

O Impacto da Inteligência Artificial e da Automação na Pesquisa Científica

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UNICAMP
CTBE/CNPEM

5	3			7				
6			1	9	5			
	9	8					6	
8				6				3
4			8		3			1
7				2				6
	6					2	8	
			4	1	9			5
				8			7	9

Inteligência

5	3	4	2	7	6	9	1	8
6	2	8	1	9	5	3	4	7
1	7	9	3	4	8	5	6	2
8	5	2	7	6	1	4	9	3
4	9	6	8	5	3	7	2	1
7	1	3	9	2	4	8	5	6
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2	8	7	4	1	9	6	3	5
3	4	5	6	8	2	1	7	9

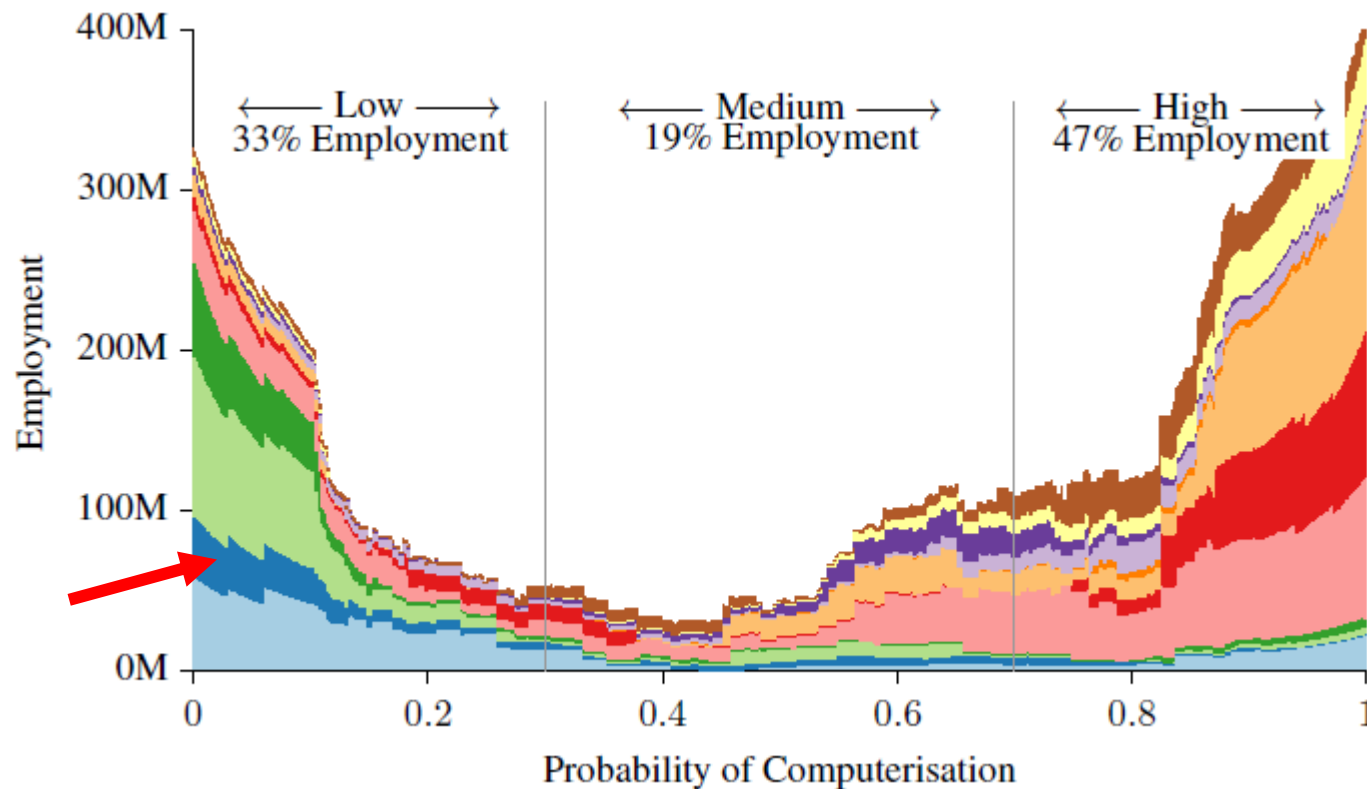
Inteligência Artificial

5	3	
6		
	9	8

- 1
- 12
- 23
- 34
- 45
- 56
- 67
- 78
- 89
- 9

IA = Estupidez acelerada....

Probabilidade de Substituição



- Management, Business, and Financial
- Computer, Engineering, and Science
- Education, Legal, Community Service, Arts, and Media
- Healthcare Practitioners and Technical
- Service
- Sales and Related
- Office and Administrative Support
- Farming, Fishing, and Forestry
- Construction and Extraction
- Installation, Maintenance, and Repair
- Production
- Transportation and Material Moving

THE FUTURE OF EMPLOYMENT: HOW SUSCEPTIBLE ARE JOBS TO COMPUTERISATION?*

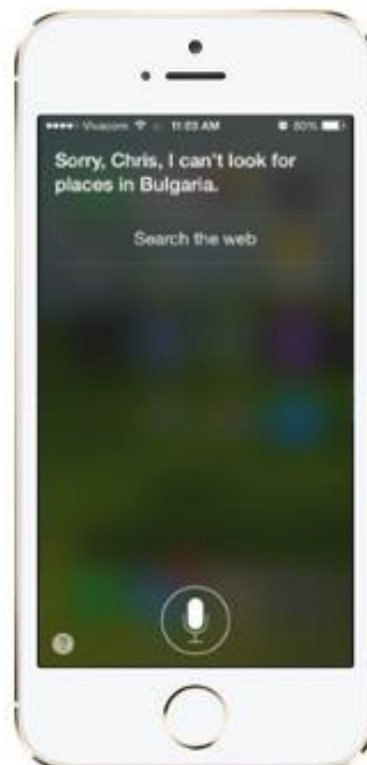
Carl Benedikt Frey[†] and Michael A. Osborne[‡]

September 17, 2013

Google Now



Siri



Cortana











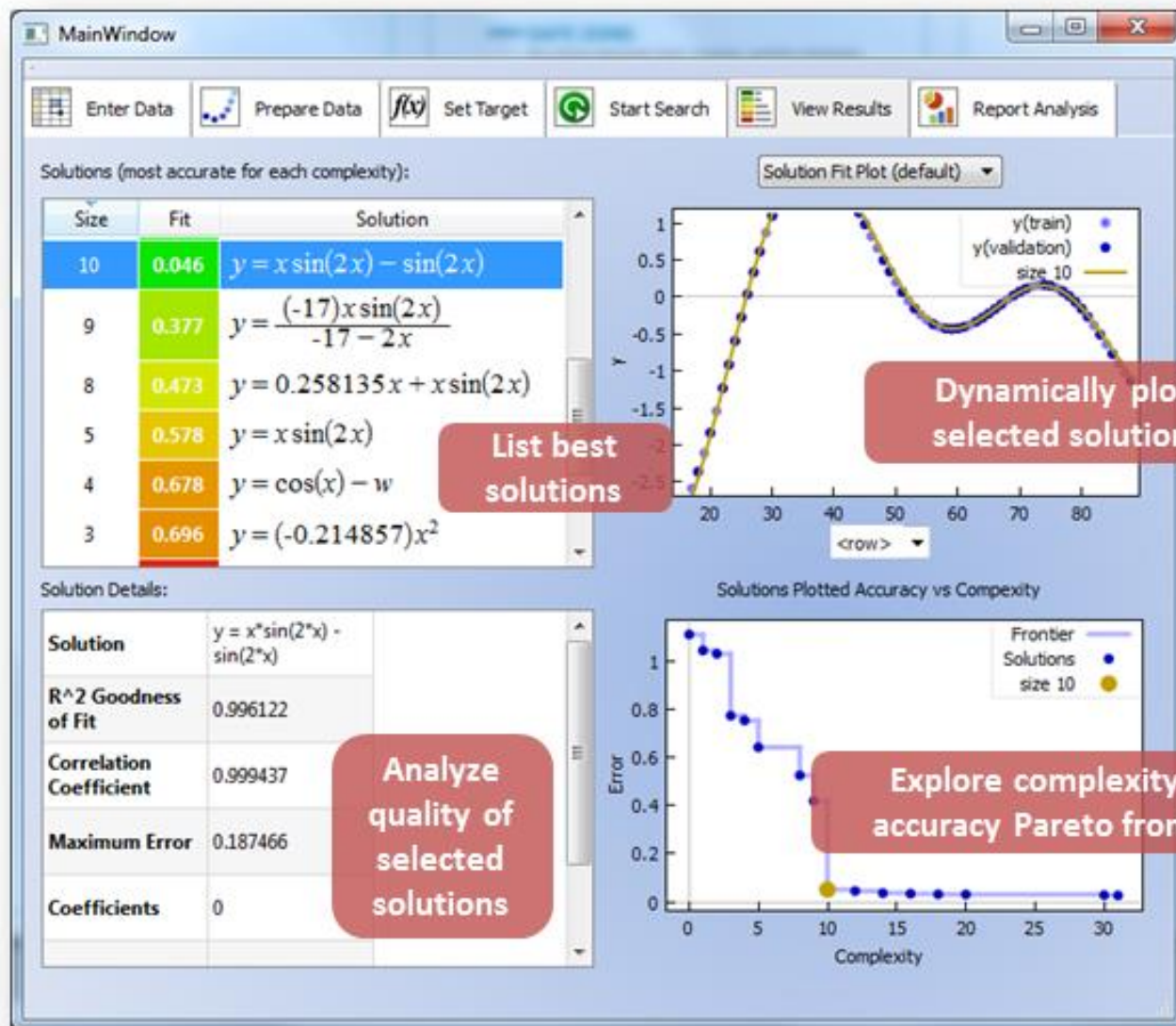
GENERAL ATOMICS, MQ-9 REAPER



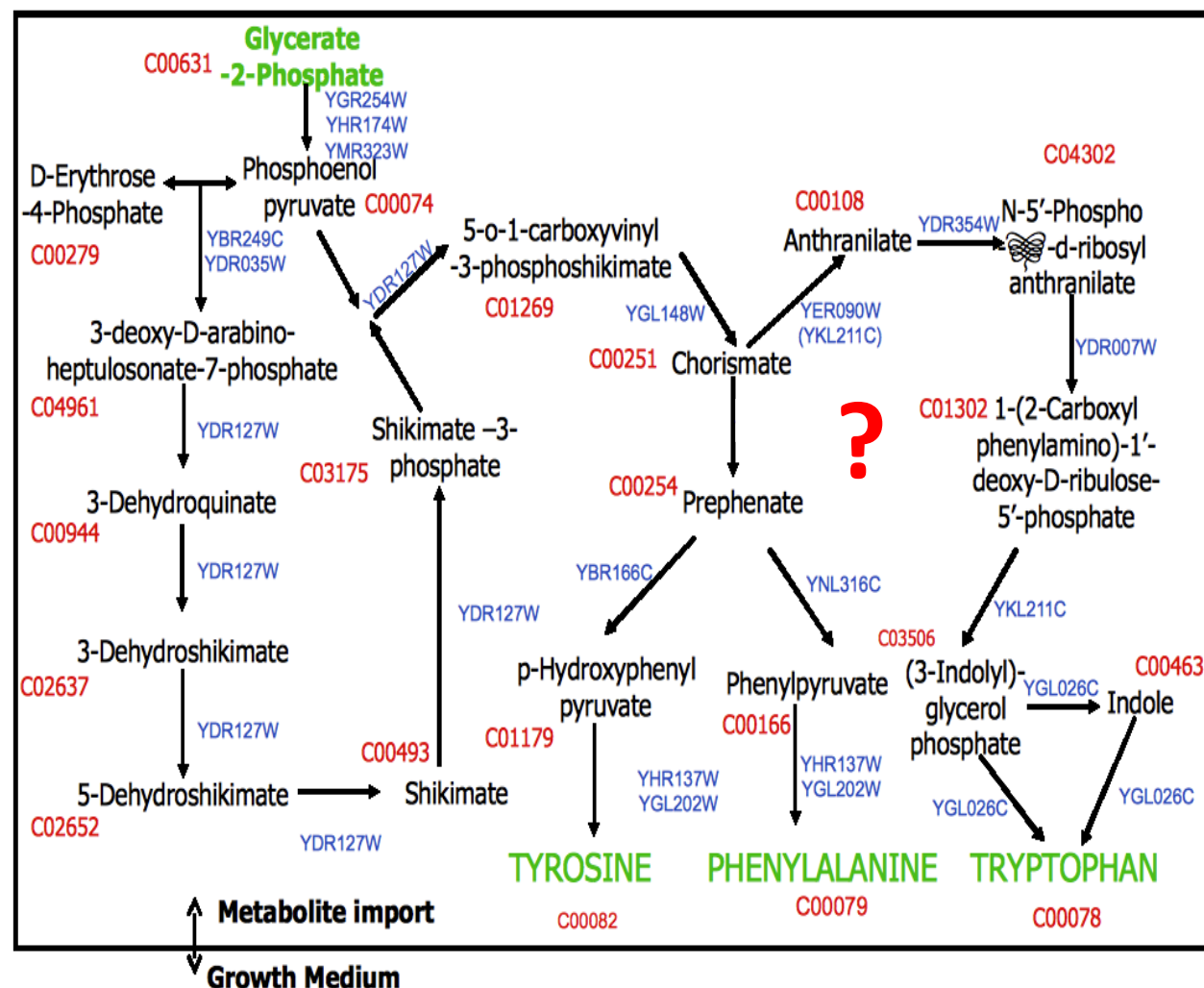
O Brasil da Internet das Coisas

- Detecção de fraudes - cartão de crédito
- Negociações algorítmicas (>50% das operações em bolsa nos EUA)
- Assistente jurídico
- Indicação de produtos, filmes (NetFlix)
- Propagandas direcionadas, etc.
- O fim da privacidade
- **Pesquisa Científica???**

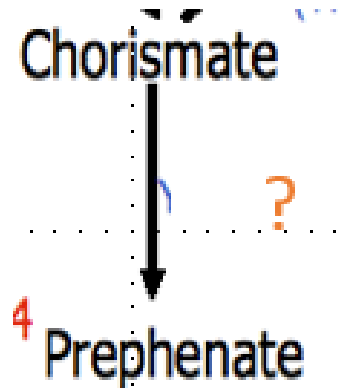
Eureqa (Regressão com Algoritmo Genético)



Phenylalanine, Tyrosine, and Tryptophan Pathways for *S. cerevisiae*



PSI - Blast

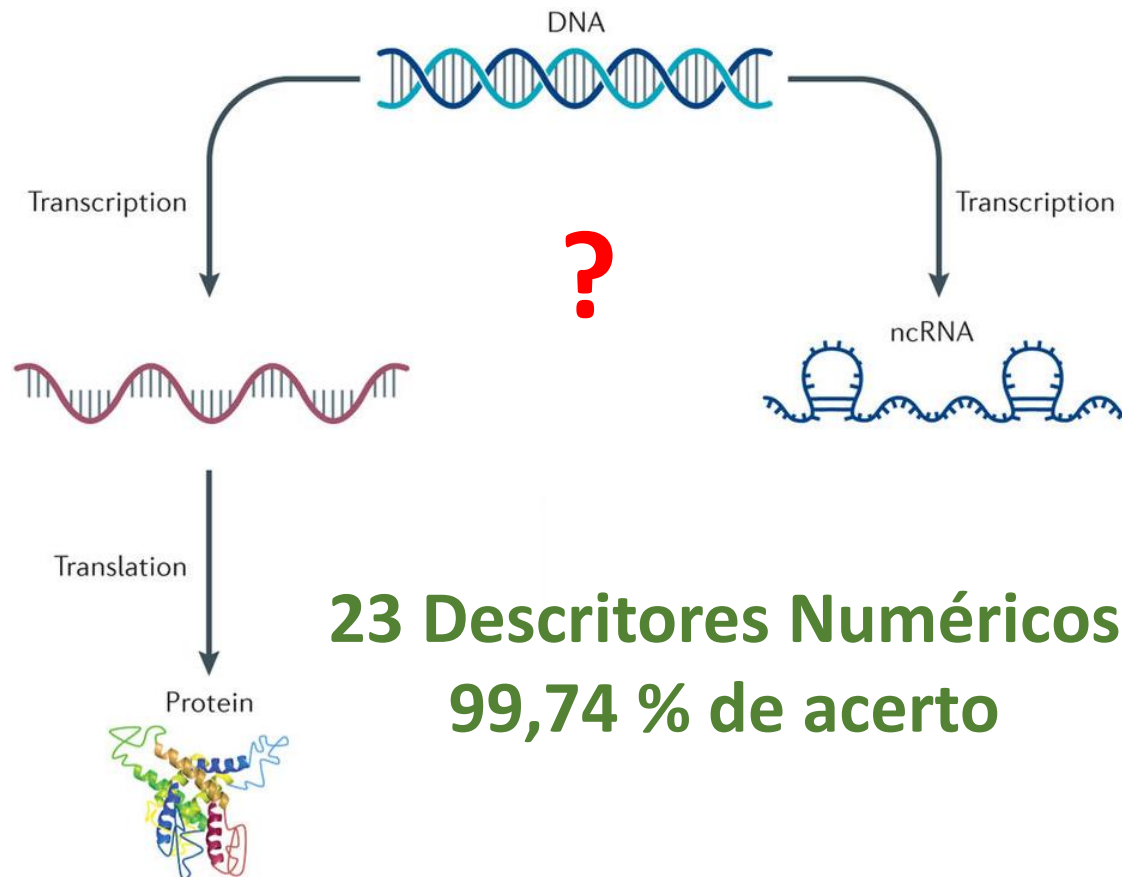


YER152C/ YGL060W

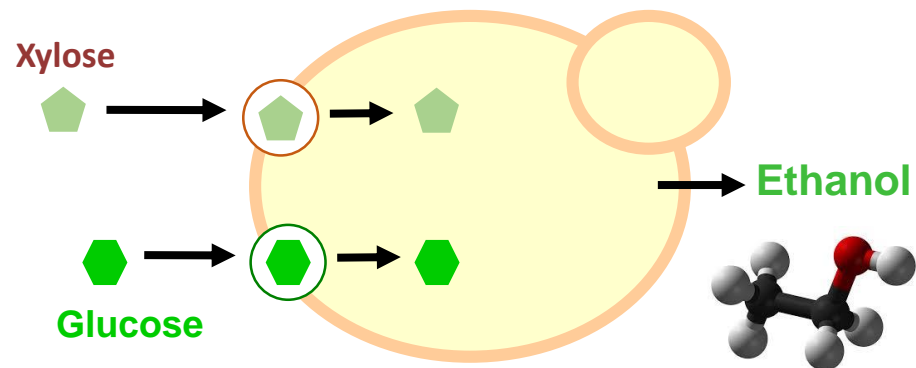
- These can be tested by:
 - Growing YER152CΔ in environment +/- prephenate.
 - Growing YGL060WΔ in environment +/- prephenate.



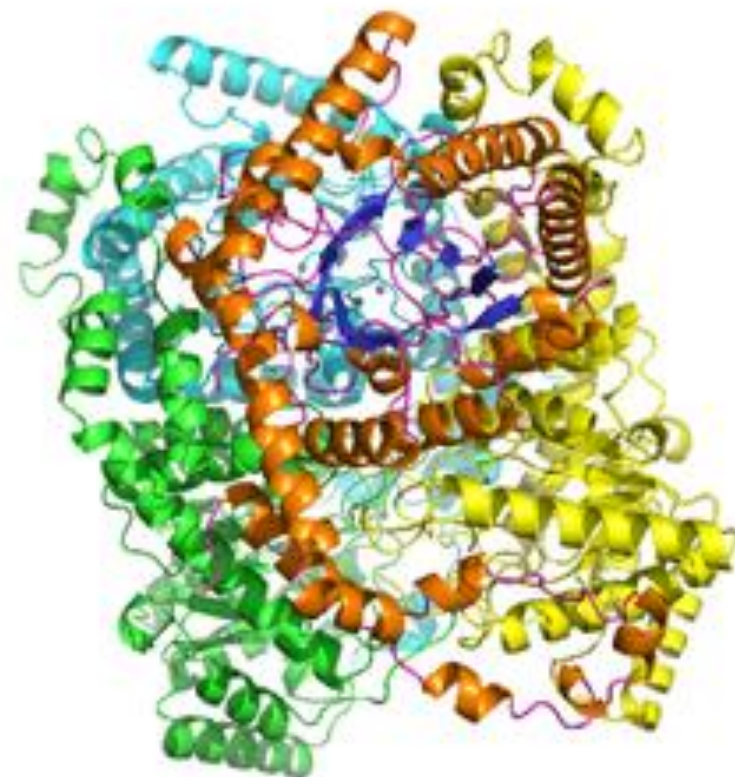
Identificador de lncRNAs



23 Descritores Numéricos
99,74 % de acerto

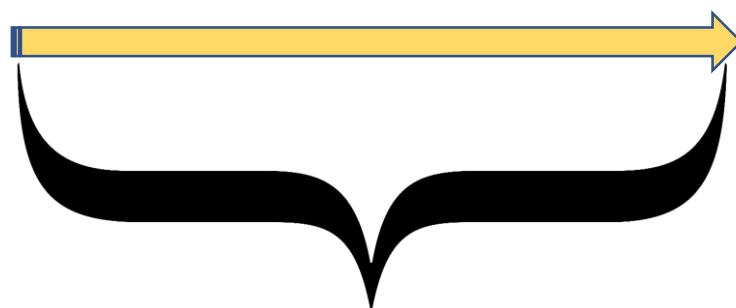


841 Descritores Numéricos (11)
96,10 % de Eficiência



Os Três Níveis de IA

Restrita (ANI)



Geral (AGI)



SUPER (ASI)

Tempo
requerido
para o
PULO...

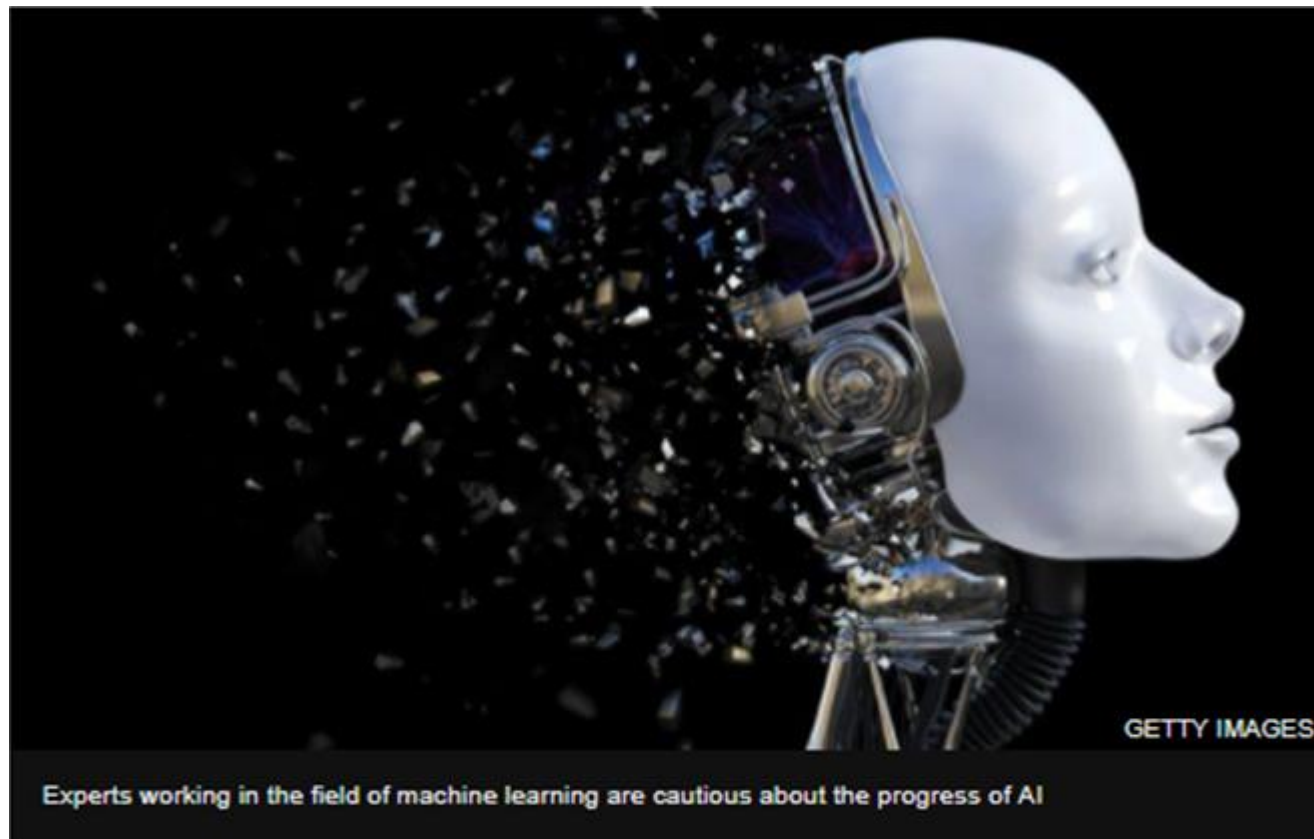
Tempo Requerido
para Transição



AI may take your job - in 120 years

🕒 20 June 2017 | Technology

f t m ✉ Share

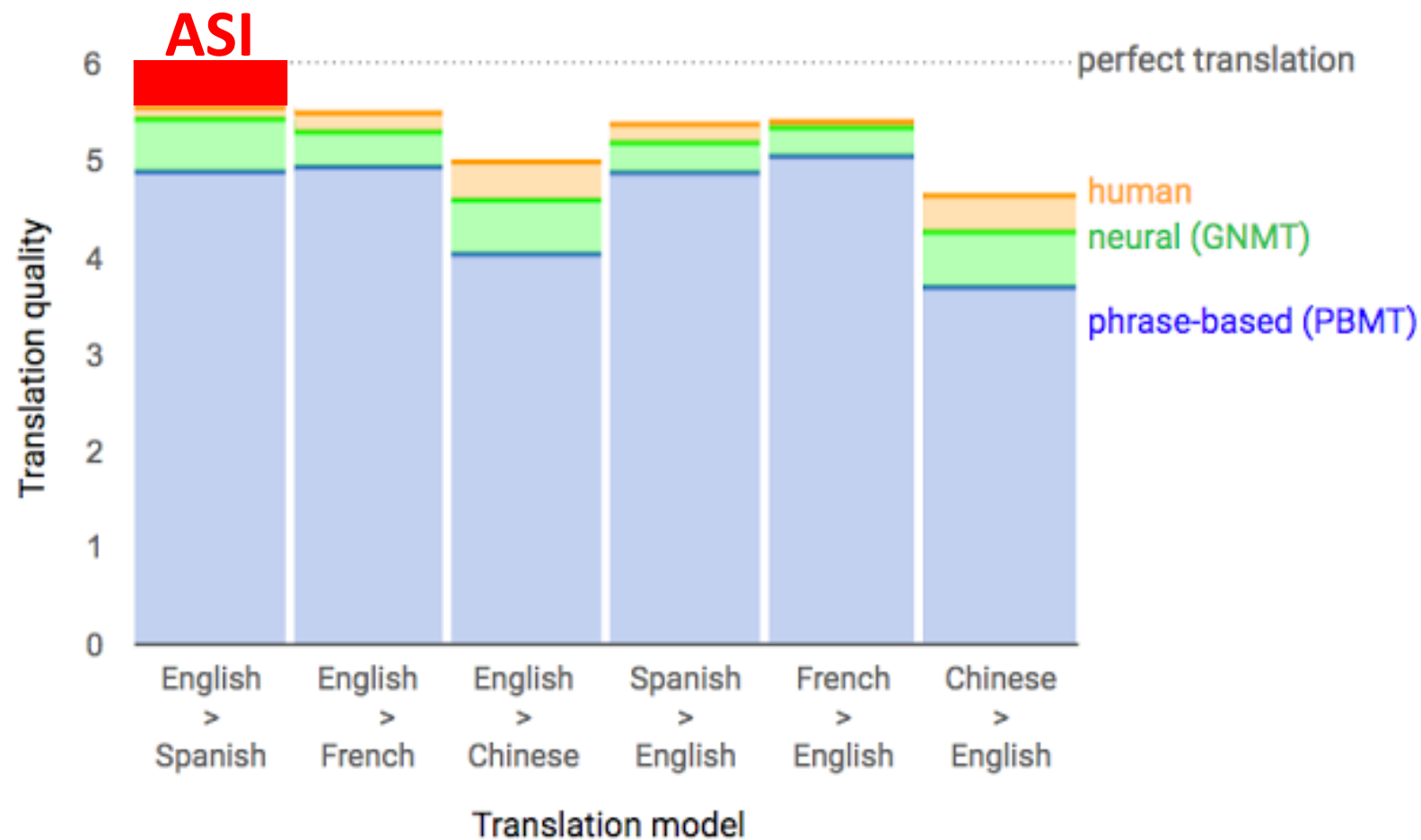


A global survey of experts in machine learning suggests it will be 120 years before all human jobs are automated.

In 45 years' time, though, half of jobs currently filled by humans will have been taken over by an artificial intelligence system, results indicate.

- Traduzir línguas (~ 2024)
- Escrever trabalhos escolares (~ 2026)
- Dirigir Jamantas (~ 2027)
- Trabalhar em lojas (~ 2031)
- Escrever “Best Sellers” (~ 2049)
- Trabalhar como Cirurgião (~ 2053)
- Qualquer coisa em que IA possa ser mais eficiente e economicamente atrativa....

2024???



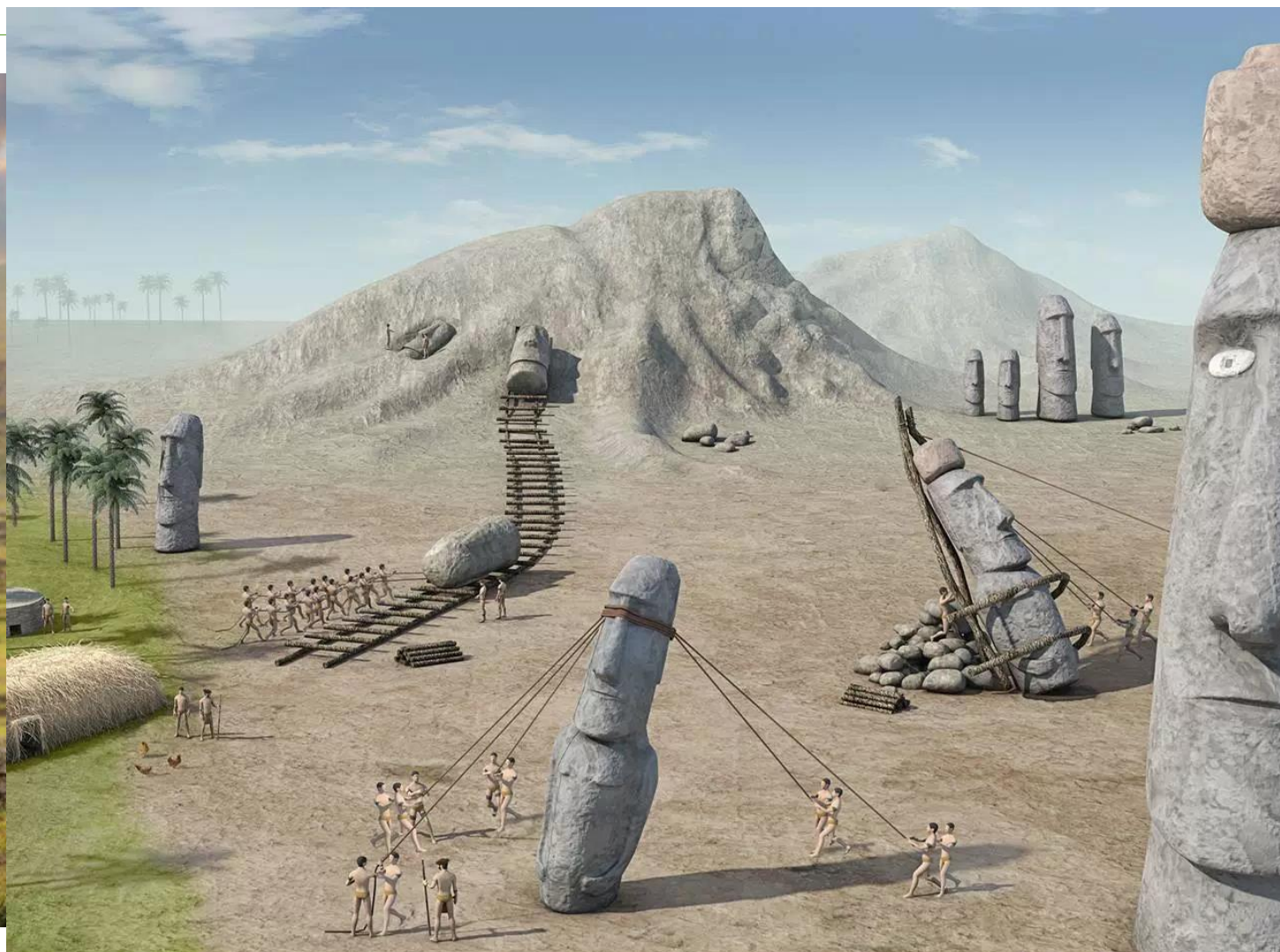
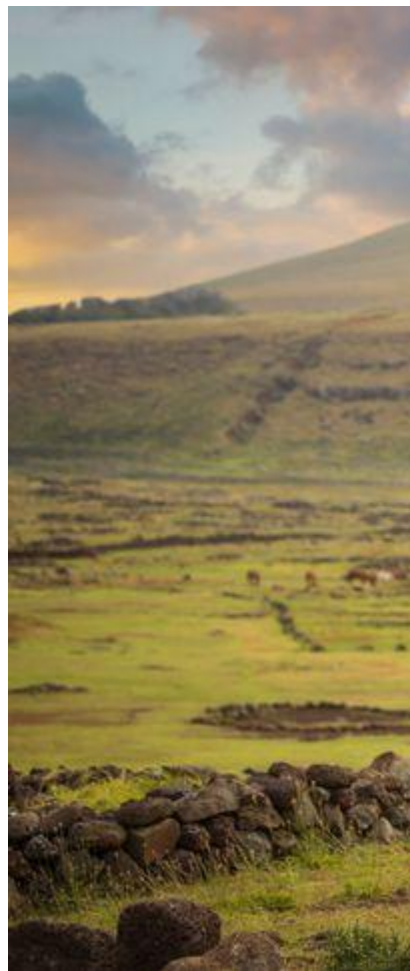
O que pode atrapalhar a realização do Potencial da IA na Ciência

- Paywalls
- Segredo industrial
- Modelo de comunicação científica atual
- Falta de incentivo à divulgação de resultados negativos
- Falta de incentivo ao produtor de dados brutos
- Sistema de patentes / propriedade intelectual
- **Natureza Humana**

O Lugar mais Isolado do Mundo



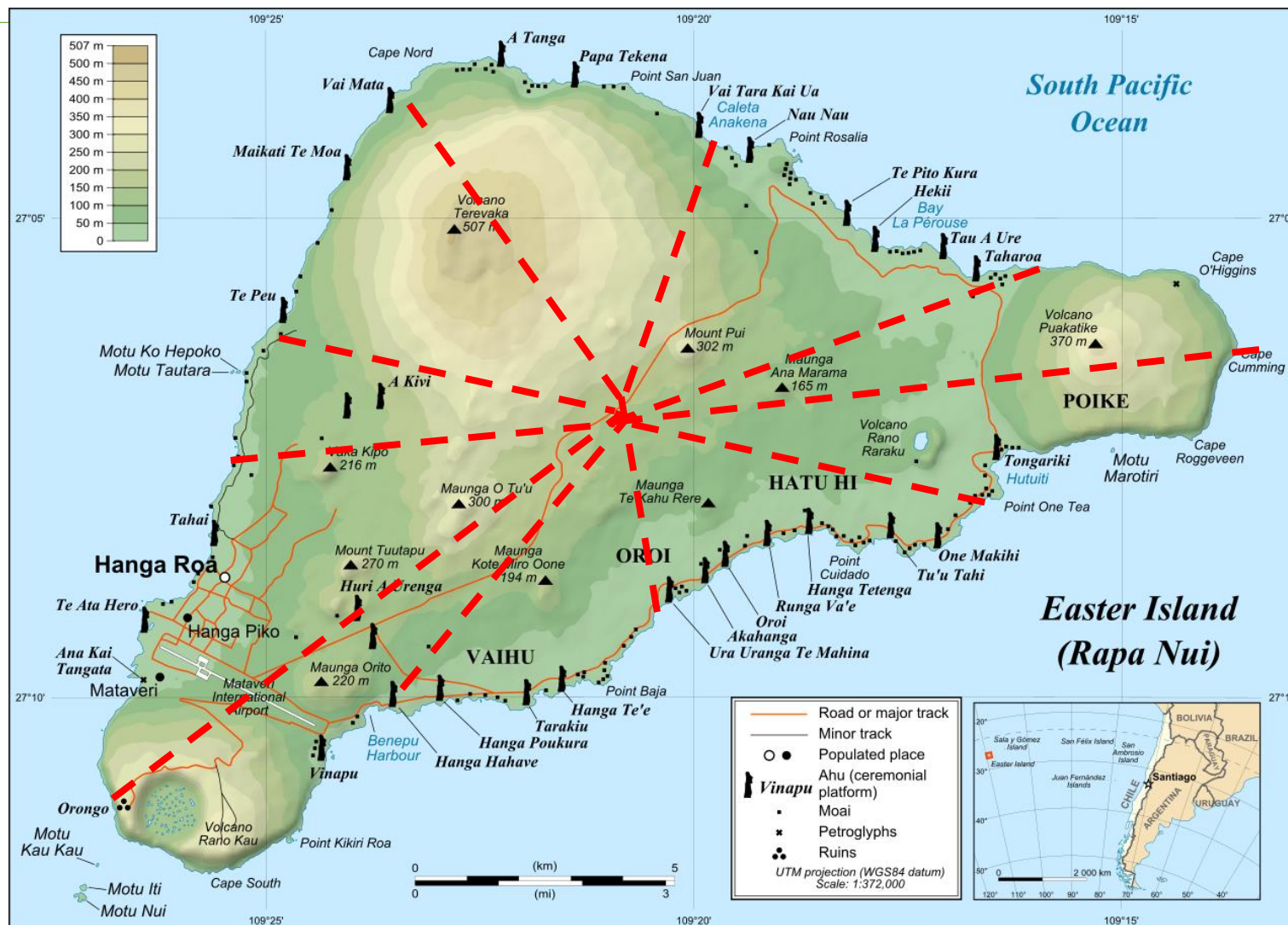
Moais e Ahus



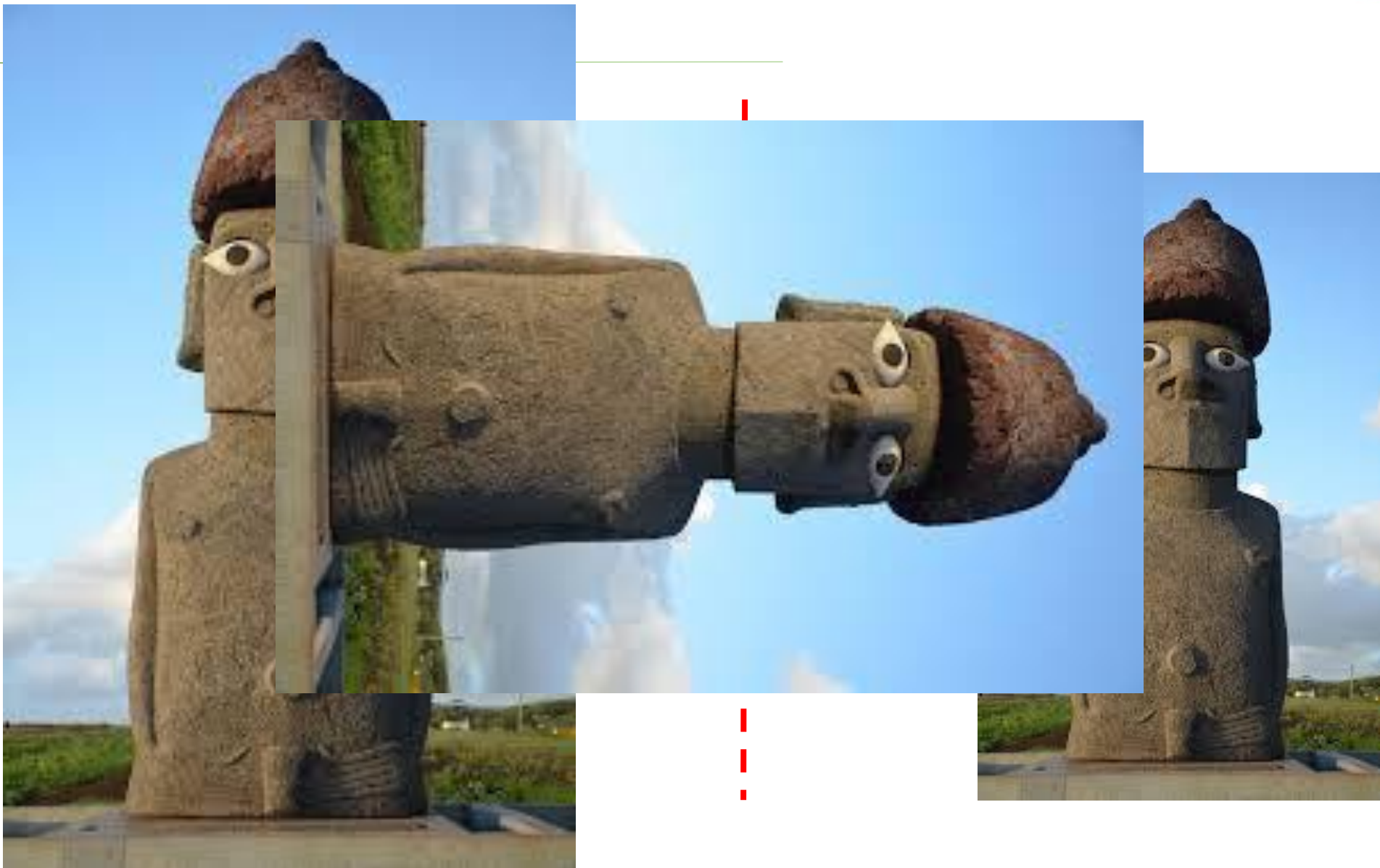
tuas
m
t
s

tores
transportadores

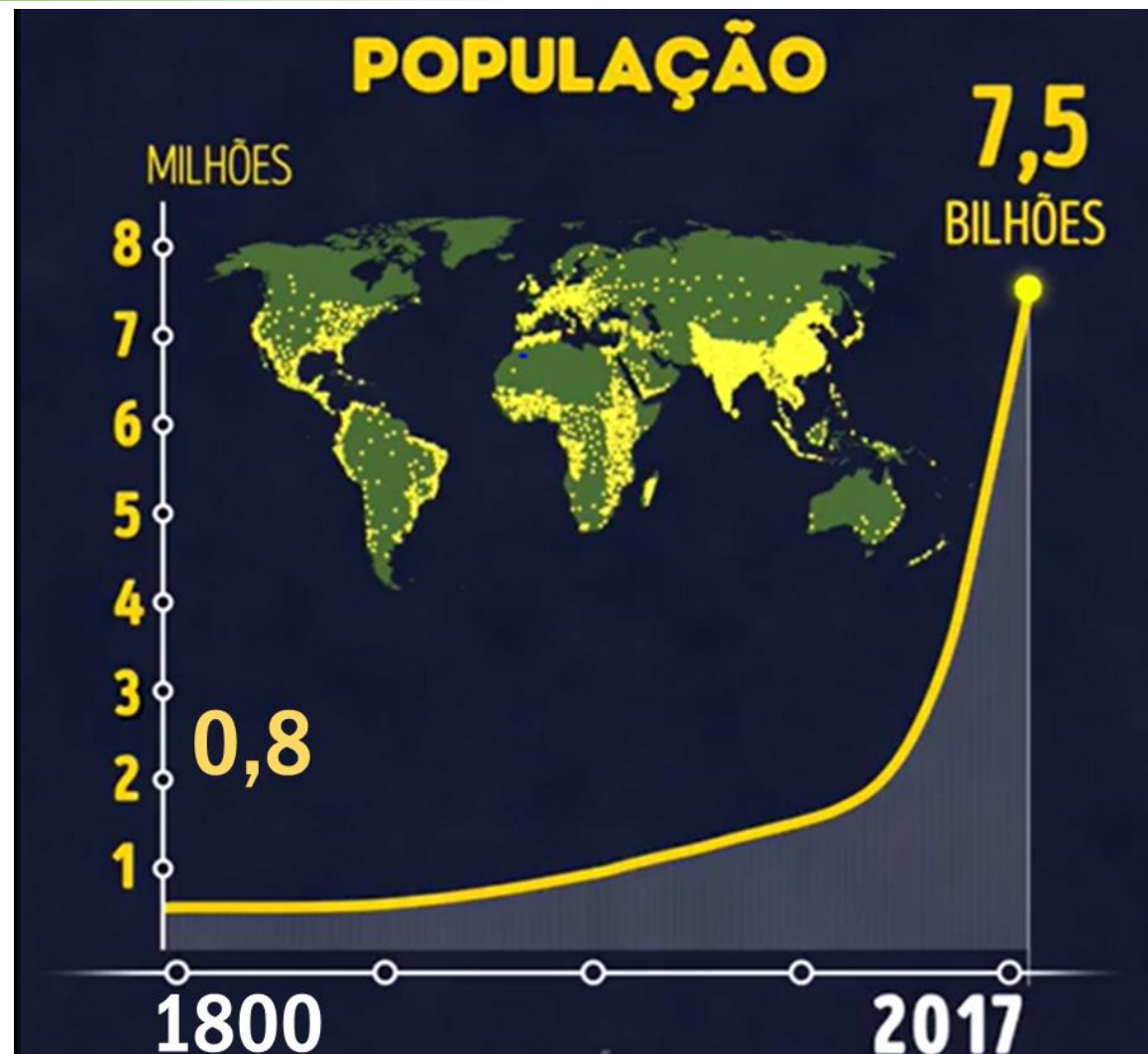
Ilha de Páscoa



Vizinhança...



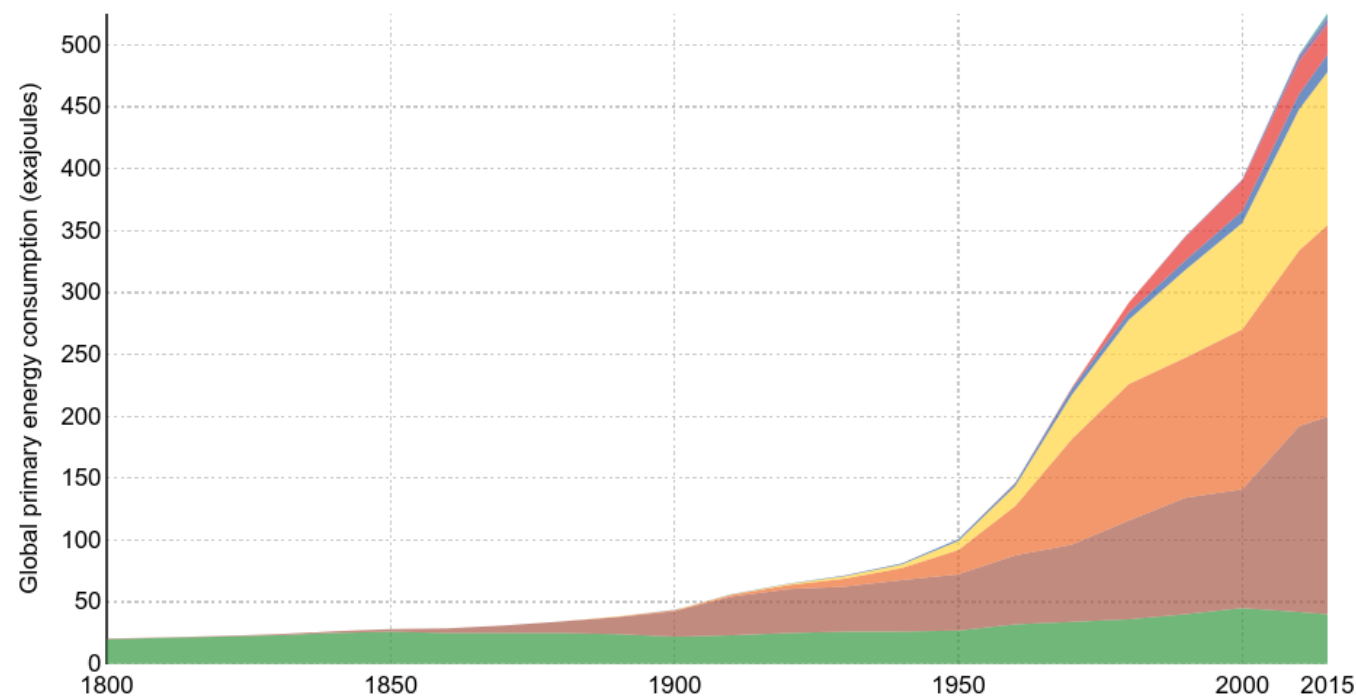
Incremento Populacional



Global primary energy consumption, 1800-2015

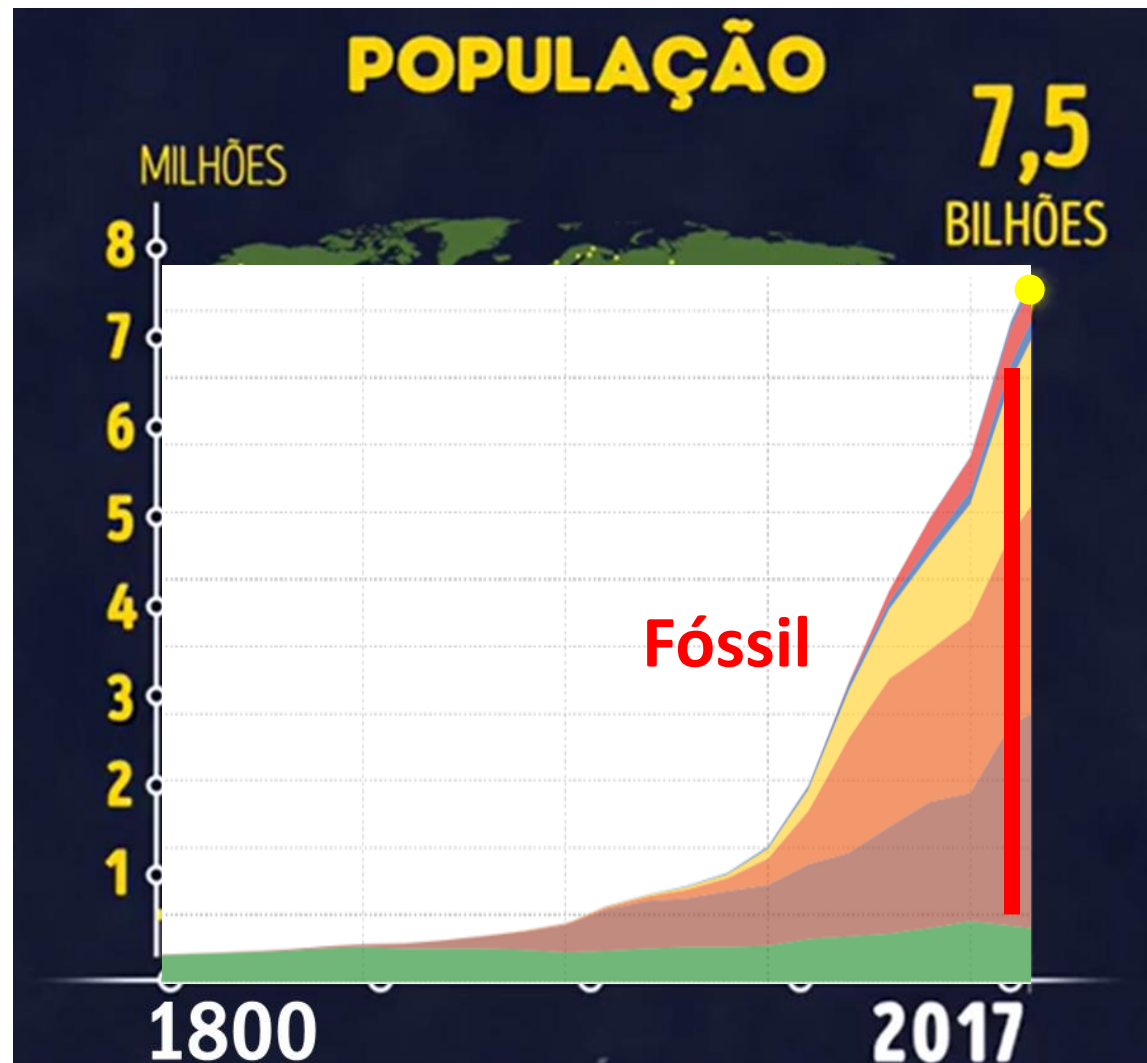
Global primary energy consumption by source, measured in exajoules (EJ). Values are reported to the nearest 0.01EJ

Our World
in Data

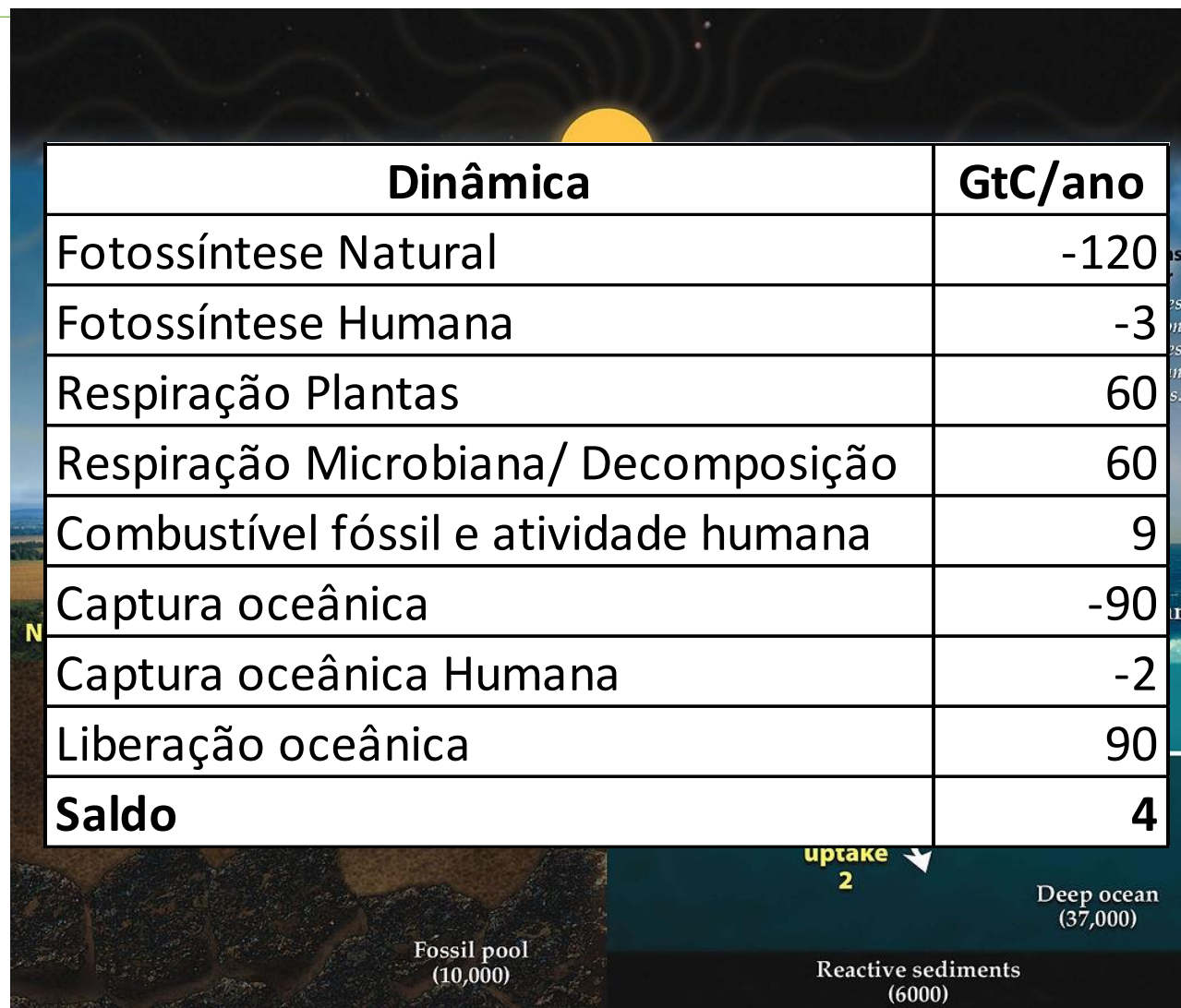


Source: Vaclav Smil (2017), Energy Transitions: Global and National Perspectives OurWorldInData.org/energy-production-and-changing-energy-sources/ • CC BY-SA

Nós Somos Reciclo de Fósseis

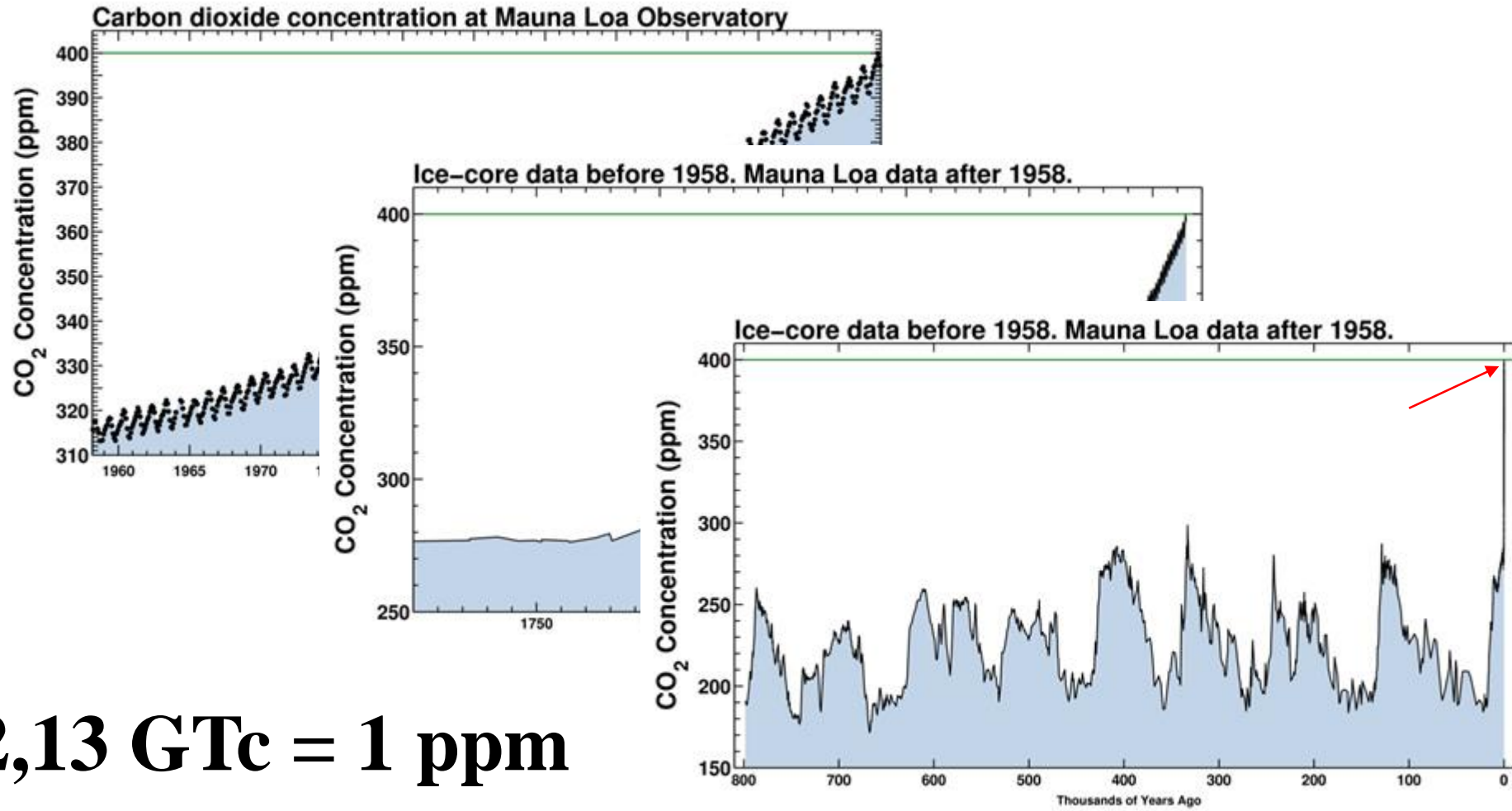


CO2 Inventory



4

CO₂ Increase



2,13 GTc = 1 ppm

Concentração de CO₂ no ar atinge recorde e iguala época em que Terra era até 3°C mais quente 15



Em Genebra 30/10/2017 | 09h57



 Ouvir texto  Imprimir  Comunicar erro

AFP



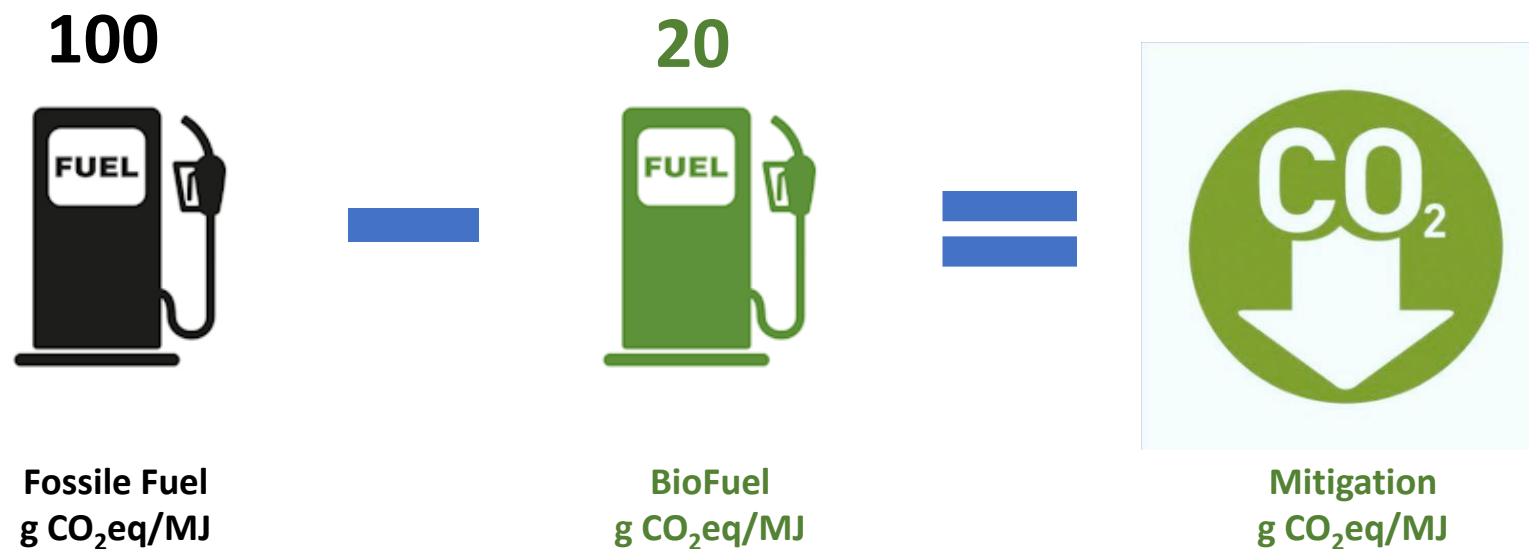
Fábrica chinesa solta fumaça no céu de Jilin, na região Norte do país

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6			1	9	5			
	9	8					6	
8				6				3
4			8		3			1
7				2				6
	6					2	8	
			4	1	9			5
				8			7	9



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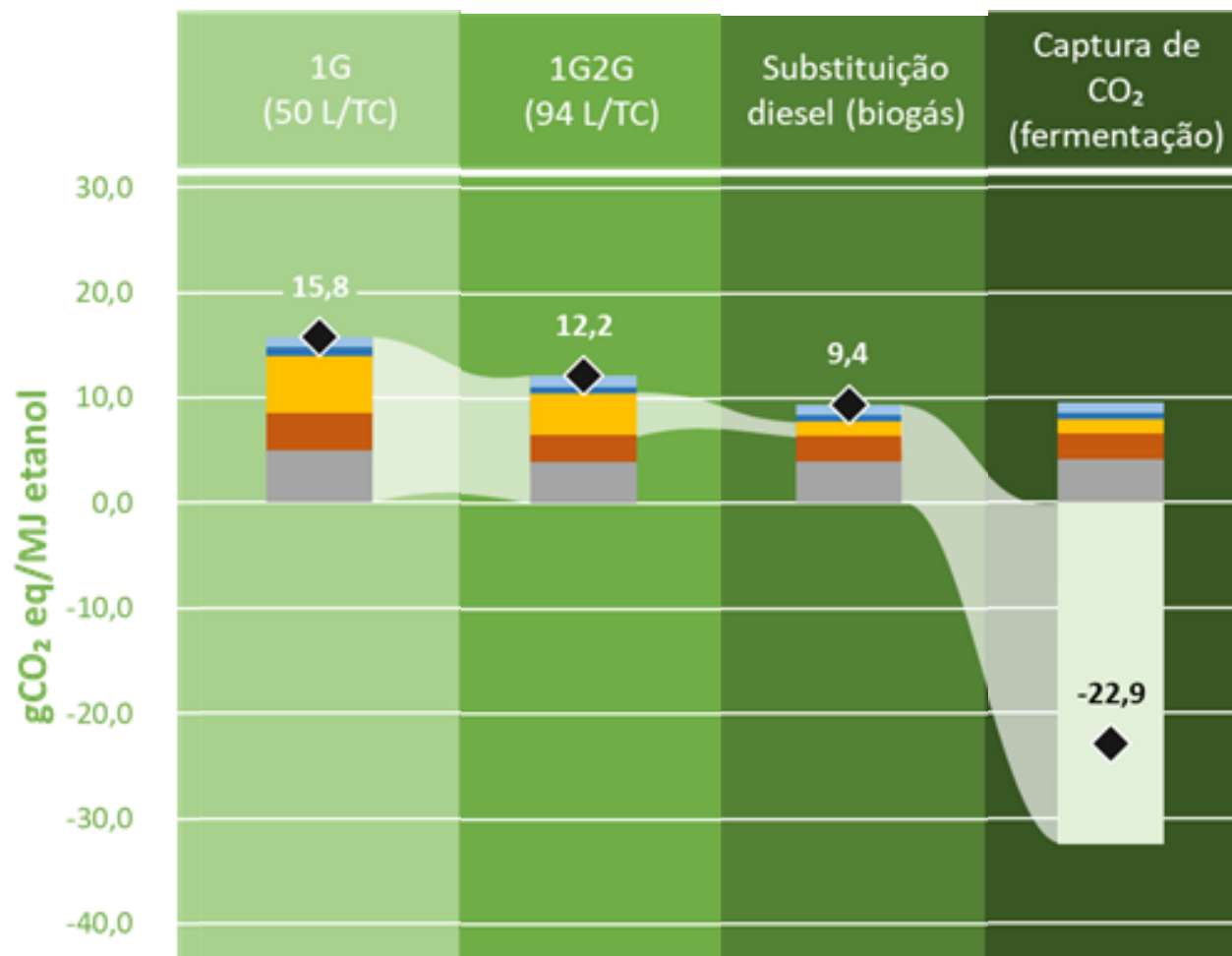




\$80

CBIO





BioDiesel

BioGas

BioQAV

Butanol

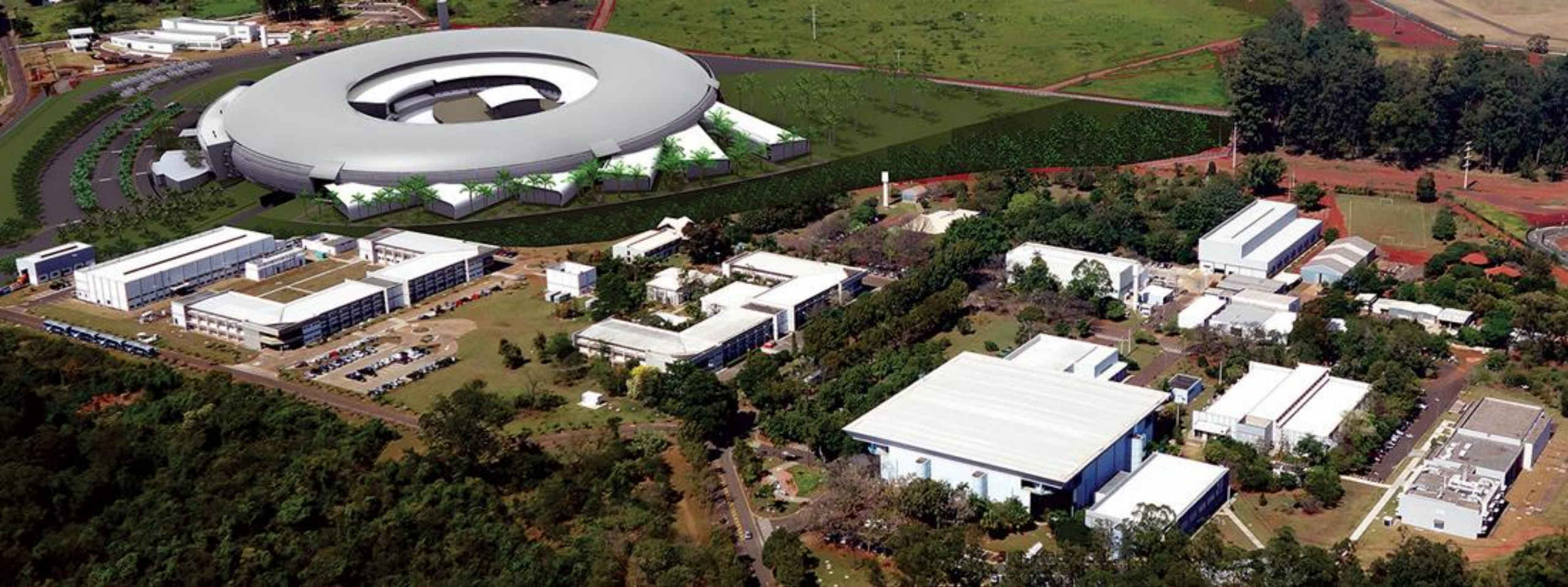
Green Ethylene

Green Propylene

.....



- Com AGI ou ASI virtualmente qualquer tarefa humana será automatizável
- Com os atuais modelos econômicos, isso significará:
 - Desemprego em massa;
 - Formação de castas
- Qual o objetivo da economia?
- Qual o mecanismo para reverter o processo?
- Características humanas de difícil automação: intuição, paixão, amor, ódio, revolta, vingança....



CNPEM – National Center For Energy and Materials

Precision Agriculture



Molecular Biology



BioProcess

Industry

From the Scratch to Market

