



# NET ZERO









Lá  
vem ....



# MUDANÇAS CLIMÁTICAS

A black and white photograph of a large iceberg melting in the ocean. The iceberg is the central focus, with water splashing around its base. The sky is dark and overcast, and the ocean surface is choppy with white foam from the waves.

Eventos climáticos catastróficos

Escassez de recursos naturais

Mudanças nos ciclos da água

Extinção



# POLUIÇÃO - CO<sub>2</sub> e METANO





**NZB**

---

***Definições***

NetZero Energy

NetZero Water

NetZero Waste

**1**

**NET ZERO ENERGY**

# Net Zero Energy – 4 definições oficiais

- Net Zero Energia Local
- NetZero Fonte de Energia
- NetZero Custo de Energia
- NetZero Emissões de Energia









## 1.3 Geração por Fonte

	2013	2014	2015
<b>Energia Gerada em GWh</b>	<b>Jan-Dez</b>	<b>Jan-Dez</b>	<b>Jan-Mar</b>
Despachada ao SIN	523.427	529.612	142.178
Fora do Sistema Interligado	12.458	12.456	2.896
<b>Total de Geração</b>	<b>535.885</b>	<b>542.068</b>	<b>145.074</b>

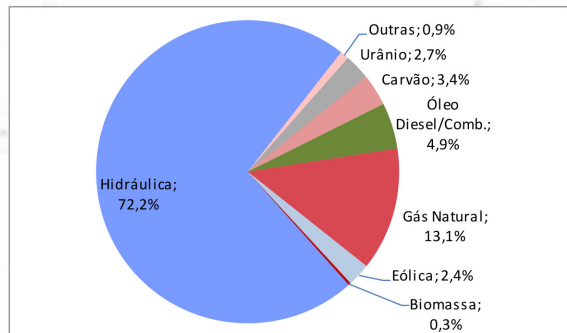
### Participação por fonte \*

<b>Renováveis</b>	<b>80,2%</b>	<b>75,5%</b>	<b>74,9%</b>
disto: Hidráulica	79,2%	74,1%	72,2%
Biomassa	0,2%	0,1%	0,3%
Eólica	0,8%	1,2%	2,4%
<b>Não renováveis</b>	<b>19,8%</b>	<b>24,5%</b>	<b>25,1%</b>
disto: Gás Natural	11,2%	13,5%	13,1%
Óleo Diesel/ Combustível	2,6%	4,3%	4,9%
Carvão	2,7%	2,7%	3,4%
Nuclear	2,8%	2,9%	2,7%
Outras	0,5%	1,1%	0,9%

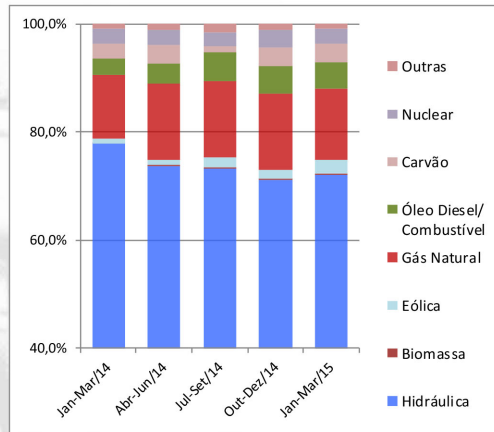
2014	2014	2014	2014	2015
<b>Jan-Mar</b>	<b>Abr-Jun</b>	<b>Jul-Set</b>	<b>Out-Dez</b>	<b>Jan-Mar</b>
141.491	129.193	125.633	133.295	142.178
3.019	3.080	3.167	3.190	2.896
<b>144.510</b>	<b>132.273</b>	<b>128.800</b>	<b>136.485</b>	<b>145.074</b>

<b>78,7%</b>	<b>74,8%</b>	<b>75,2%</b>	<b>73,0%</b>	<b>74,9%</b>
77,8%	73,8%	73,4%	71,2%	72,2%
0,0%	0,2%	0,2%	0,2%	0,3%
0,9%	0,9%	1,6%	1,6%	2,4%
<b>21,3%</b>	<b>25,2%</b>	<b>24,8%</b>	<b>27,0%</b>	<b>25,1%</b>
11,8%	14,1%	14,3%	14,1%	13,1%
3,1%	3,7%	5,2%	5,3%	4,9%
2,7%	3,4%	1,3%	3,3%	3,4%
3,0%	2,9%	2,4%	3,3%	2,7%
0,7%	1,0%	1,6%	1,0%	0,9%

Participação de cada Fonte Geradora no total - Jan-Mar/2015\*



Evolução Trimestral



\* Obs: Sistema Interligado Nacional (SIN), Jan-Mar/2015.

Fontes: Operador Nacional do Sistema Elétrico - ONS

Grupo Técnico Operacional da Região Norte - GTON (Eletrobrás)



# Emissão de CO<sub>2</sub>

- Usinas Hidrelétricas – 10 toneladas/ GWh
- Usinas Solares – 40 toneladas/GWh
- Usinas a Gás – 400 toneladas/GWh
- Usinas Óleo – 700 toneladas/GWh
- Usinas Carvão – 900 toneladas/GWh





**VIABILIZANDO O PROJETO**

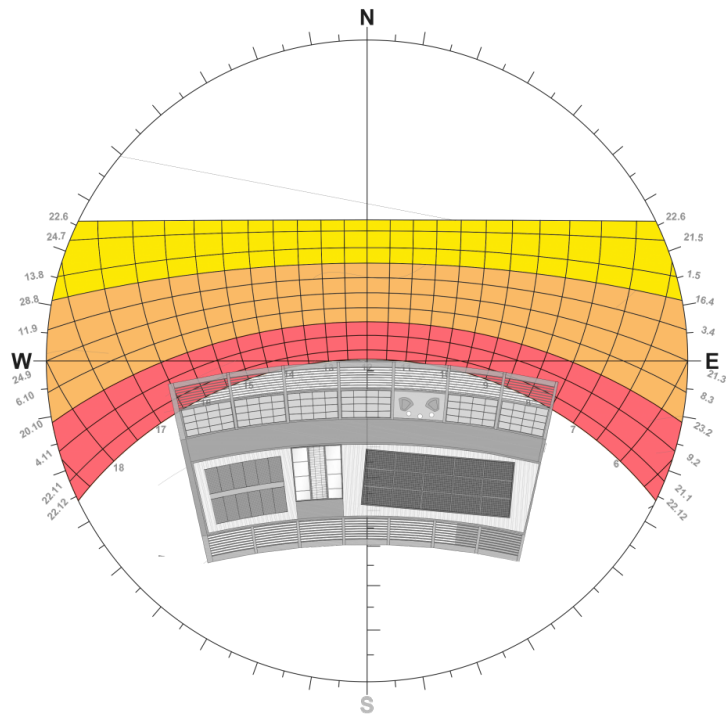
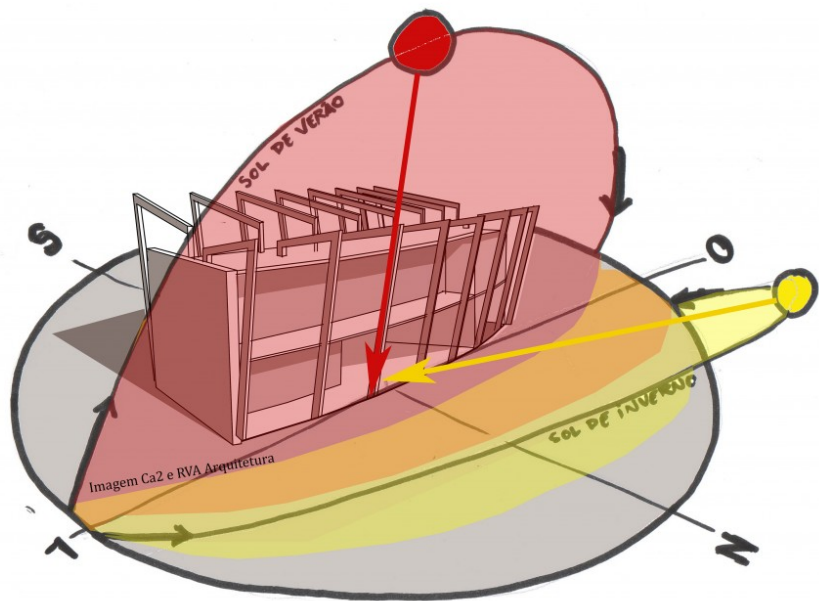




# DESIGN PASSIVO

- *Orientação e formato*
- *Ventilação Natural*
- *Tipo de Janelas*
- *Luz Natural*
- *Conforto Térmico*
- *Sombreamento*
- *Isolamento Térmico*
- *Telhados*
- *Vegetação*

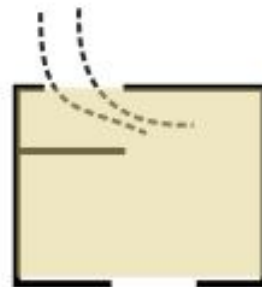
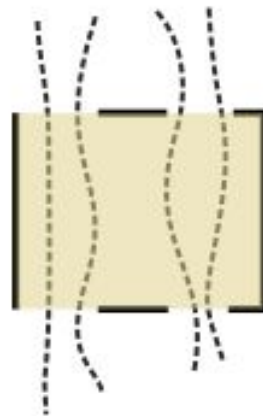
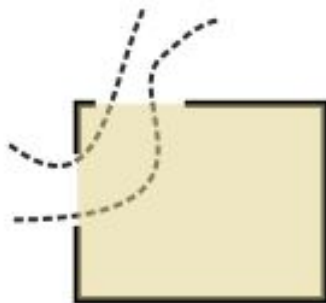
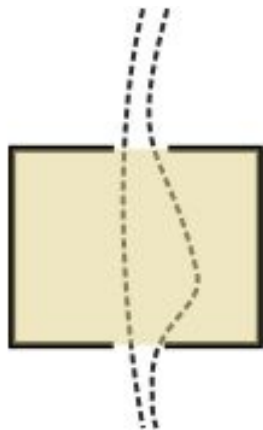
# ORIENTAÇÃO E FORMA



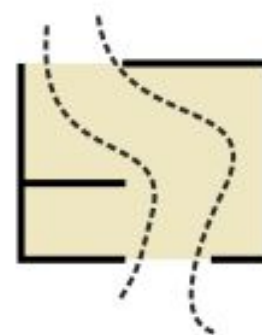
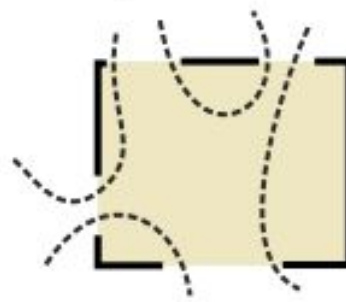
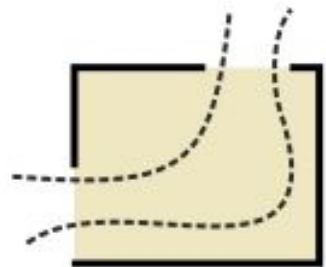
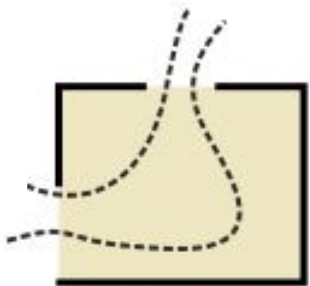
# VENTILAÇÃO CRUZADA



NÃO



SIM

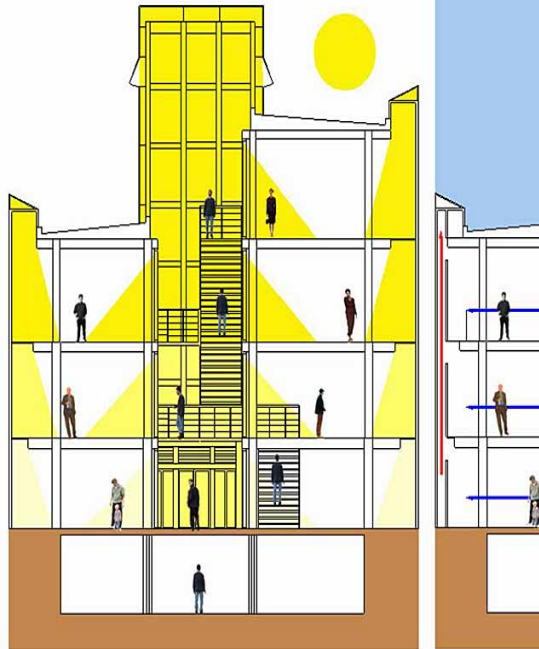


# TIPO DE JANELA

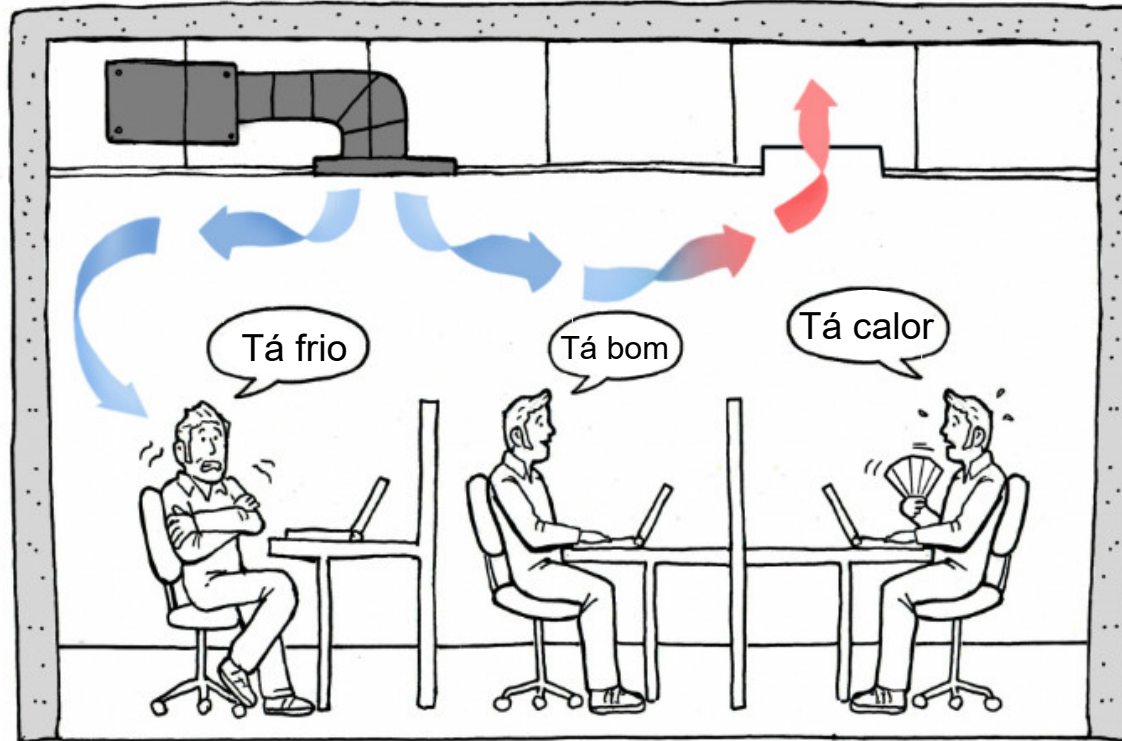


# LUZ NATURAL

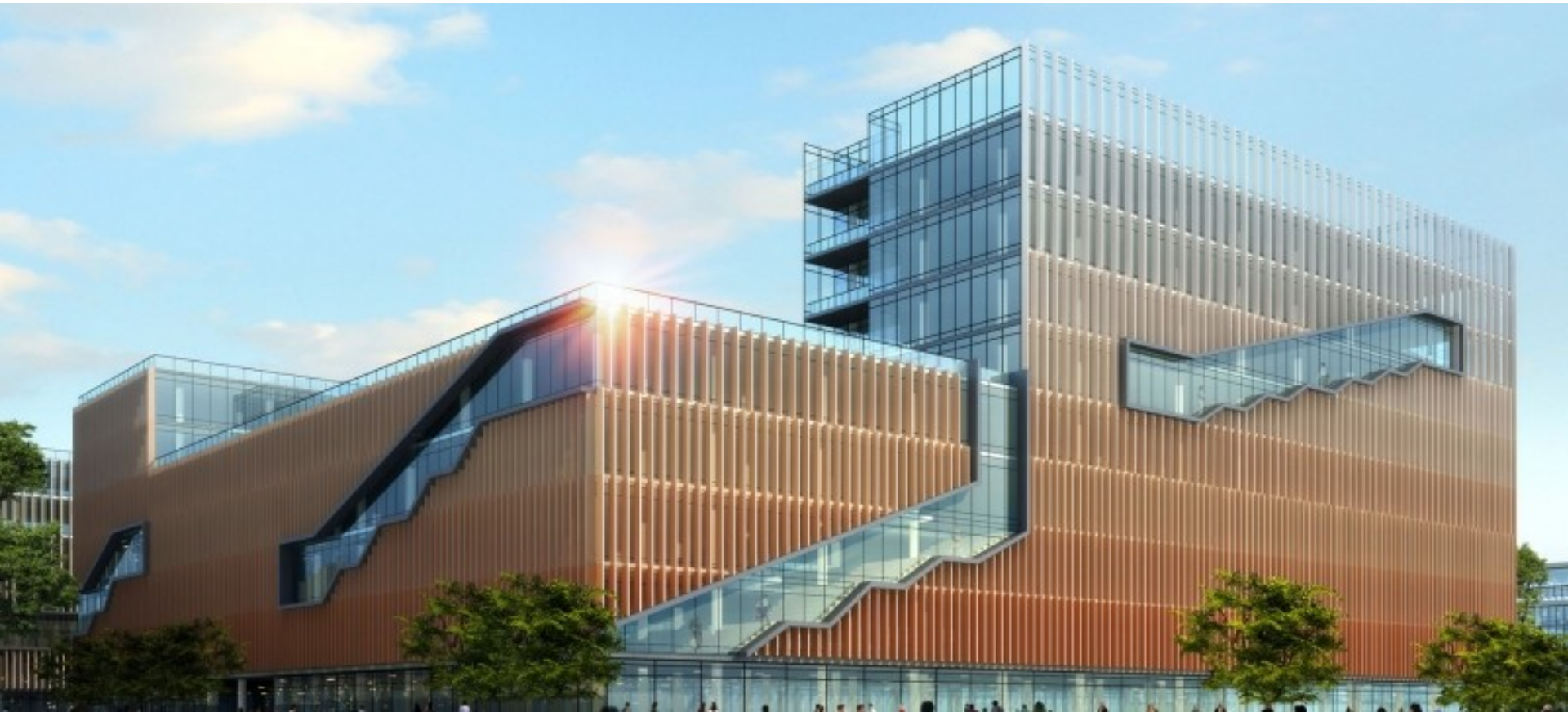
NATURAL LIGHT



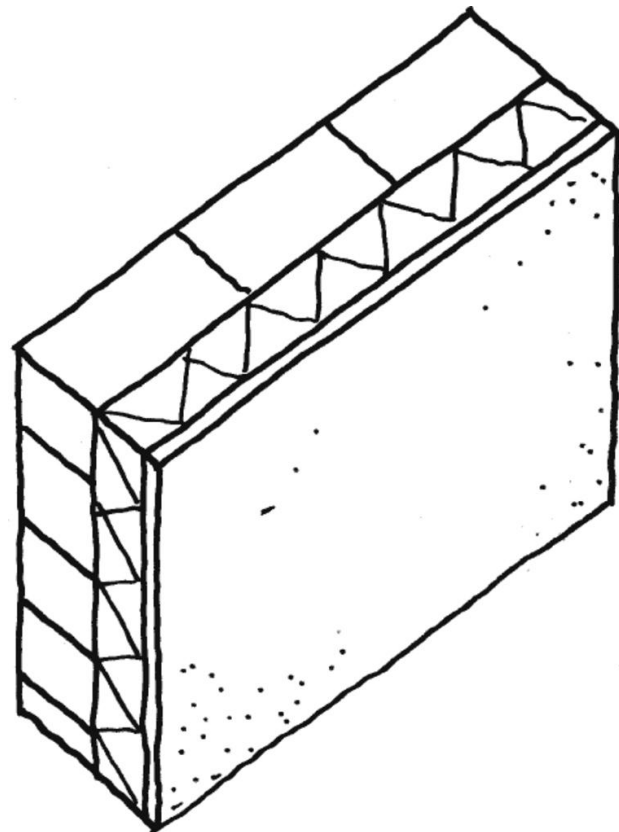
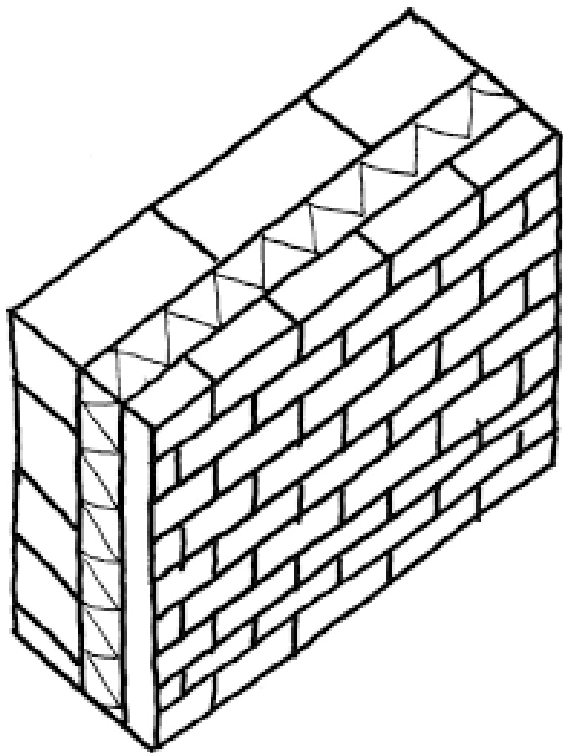
# CONFORTO TÉRMICO



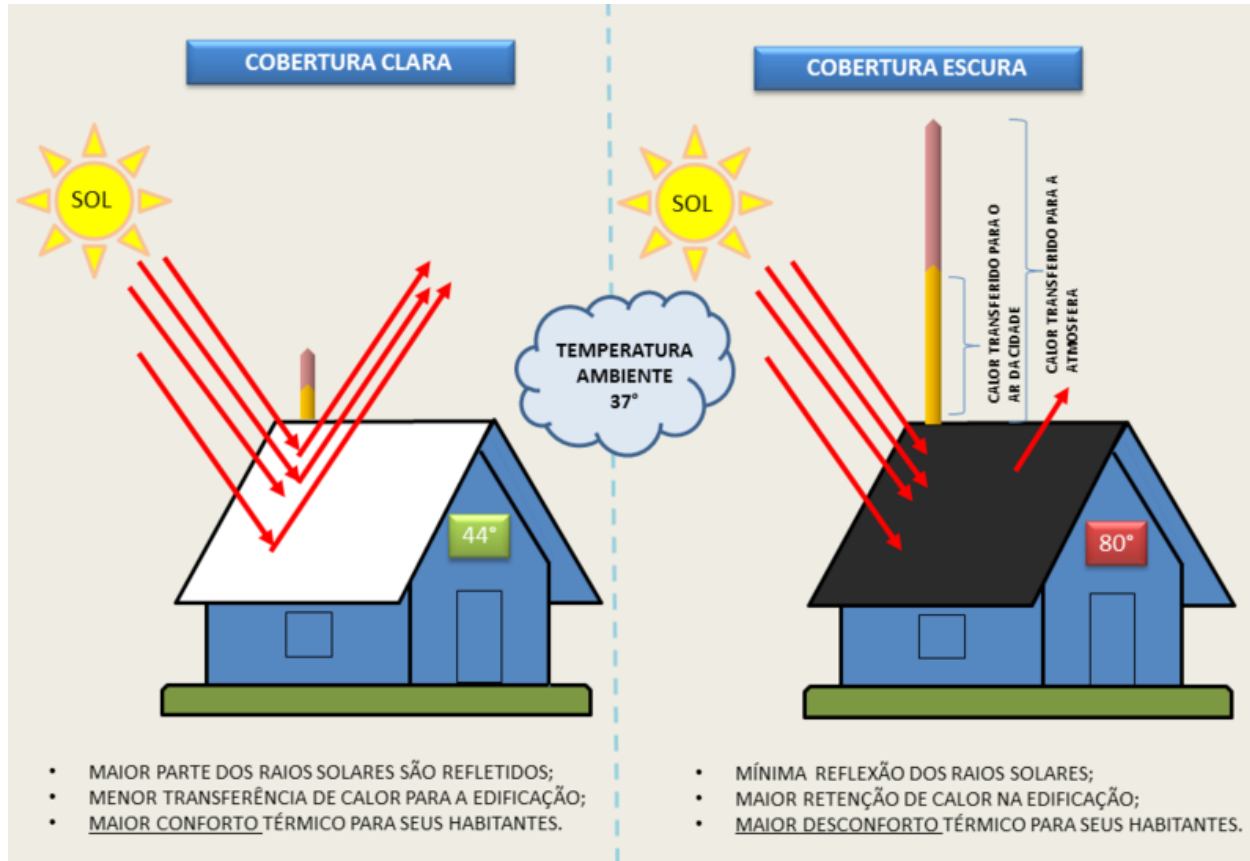
# SOMBREAMENTO



# ISOLAMENTO TÉRMICO



# TELHADOS



# VEGETAÇÃO

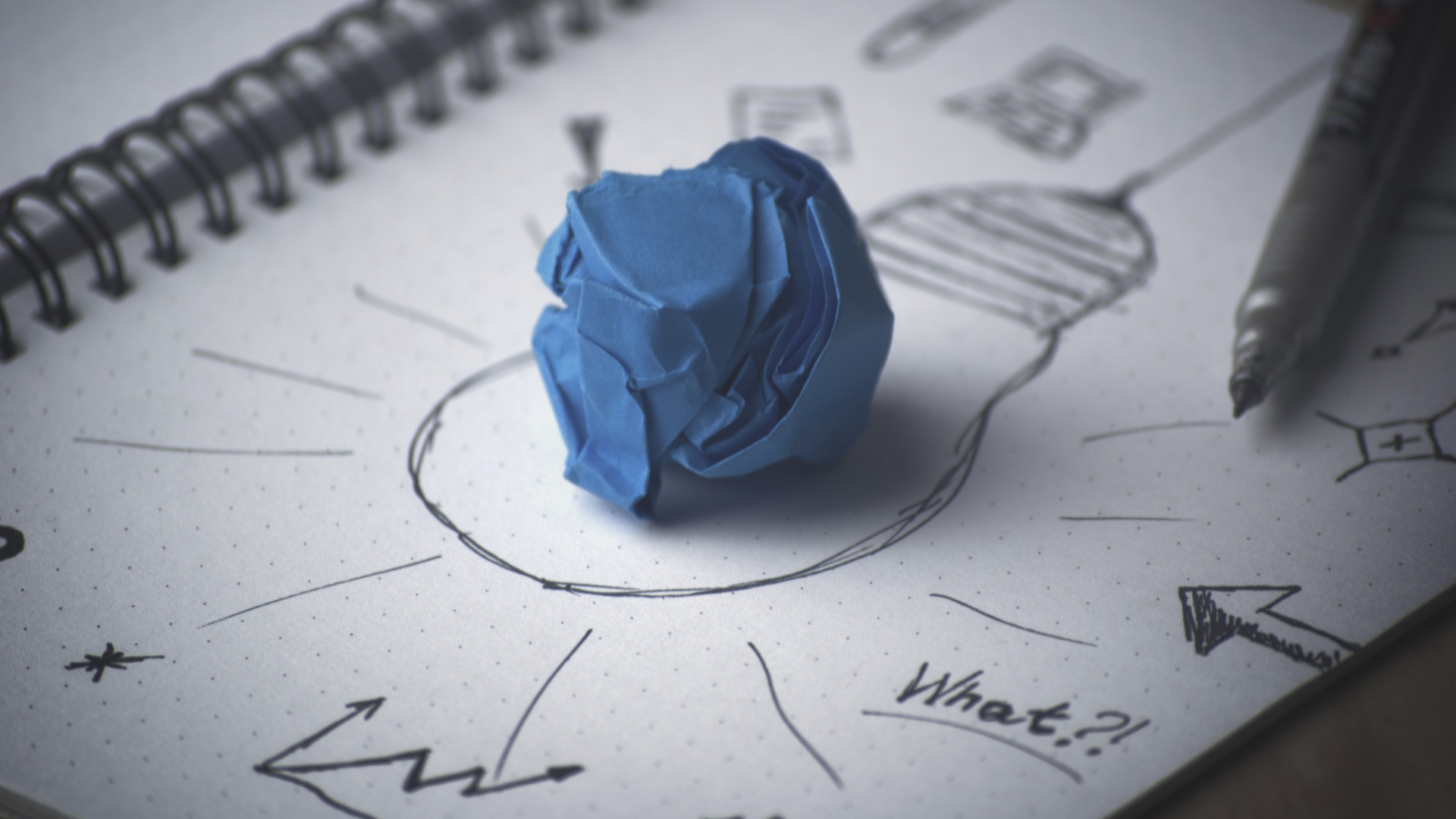


# *Design*

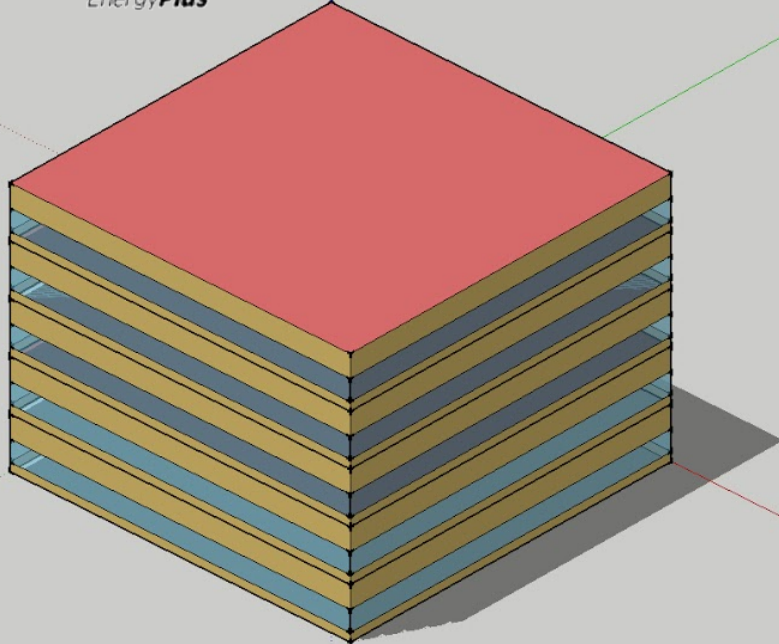
---

# *Carga Ativa*

- Engenheiros capacitados
- Simulação Energética
- Equipamentos Super Eficientes



What?!



OpenStudio Tools

OpenStudio Rendering Toolbars

ResultsViewer

Select File: ResultsViewer.Hp8052

Plot 20

Filter Criteria

Table View Tree View

Variable Name	Key Value
Electricity:Facility	
Site Outdoor Air Drybulb Temperature	Environment
Site Outdoor Air Drybulb Temperature	Environment
Zone Air Relative Humidity	THERMAL ZONE 1
Zone Air Relative Humidity	THERMAL ZONE 2
Zone Air Relative Humidity	THERMAL ZONE 3
Zone Air Relative Humidity	THERMAL ZONE 4
Zone Air Relative Humidity	THERMAL ZONE 5
Zone Air Temperature	THERMAL ZONE 1
Zone Air Temperature	THERMAL ZONE 2
Zone Air Temperature	THERMAL ZONE 3
Zone Air Temperature	THERMAL ZONE 4
Zone Air Temperature	THERMAL ZONE 5

Plot 11 Plot 20

(ResultsViewer.Hp8052) Zone Air Temperature, THERMAL ZONE 5

Hour of Day

Simulation Time

Temperature (C)

Center: 182.50

Span: 182.50

# ENERGIAS RENOVÁVEIS





# EQUIPAMENTOS



LEARN MORE AT  
[energystar.gov](http://energystar.gov)

*Manutenção e*



*Comissionamento*

*Existe vida  
após a entrega!*

---



The image features two interlocking gears with a metallic, teal-blue finish. The gear on the left is partially visible, with the word "Solutions" embossed on its teeth. The gear on the right is more prominent, with the word "Maintenance" embossed on its teeth. The lighting is dramatic, coming from the right, which creates bright highlights and deep shadows, emphasizing the three-dimensional texture of the gears. The background is a soft, out-of-focus gradient of light blue and white.

**Solutions**

**Maintenance**

# COMMISSIONAMENTO



***NZB***

---

***Certificações***

LEED V4

Zero Energy Certification

Living Building Challenge





**LIVING  
BUILDING  
CHALLENGE<sup>SM</sup>**



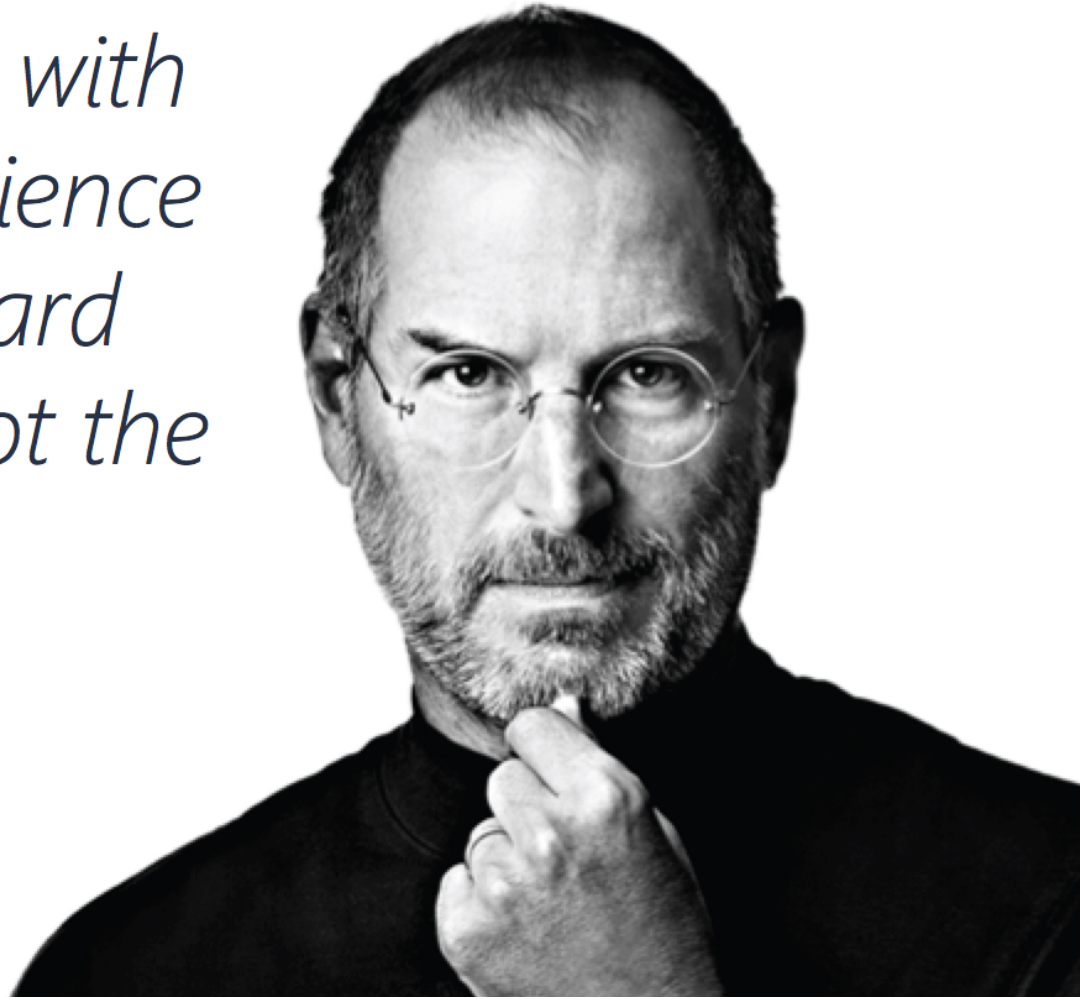
**ZERO**

**ENERGY**

**CERTIFICATION**

*"You've got to start with the customer experience and work back toward the technology – not the other way around"*

Steve Jobs



# NA PRÓXIMA AULA...



A parte 2 sobre Edificações NetZero

**OBRIGADO**

