

# ENERGIA SOLAR

**Marcio Maia Vilela**

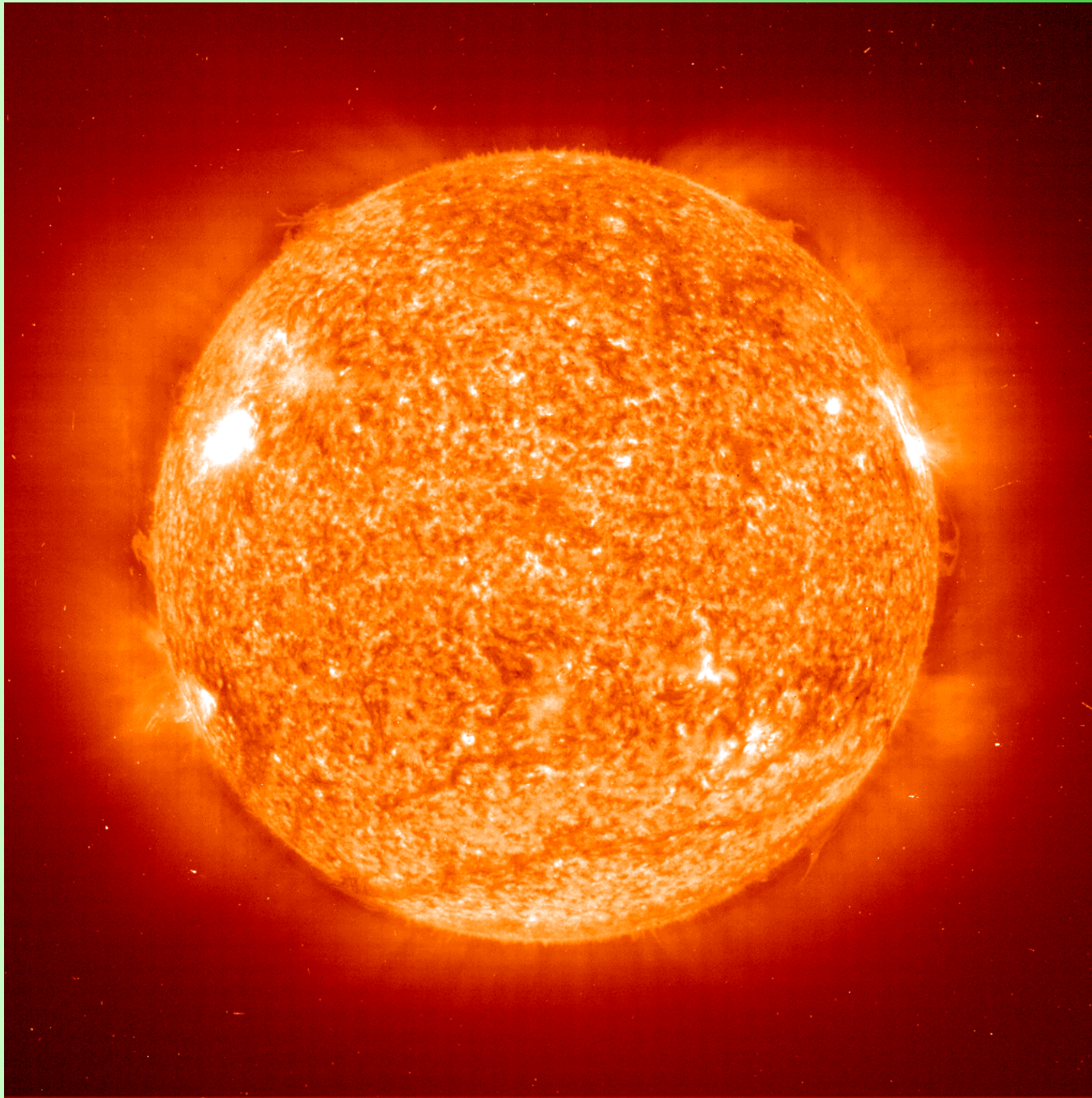
**ENERGIA FÓSSIL**  
**E**

**ENERGIA**  
**RENOVÁVEL**

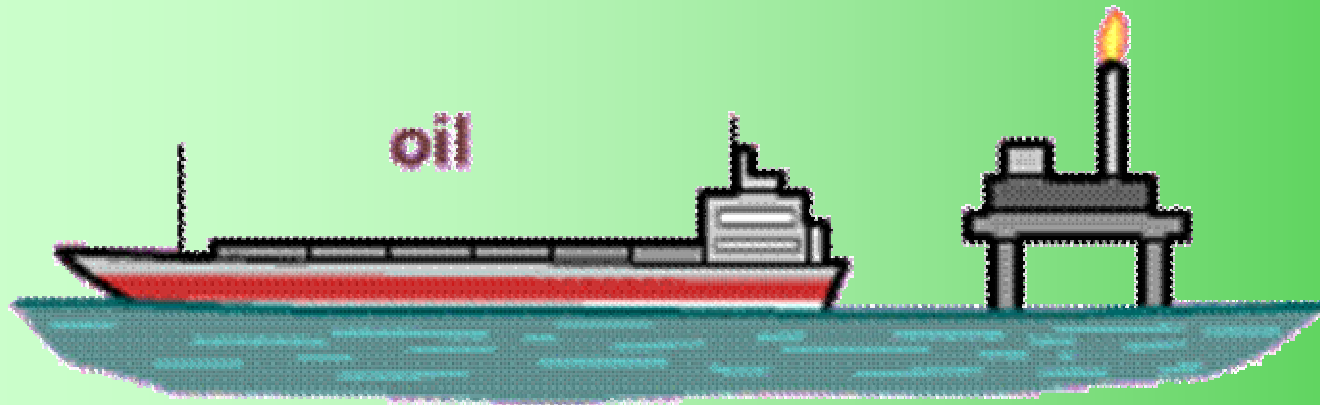
**All energy used by man originates in one of the following sources:**

- (a) radiant energy emitted by the sun (solar energy);**
- (b) geothermal energy from the interior of Earth;**
- (c) tidal energy originating in the gravitational pull from the moon;**
- (d) nuclear energy.**

**Prof. José Goldemberg in  
International Conference for Renewable Energies, Bonn, 2004**



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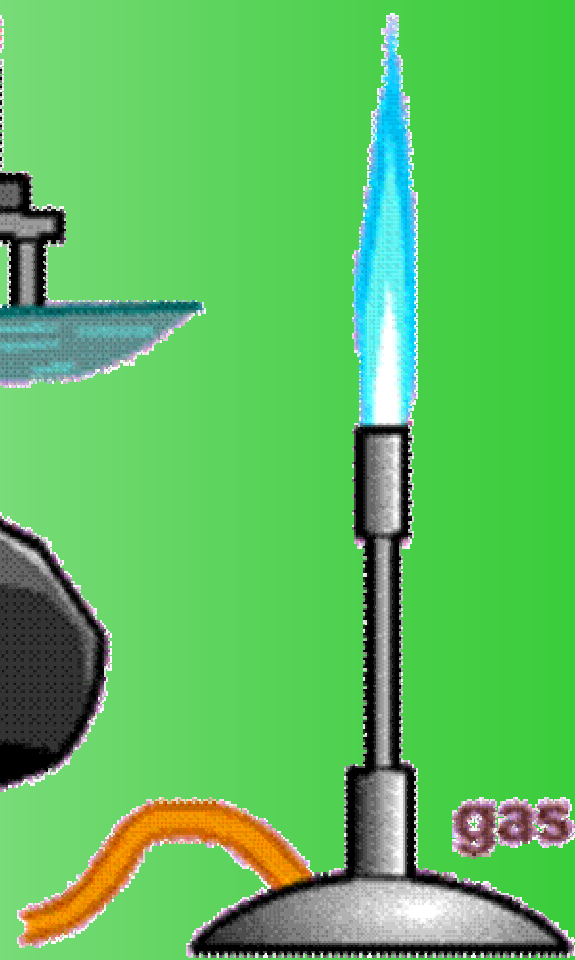


oil

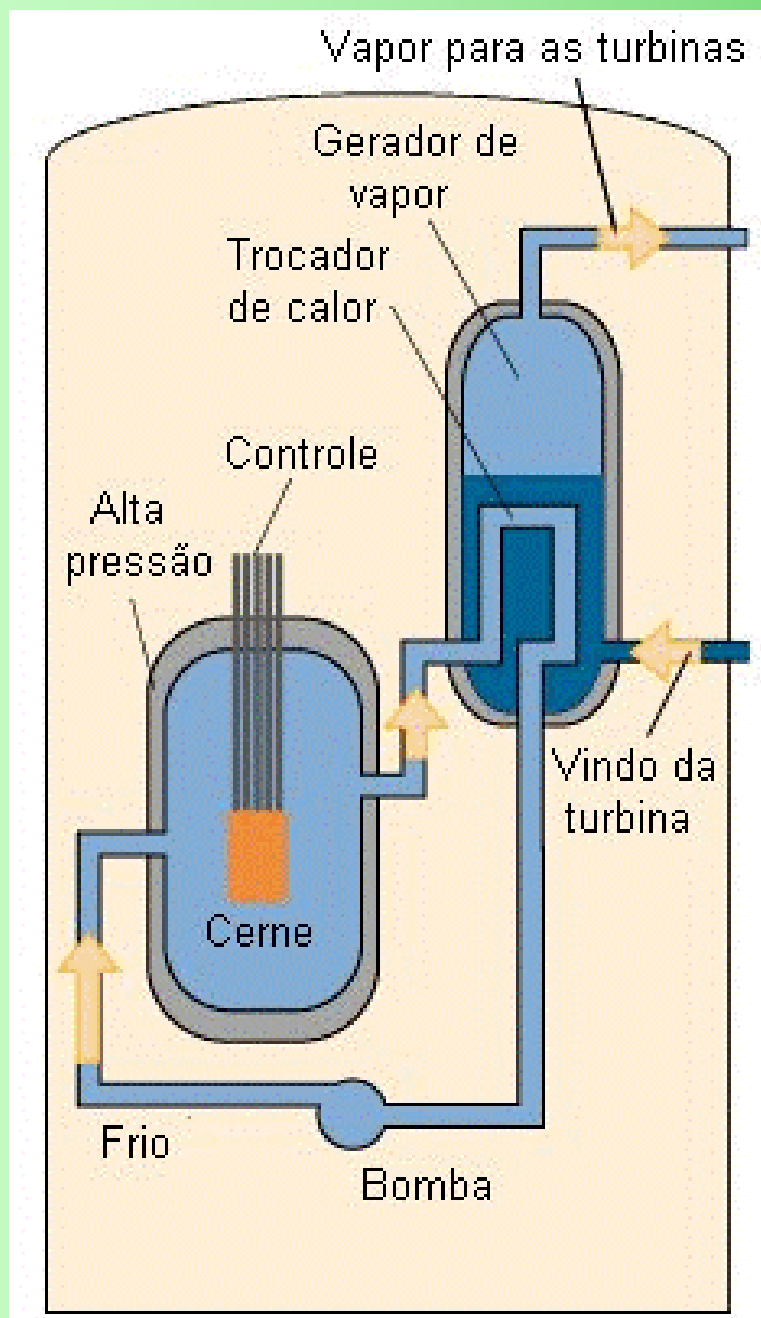
nuclear



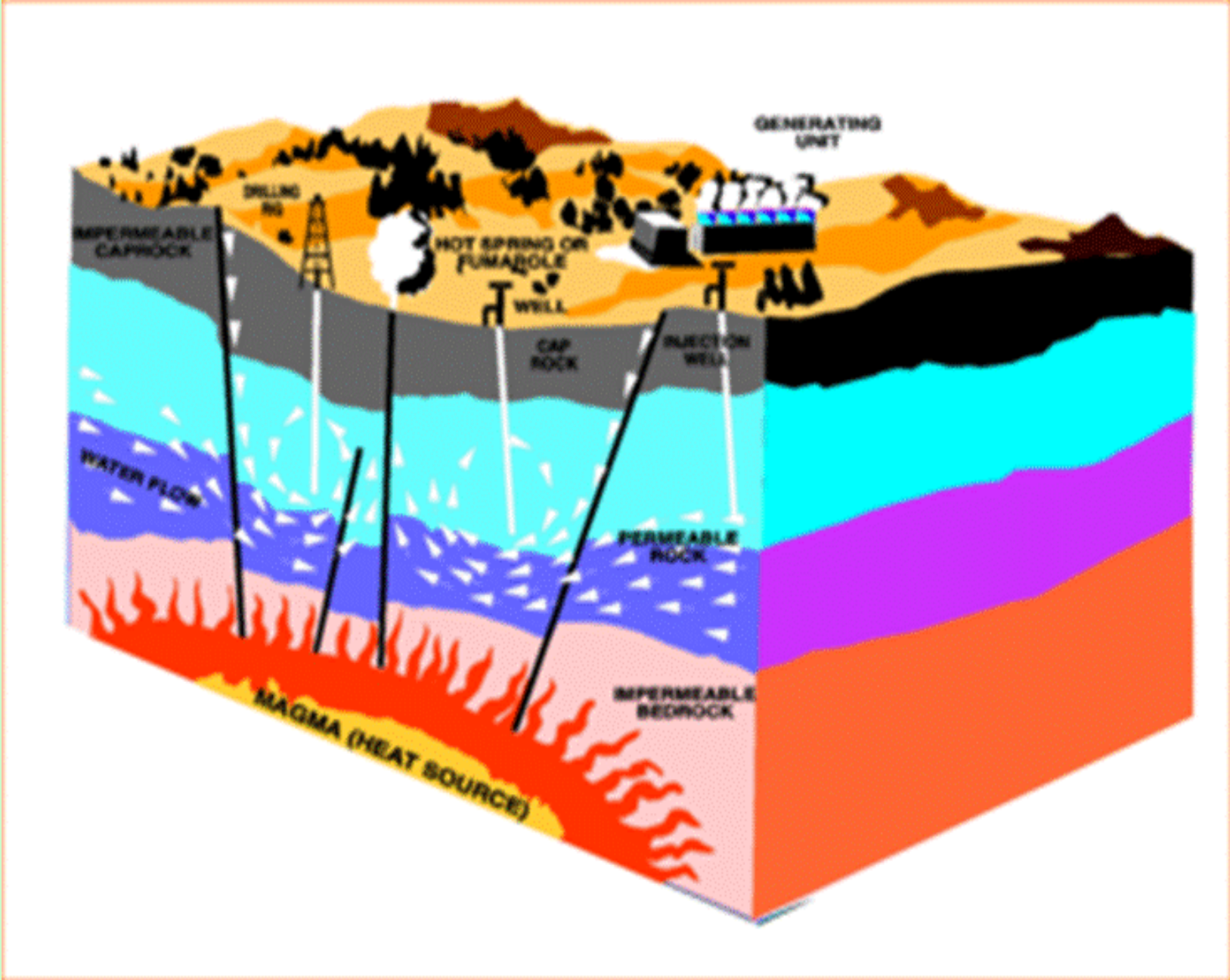
coal



gas

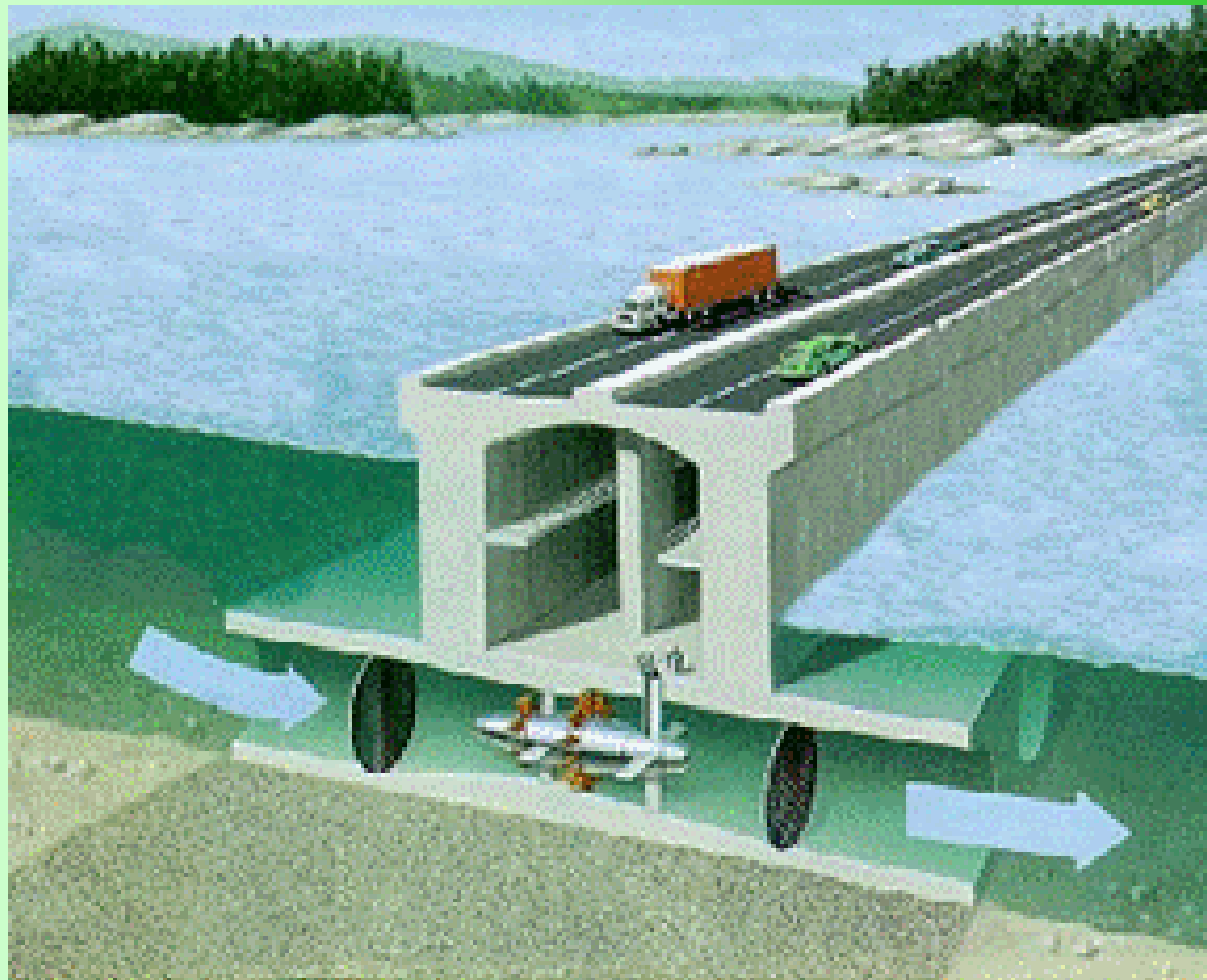










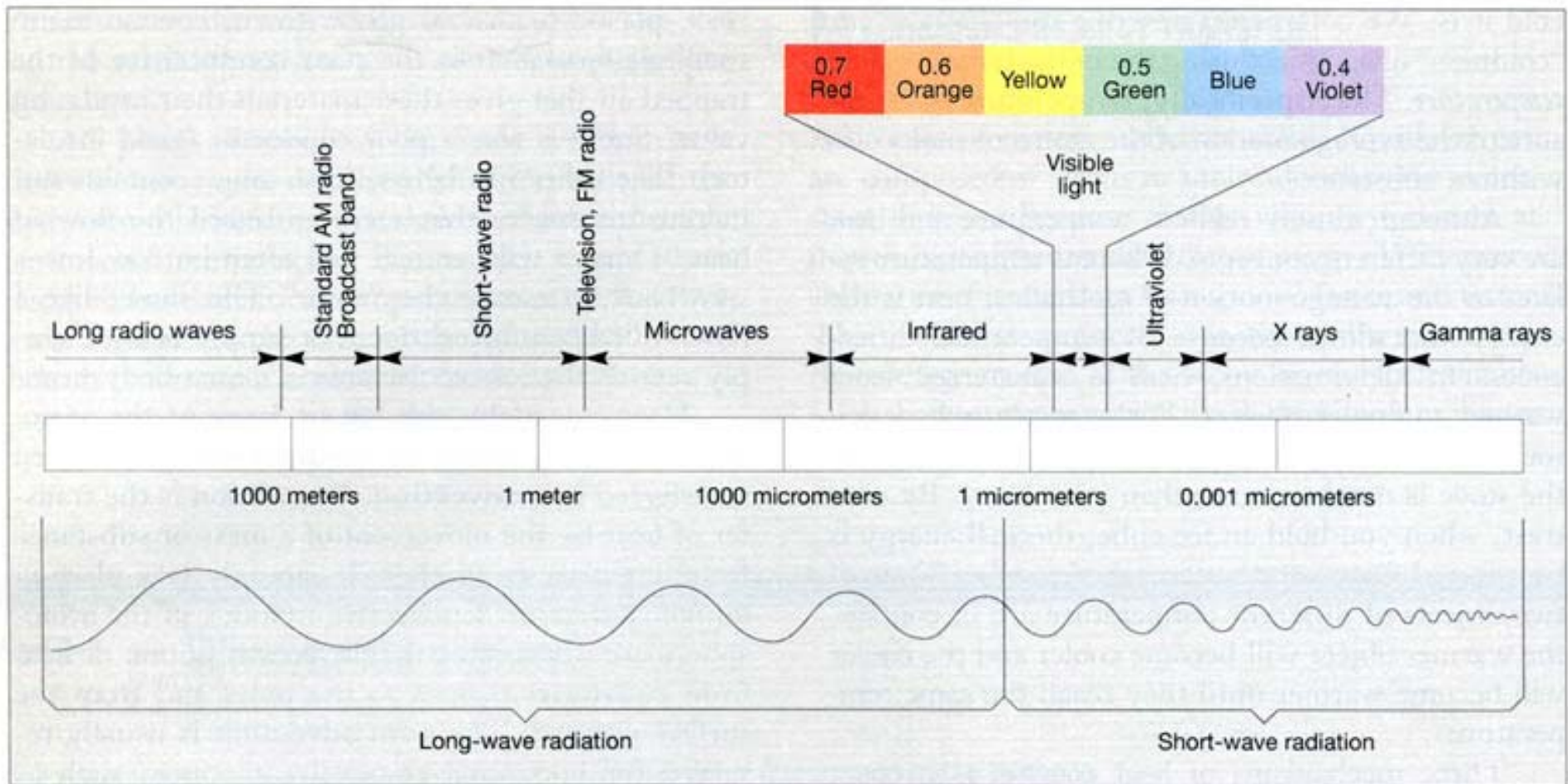


## 6 - Quais são as FONTES de energia.

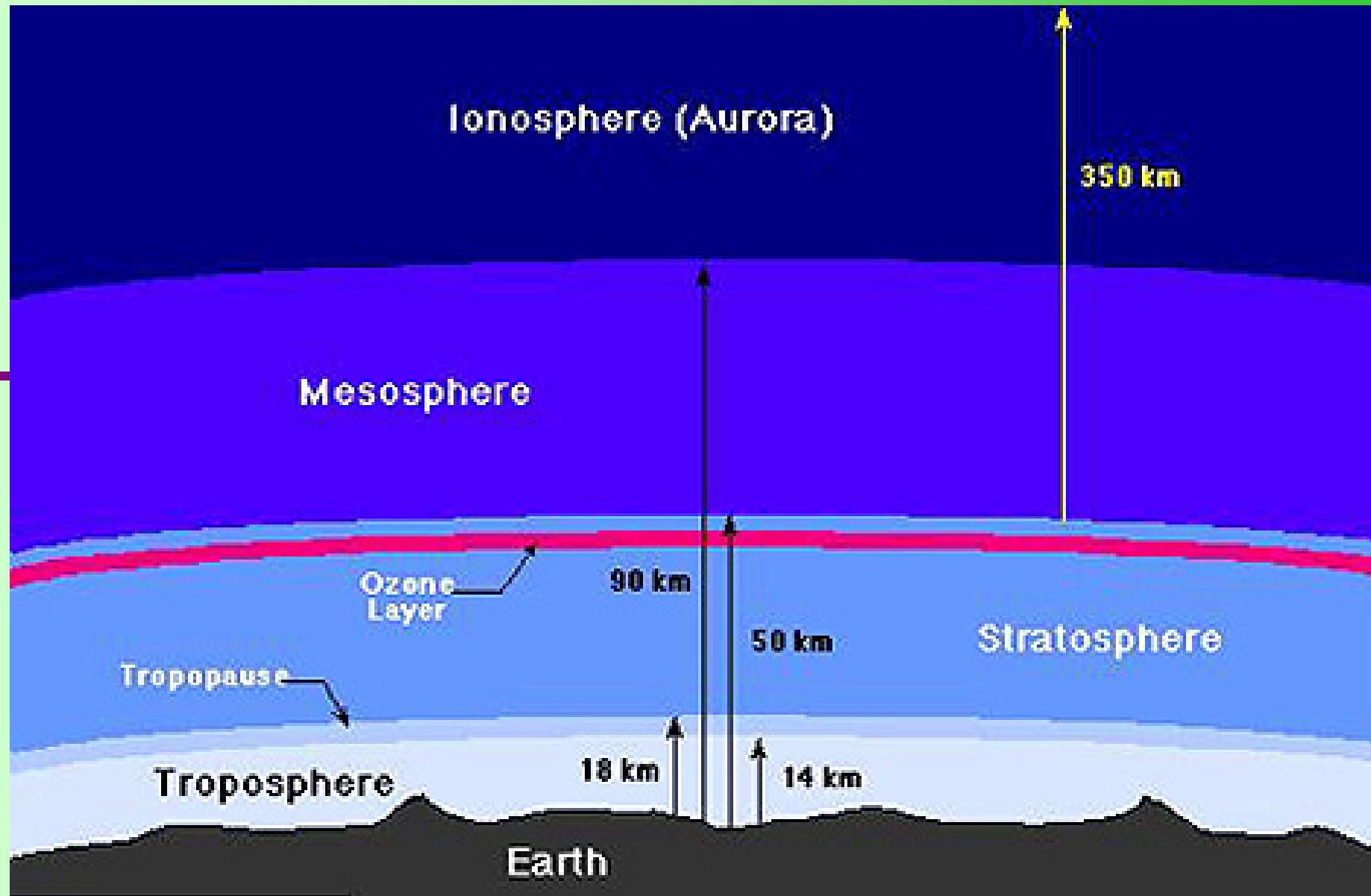
### FONTES

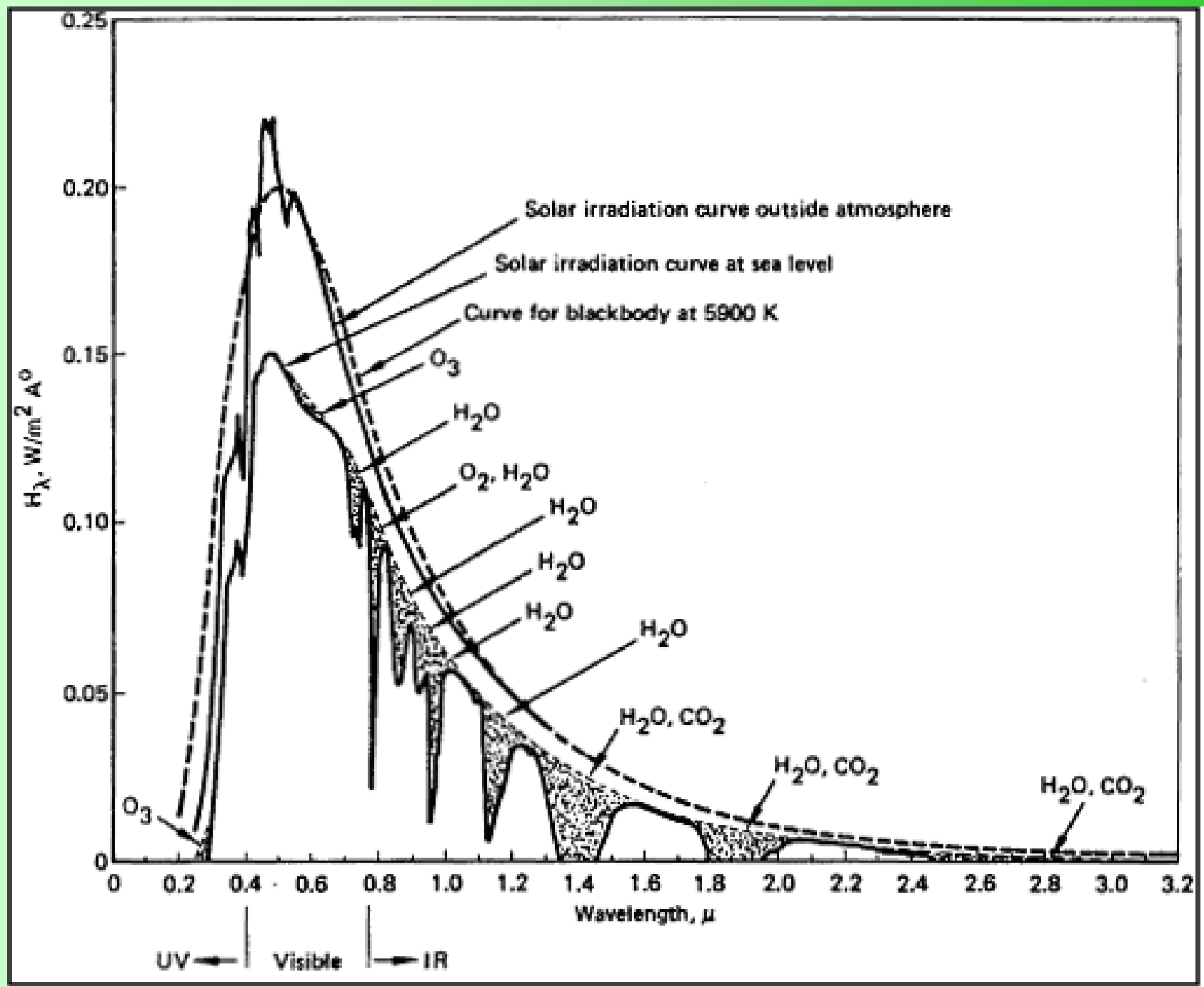
Hidráulicas (Produzidas em Usinas Hidrelétricas)	37%
Derivados do Petróleo Gás Engarrafado (GLP) Gasolina Querozene Óleo Diesel Óleo Combustível	32%
Carvão Vegetal e Lenha	9%
Bagaço de Cana	7%
Álcool	4%
Carvão Mineral	3%
Gás Natural	2%
Outras Fontes	6%

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**Figure 2•7** The electromagnetic spectrum illustrating the wavelengths and names of various types of radiation.













# Greenhouse Effect

The greenhouse effect refers to circumstances where the short wavelengths of visible light from the sun pass through a transparent medium and are absorbed, but the longer wavelengths of the infrared re-radiation from the heated objects are unable to pass through that medium. The trapping of the long wavelength radiation leads to more heating and a higher resultant temperature. Besides the heating of an automobile by sunlight through the windshield and the namesake example of heating the greenhouse by sunlight passing through sealed, transparent windows, the greenhouse effect has been widely used to describe the trapping of excess heat by the rising concentration of carbon dioxide in the atmosphere

Incoming solar radiation at top of atmosphere: 7 million calories per square meter per day, averaged for the Earth as a whole



Outgoing radiation

Light (shortwave radiation) Infrared (long-wave) radiation

Space

100%

6%

20%

4%

6%

38%

26%

Atmosphere

Absorbed by water vapor, dust, CO<sub>2</sub> 16%

Back-scattered by air

Reflected by clouds

Net emission by water vapor, CO<sub>2</sub>

Emission by clouds

3%

Absorbed by clouds

15% Absorption by water vapor, CO<sub>2</sub>

Net surface emission of long-wave radiation

Sensible heat

Latent heat

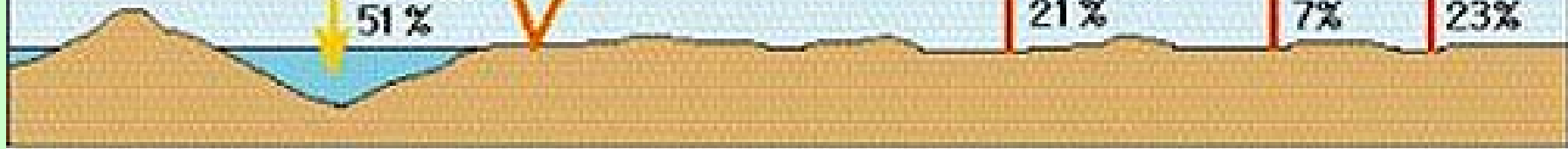
Absorbed by water and land 51%

Reflected by water and land surface

21%

7%

23%



**O Dióxido de Carbono (CO<sub>2</sub>);\ e Metano (CH<sub>4</sub>), entre outros, absorvem infravermelho e diminuem seu escape para o espaço**

**Como funciona o  
aquecedor solar?**

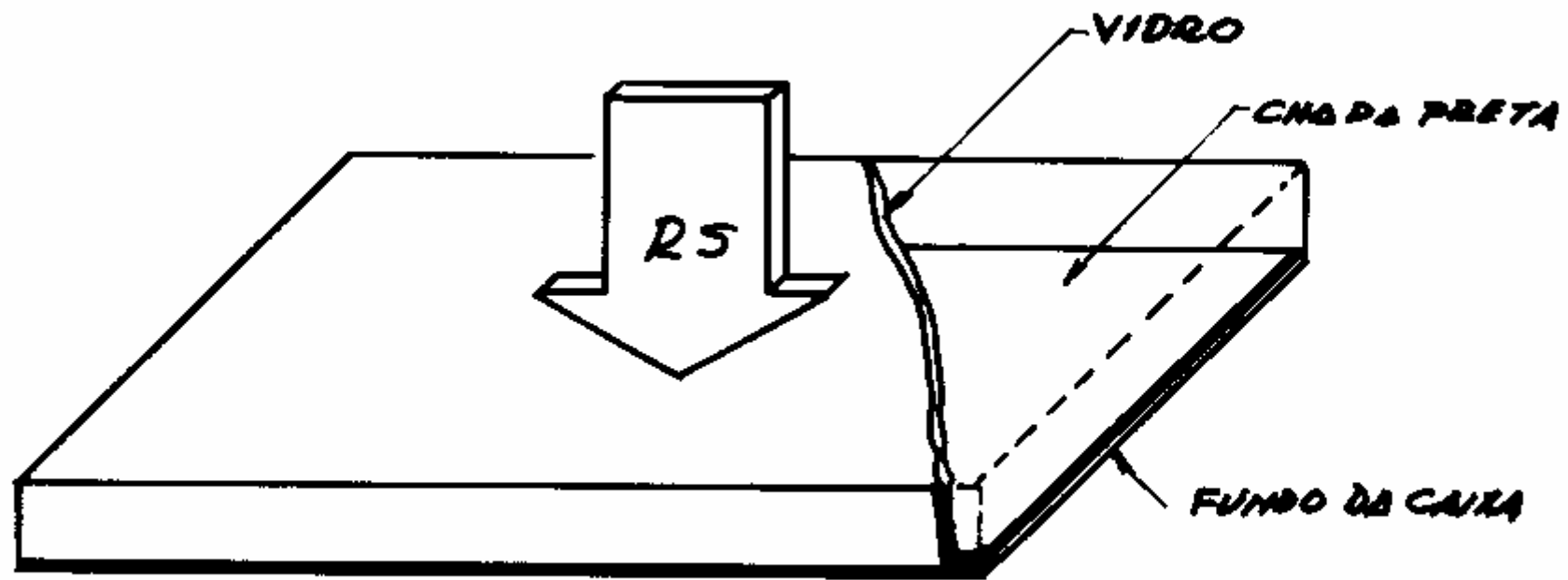


FIGURA 1

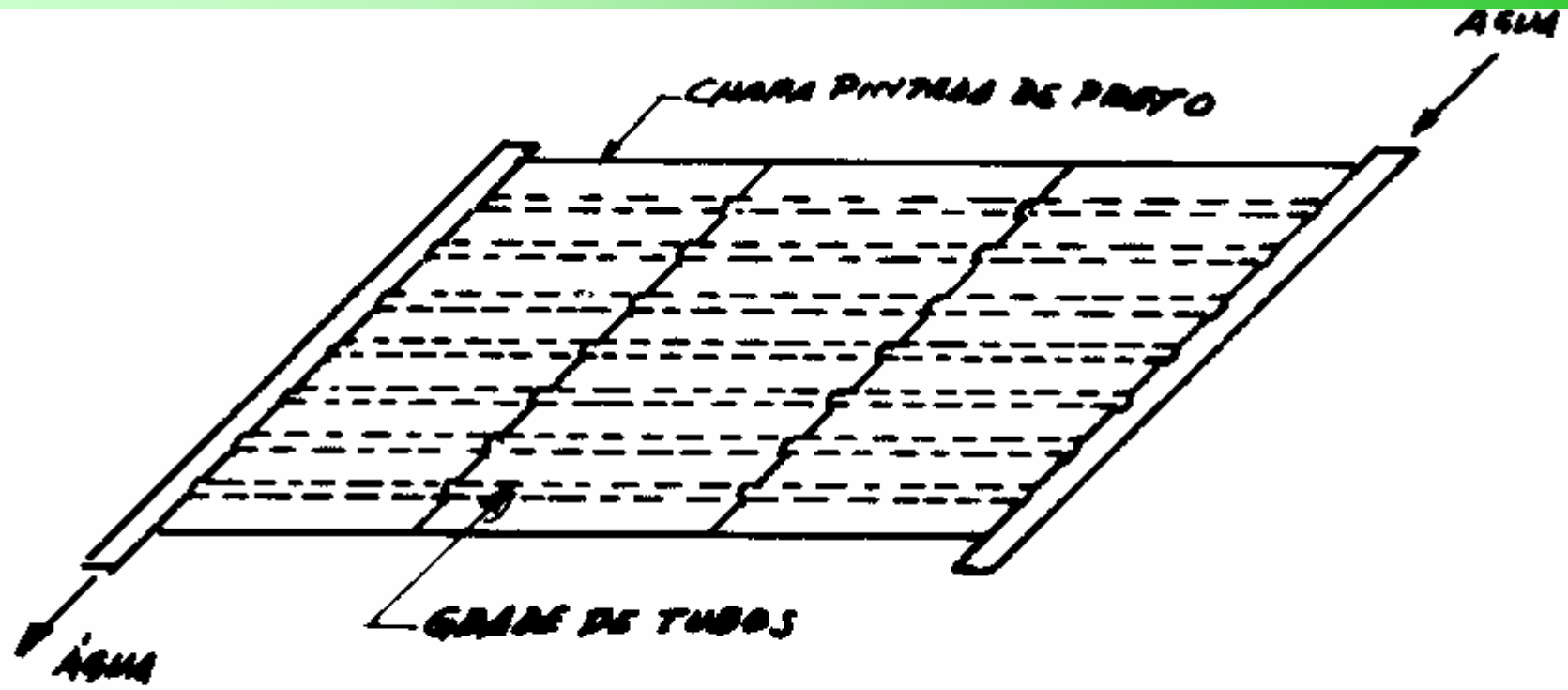
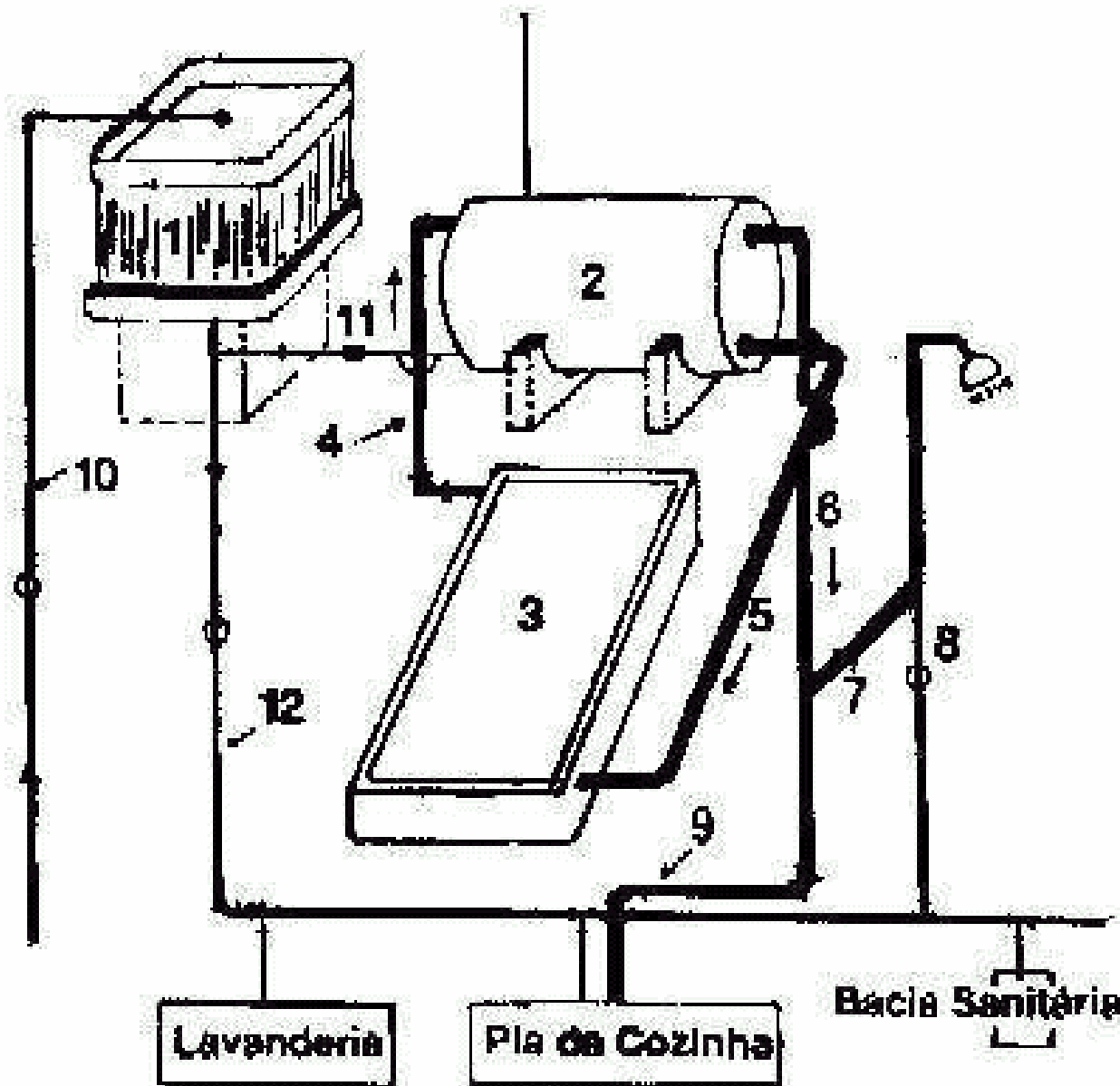
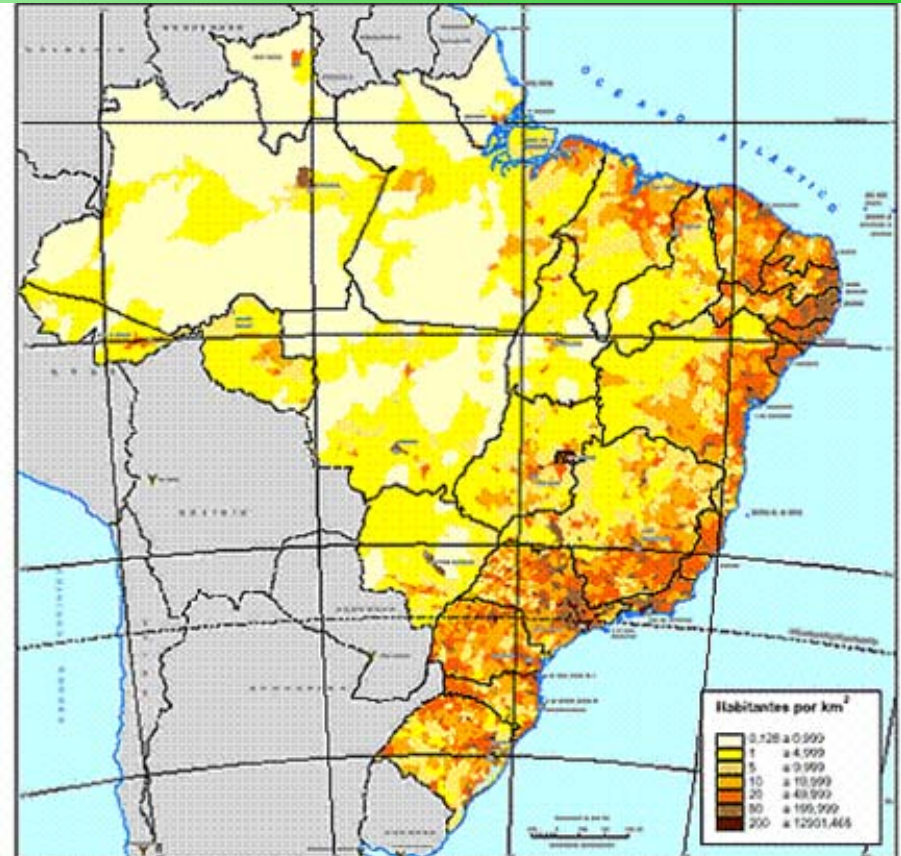
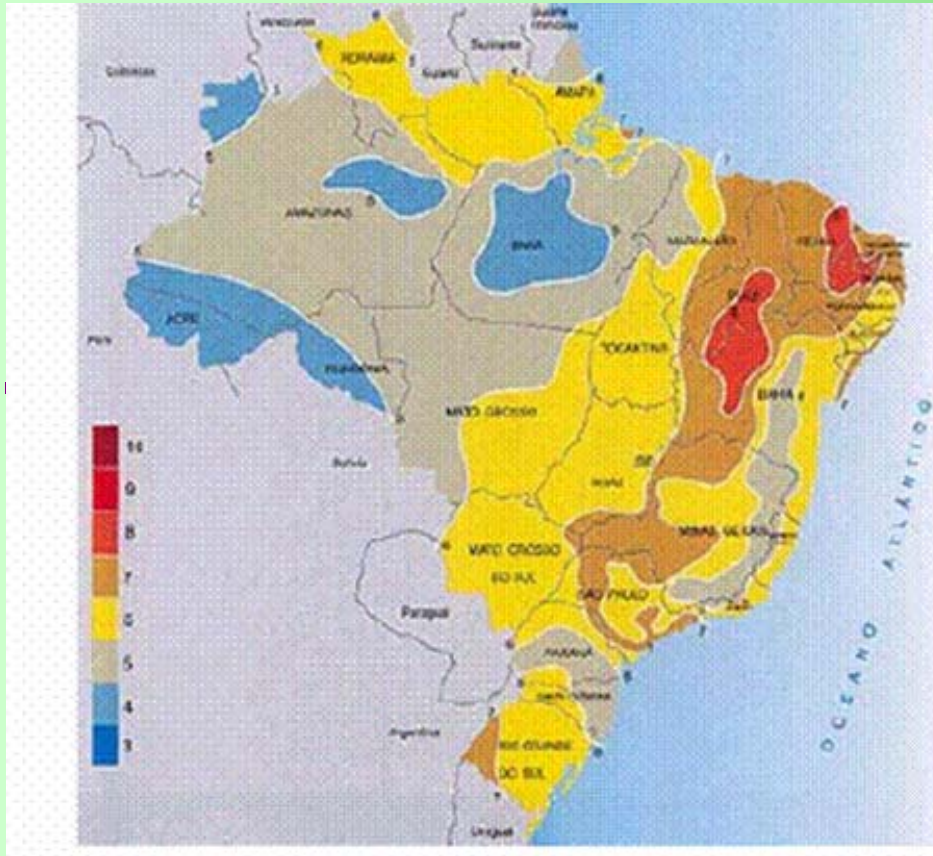


FIGURA 2







# Barreiras Identificadas

- Geográficas**
  - a) extensão Territorial
  - b) variedade de Climas
- **Culturais**
  - a) diversidade
  - b) impermeabilidade na comunicação
- Sociais** Dificuldade de trânsito de informações entre diferentes classes sociais
- Econômicas** Apartheid social entre setores sociais (mais abastados x menos abastados)

## **0) Custo comparativo**

- aq. solar x chuveiro – setor residencial
- aq. solar x tarifa elétrica – setor industrial

## **1) Indústria Termosolar pouco desenvolvida**

- pequeno número de fabricantes
- distribuição desigual pelo Brasil
- poucas têm linha completa etiquetada
- integração da cadeia pele fabricante

### **3) Dificuldade de Financiamento para Compra e Instalação de Equipamentos**

- Reservatório e/ou tubulação de água quente prédio na planta - integração financ. aq.+ imóvel prédio já construído – caso a caso**
- Financ. direto, mas apenas para clientes**
- CEF - 1,65%+ R\$25,00/mês**
- REAL - R\$50,00 na abertura + 1,5/mês**

## **4) Pequena Exploração de Nichos de Mercado**

**-Comércio e Serviços: hotéis, motéis, creches, escolas, universidades, penitenciárias, hospitais, asilos, centros esportivos, clubes.**