological Survey of Brazil (SGB/CPRM), Center of Applied Geosciences (CGA), Brasília, DF, Brazil

<sup>c</sup> University Federal Fluminense (UFF), Department of Geology and Geophysics (DGG), Niterói, RJ, Brazil

<sup>d</sup> Geological Survey of Brazil (SGB/CPRM), Center of Applied Geosciences (CGA), Curitiba, PR, Brazil



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### Integrated assessment and prospectivity mapping of geothermal resources for EGS in Brazil

Christian Michel Lacasse <sup>a,\*</sup>, Elias Martins Guerra Prado <sup>a</sup>, Suze Nei Pereira Guimarães <sup>b</sup>, Oderson Antônio de Souza Filho <sup>c</sup>, Fábio Pinto Vieira <sup>b</sup>

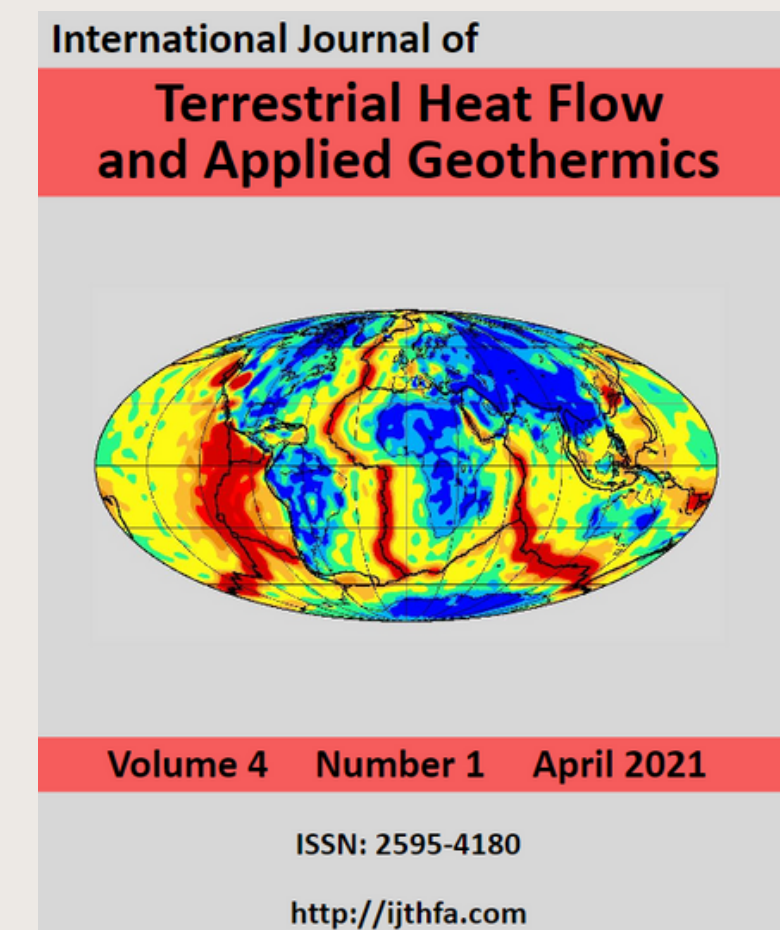
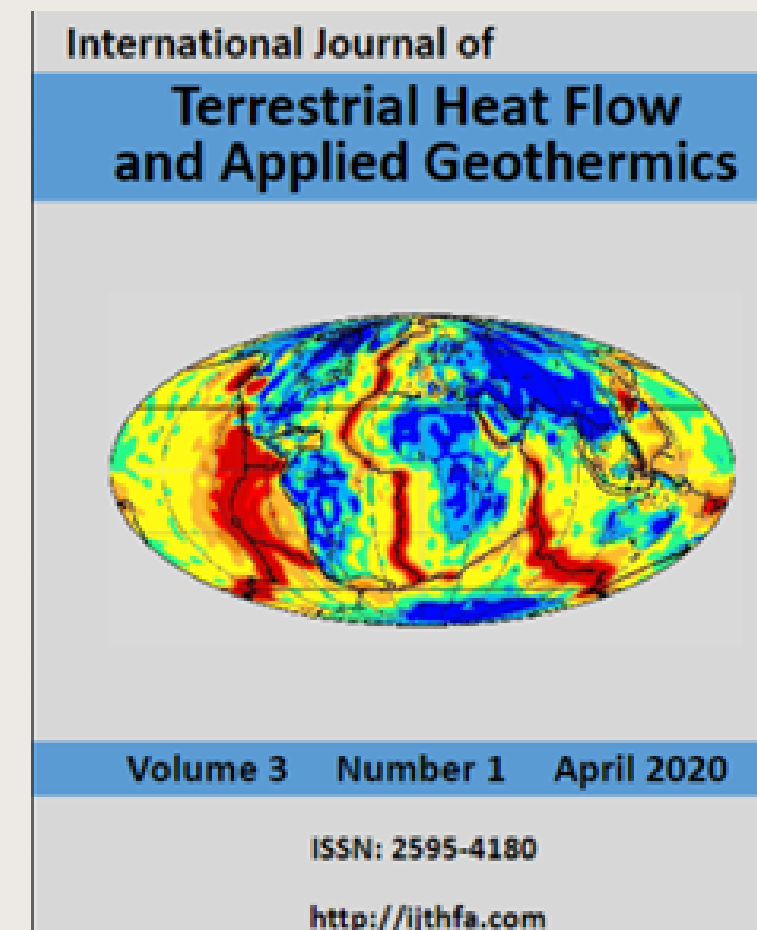
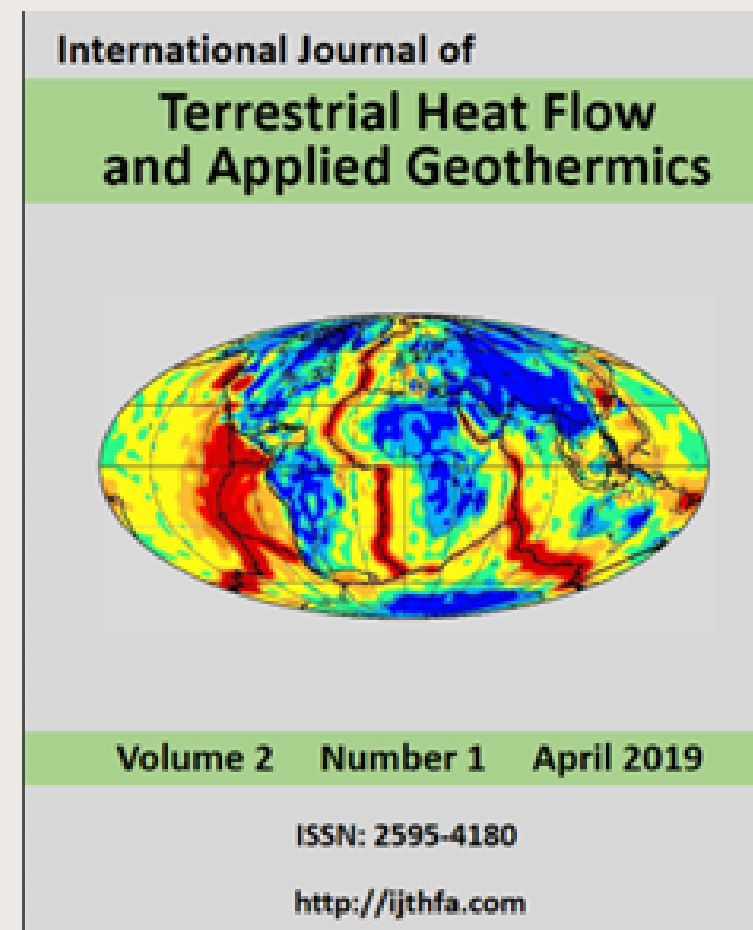
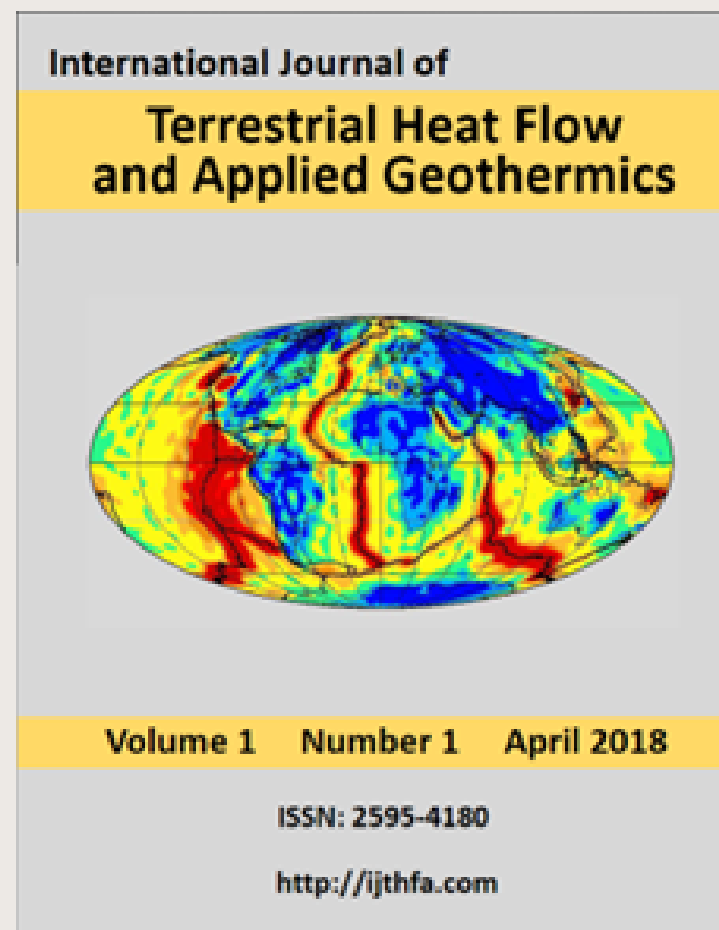
<sup>a</sup> Geological Survey of Brazil (SGB-CPRM), Center of Applied Geosciences (CGA), Quadra 02, Bloco H, Edifício Central Brasília, Setor Bancário Norte, Asa Norte, CEP: 70040-904, Brasília, DF, Brazil

<sup>b</sup> The National Observatory (ON-MCTI), Geophysics Department, Geothermal Laboratory, Rua General José Cristino, 77, São Cristóvão, CEP 20921-400, Rio de Janeiro, RJ, Brazil

<sup>c</sup> Geological Survey of Brazil (SGB-CPRM), Center of Applied Geosciences (CGA), 475, Rua Voluntários da Pátria, CEP: 80.020000, Curitiba, PA, Brazil

# Projeto de Editoração e Divulgação Científica - Revista de Geotermia: International Journal of Terrestrial Heat Flow and Applied Geothermics

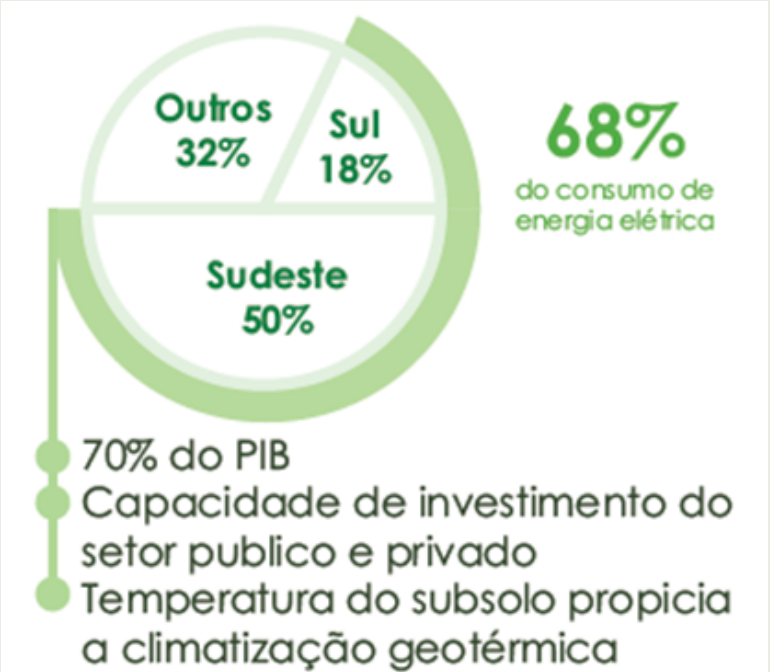
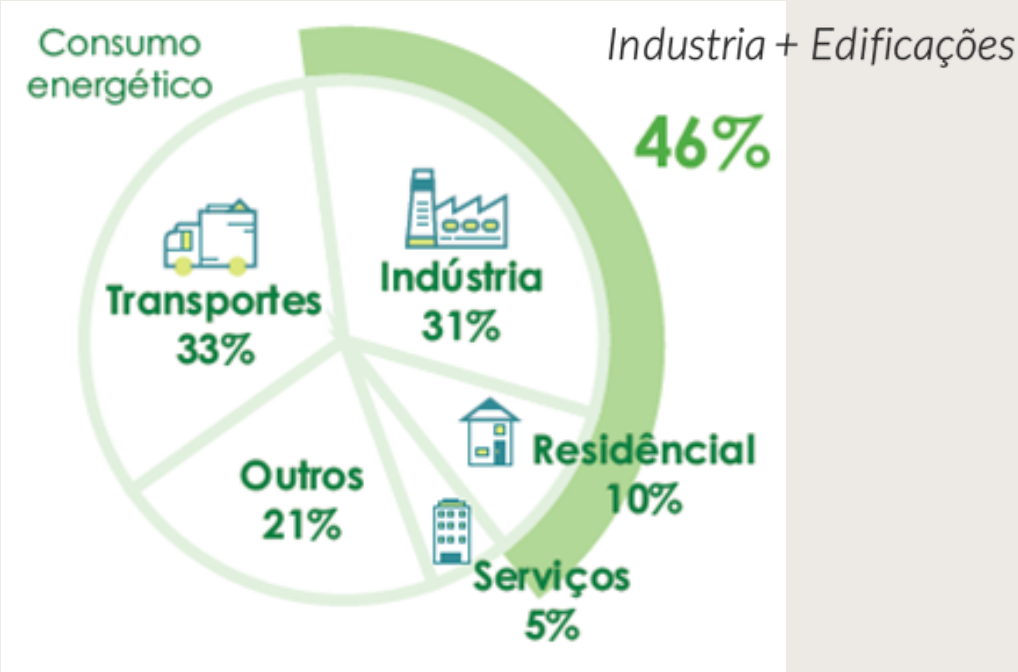
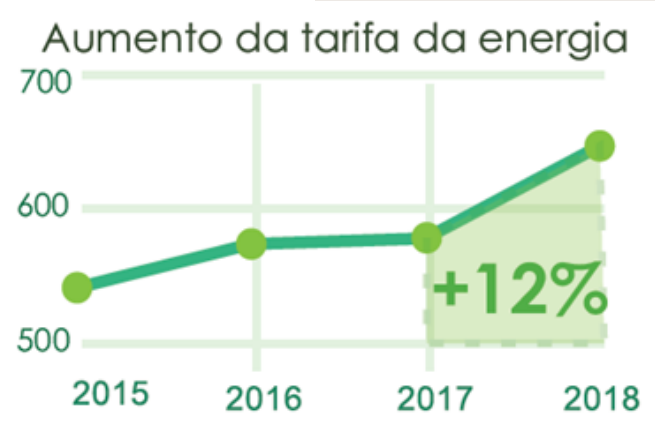
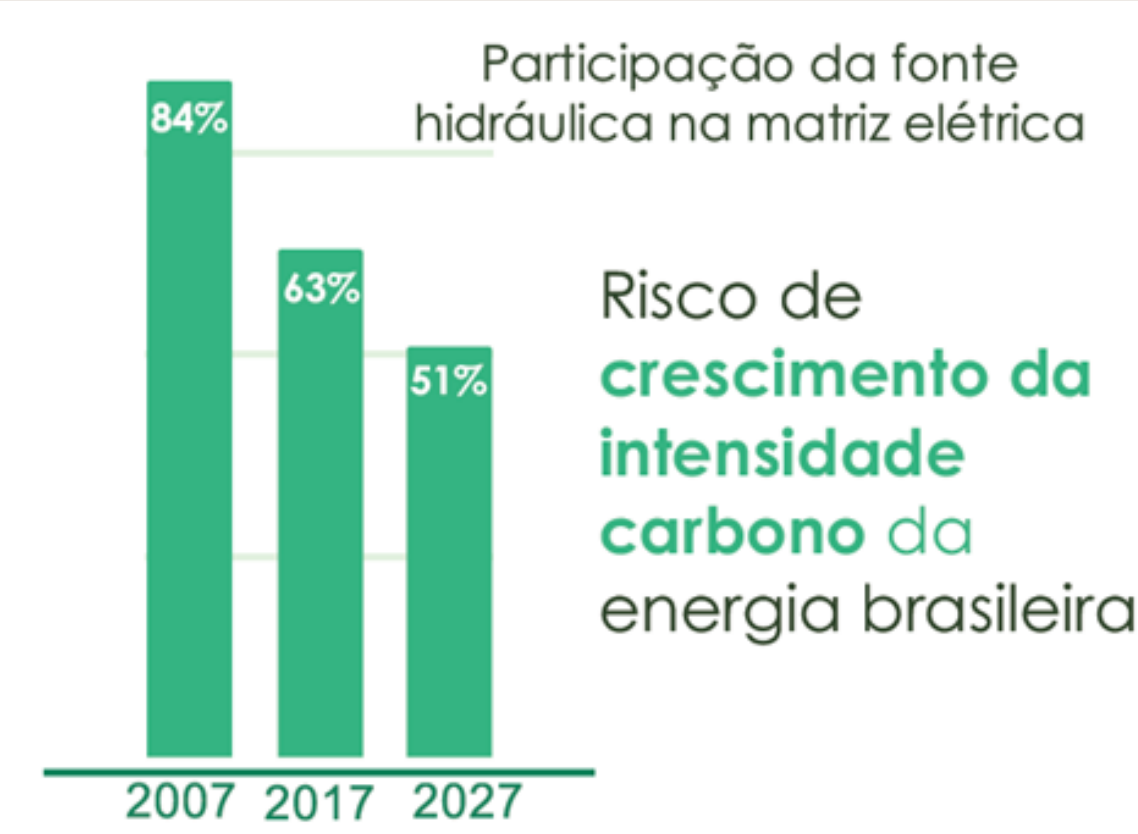
Parceria com International Heat Flow Commission (IHFC)



<http://ijthfa.com/index.php/journal/index>

**Quais as vantagens em desenvolver soluções de eficiência energética no Brasil?**

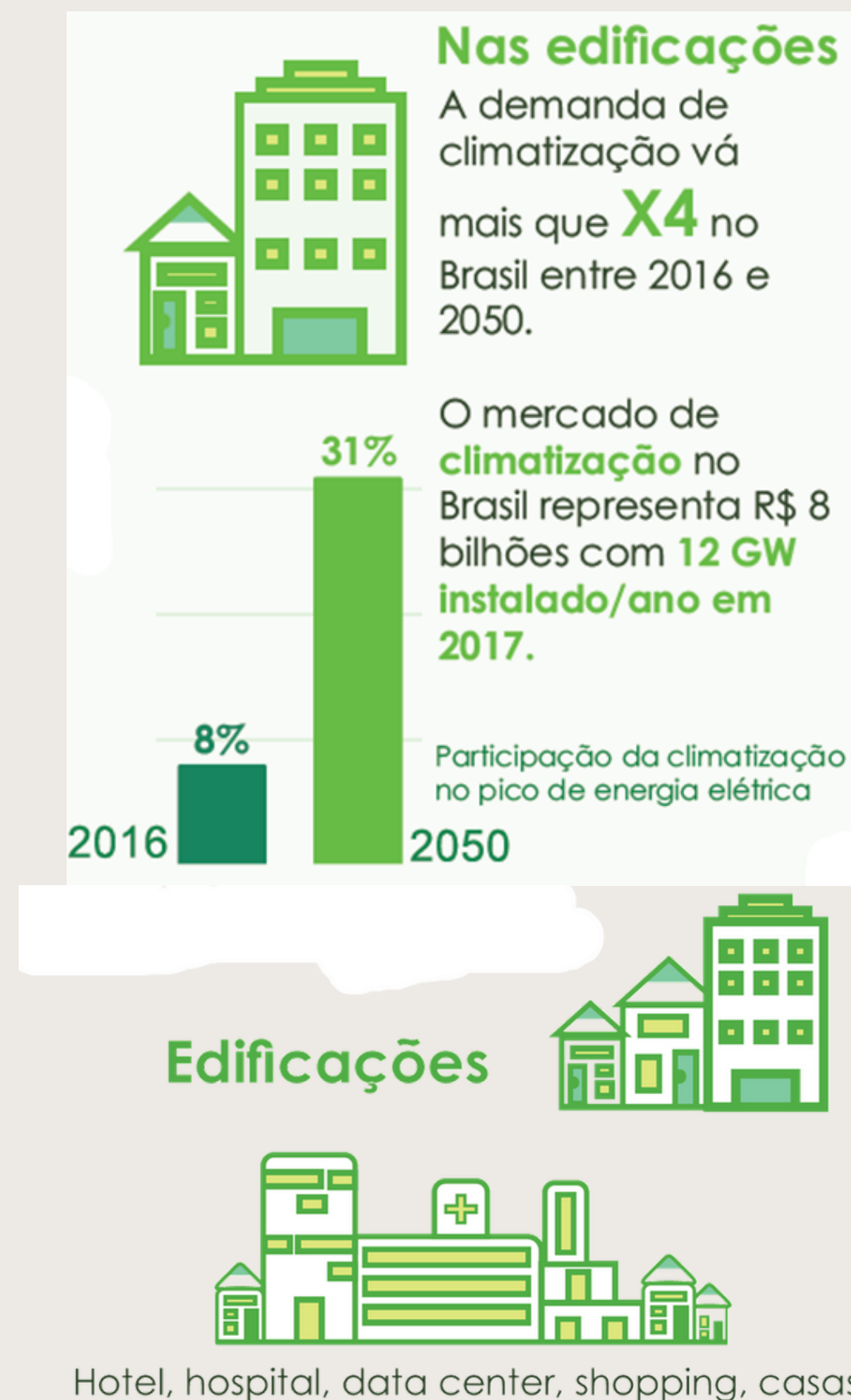
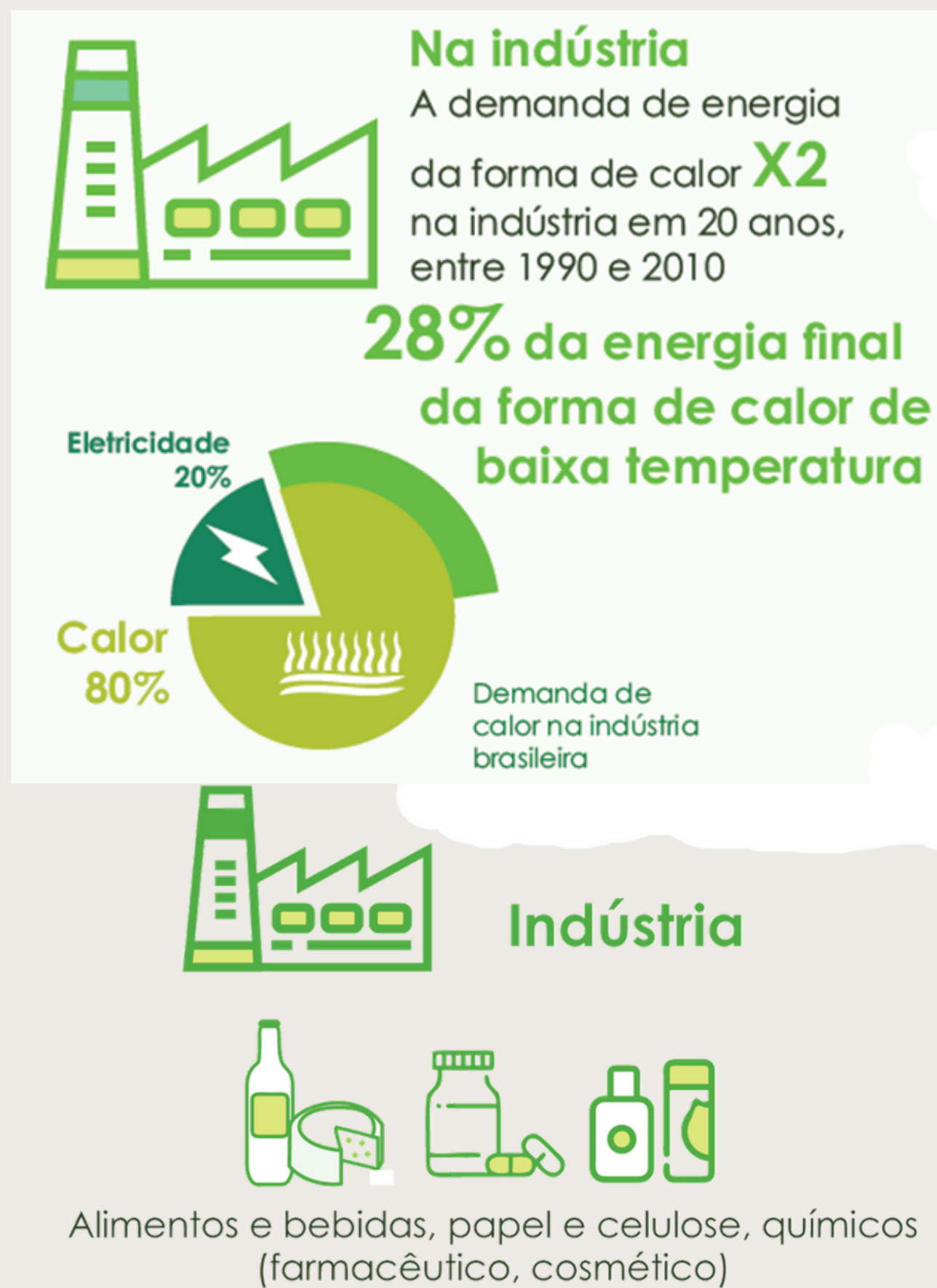
# Os desafios do setor da eficiência energética no Brasil



# Porque focar em soluções de eficiência térmica?

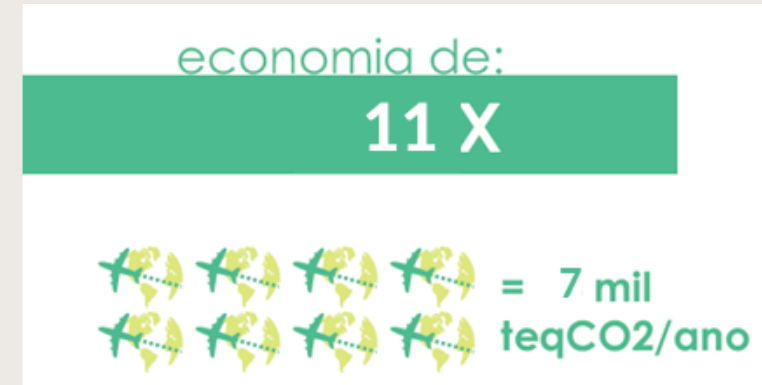

# A importância da eficiência térmica no Brasil

A demanda energética da indústria é dominada pelo calor.

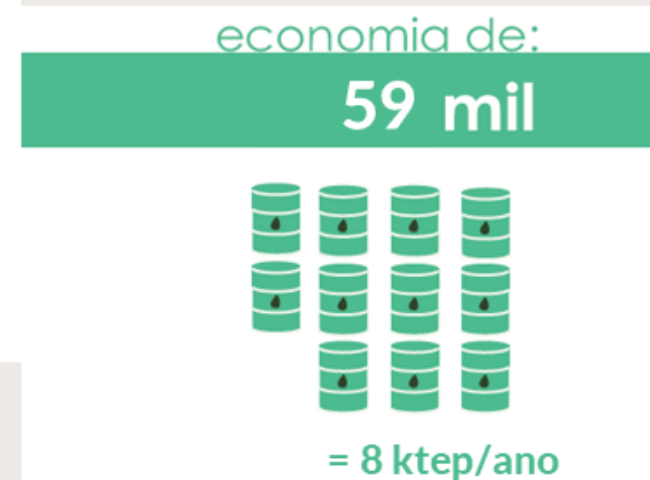


# Estimativa da oportunidade da tecnologia no Brasil

Climatização das edificações nas regiões Sul e Sudeste:



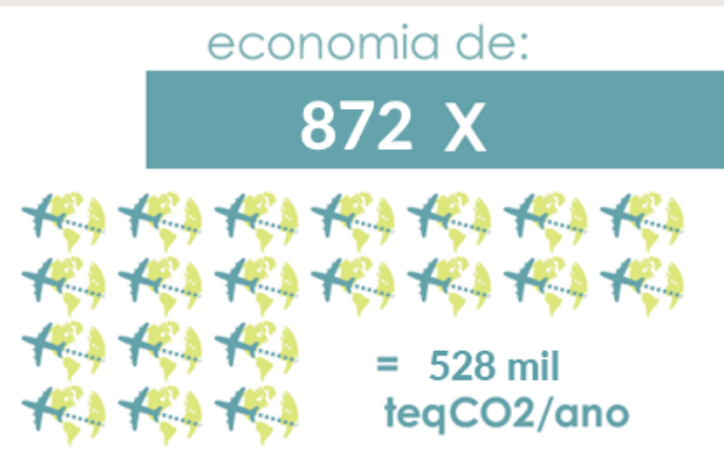
equivalente de um avião viajando ao redor do mundo



barris de petróleo bruto



Produção de calor de baixa temperatura nas indústrias do Brasil intero



Oportunidade calculada com a hipótese de conversão do mercado HVAC de apenas 1%

# Equipe

## Endereço

Rua General José Cristino, 77 - Sala EL226  
Bairro São Cristóvão  
Rio de Janeiro - RJ - CEP 20921-400

## Fone

+55 (21) 3504 9154

## Email

labgeot.on@gmail.com



Dra. Suze Nei P. Guimarães  
Pesquisadora Post-Doc  
suze@on.br



Dr. Fábio P. Vieira  
Tecnologista /  
Coordenador Dep. Geofísica  
fabio.vieira@on.br



Dr. Valiya M. Hamza  
Pesquisador Aposentado /  
Consultor  
hamza@on.br

