



uc3m

Universidad
Carlos III
de Madrid

SPINOFF

CARBON CALCULATOR FOR GENERATIVE AI

ÁNGEL CUEVAS (angel@hiili.org, acrumin@it.uc3m.es)
RUBÉN CUEVAS (ruben@hiili.org, rcuevas@it.uc3m.es)

GREEN AI

PROGRAMA NACIONAL
DE ALGORITMOS
VERDES



OUR STORY



2018



Environmental Impact Assessment Review 73 (2018) 177–200



ELSEVIER

Contents lists available at ScienceDirect

Environmental Impact Assessment Review

journal homepage: www.elsevier.com/locate/eiar



Environmental impact assessment of online advertising[☆]

M. Pärssinen^{a,*}, M. Kotila^b, R. Cuevas^c, A. Phansalkar^d, J. Manner^e

^a Aalto University, Department of Communications and Networks, Espoo 02150, Finland

^b Boston, United States

^c Universidad Carlos III de Madrid, Avenida de la Universidad, 30, Leganés 28911, Spain

^d Boston, United States

^e Aalto University, Department of Communications and Networks, Espoo 02150, Finland













2018 2023

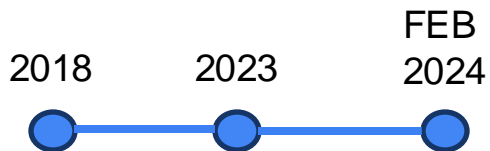


IEEE TRANSACTIONS ON SUSTAINABLE COMPUTING, VOL. 8, NO. 4, OCTOBER-DECEMBER 2023

739

CarbonTag: A Browser-Based Method for Approximating Energy Consumption of Online Ads

José González-Cabañas , Patricia Callejo , Rubén Cuevas , Steffen Svartberg , Tommy Torjesen ,
Ángel Cuevas , Antonio Pastor , and Mikko Kotila 

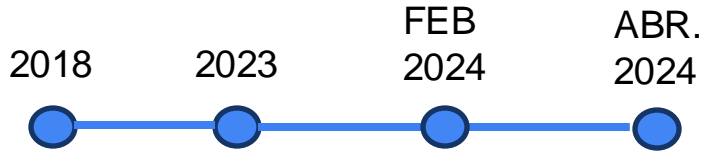


Calculating the Best of Both Worlds for
Approximating Energy Consumption of On- to Off-
Peak Demand



hiili

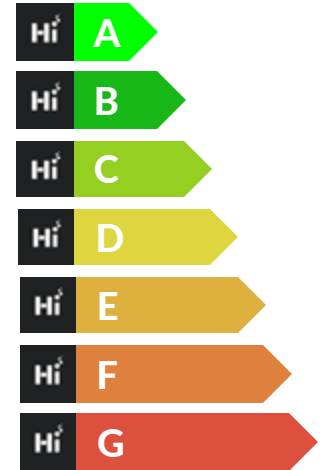
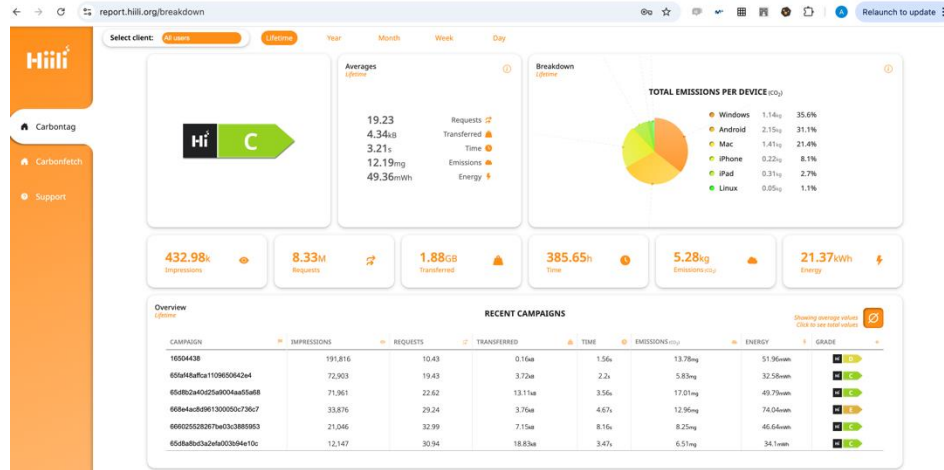
FORMAL CREATION

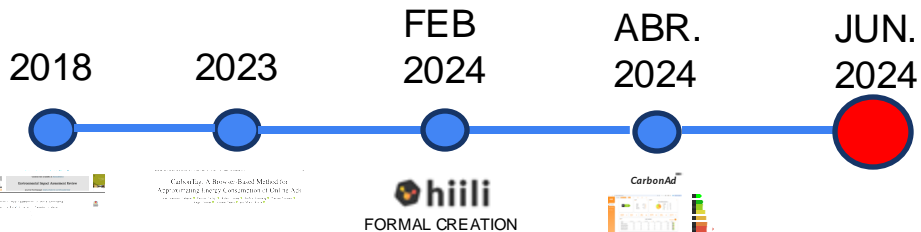


CarbonAD - Report
CarbonAD - Report

hiili
FORMAL CREATION

CarbonAD™





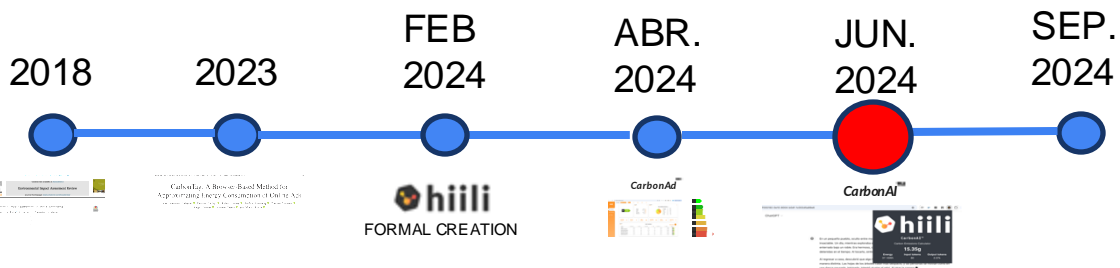
CarbonAI™

7055192-0e10-8004-b0df-1c002d5a89e6

ChatGPT

En un pequeño pueblo, oculto entre mo... insaciable. Un día, mientras exploraba e... enterrado bajo un roble. Era hermoso, c... detenidas en el tiempo. Al tocarlo, sinti... Al regresar a casa, descubrió que algo l... manera distinta. Las hojas de los árboles caían más despacio, y las personas se movían como en una danza pausada. Intrigada, intentó ajustar el reloj. Al girar la corona, ●

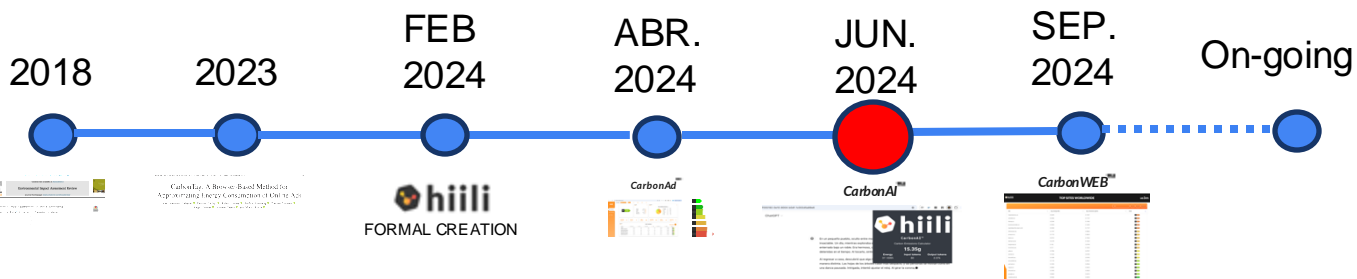
hiili
CarbonAI™
Carbon Emissions Calculator
15.35g
Energy 37.16Wh Input tokens 80 Output tokens 2.07k



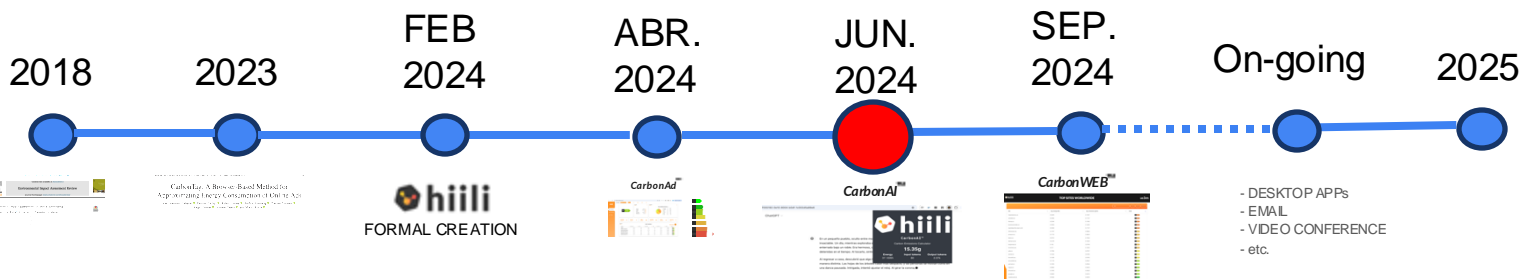
CarbonWEB™

hiili TOP SITES WORLDWIDE uc3m

Site	Avg. Energy (Wh)	Avg. Emissions (gCO2)	Rank
mprestamos.es	0.2635	0.1267	1
zendesk.es	0.2406	0.1157	2
disney.es	0.3244	0.1560	3
businessinsider.es	0.3524	0.1695	4
significados.espn.com	0.2364	0.1137	5
20minutos.es	0.1797	0.0864	6
amazon.es	0.1715	0.0824	7
iberre.es	0.2212	0.1064	8
damar-sa.es	0.2129	0.1024	9
kaspersky.es	0.166	0.0798	10
loveherry.es	0.217	0.1043	11
yelp.es	0.1596	0.0767	12
semet.es	0.1632	0.0785	13
locowifi.es	0.1628	0.0783	14
arcsabid.es	0.1179	0.0567	15
just-eat.es	0.1093	0.0526	16
trigala.es	0.0883	0.0425	17
elmundo.es	0.1093	0.0525	18
google.es	0.0865	0.0416	19
mastercard.es	0.0526	0.0233	20



- DESKTOP APPs
- EMAIL
- VIDEO CONFERENCE
- etc.



Corporate sustainability reporting

EU rules require large companies and listed companies to publish regular reports on the social and environmental risks they face, and on how their activities impact people and the environment.

The first companies will have to apply the new rules for the first time in the 2024 financial year, for reports published in 2025.



MOTIVATION



MEASURE



OPTIMIZATION
EFFICIENCY
SUSTAINABILITY
MINIMIZATION





DEVELOP AN AI CARBON CALCULATOR TECHNOLOGY TO MEASURE ENERGY CONSUMPTION/CARBON EMISSIONS OF AI SOLUTIONS



METHODOLOGY

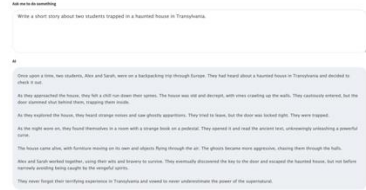
CarbonAI



attribute 1
attribute 2
attribute 3
...
attribute N



$$\begin{aligned} \text{Energy} &= f(\text{attr1}, \text{attr2}, \text{attr3}, \dots, \text{attr20} +) \\ \text{CO2} &= f(\text{Energy} \times \text{Grid}) \end{aligned}$$





DEMO
CarbonAI

Video_CarbonAI.mov

chatgpt.com/c/6706d098-1110-8004-853f-7a42526feeb3

ChatGPT

ChatGPT

GPT Search

Explore GPTs

Today

Hidden Path to Magic

Bosque con agua y montañas

Yesterday

El reloj del tiempo

Previous 30 Days

La búsqueda interior de Mateo

Magical Key Discovery

Wish Fulfilled in Forest

Autumn's Hidden Lantern

Magical Forest Discovery

September

Haunting Music Box Discovery

August

Whiskers' Flying Adventure

Lisa's Treasure Adventure

El niño que volaba

July

Olympic Results Sources

Camisetas personalizadas montañ

Magical Oak Adventure

Grandmother's Hidden Love

Upgrade plan
More access to the best models

Create a code that generates the

Here's a Python code that generates the Fibonacci series:

```
python
def fibonacci(n):
    fib_series = [0, 1]
    while len(fib_series) < n:
        next_value = fib_series[-1] + fib_series[-2]
        fib_series.append(next_value)
    return fib_series

# Input: Number of terms in the Fibonacci series
num_terms = int(input("Enter the number of terms: "))

# Generate and display the Fibonacci series
if num_terms <= 0:
    print("Please enter a positive integer.")
elif num_terms == 1:
    print("Fibonacci series:", [0])
else:
    print("Fibonacci series:", fibonacci(num_terms))
```

How it works:

- The function `fibonacci(n)` generates the Fibonacci series up to the `n`th term.
- The user is prompted to input the number of terms they want to generate.
- The program returns the Fibonacci series as a list, starting with 0 and 1.

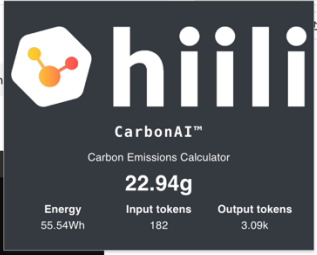
For example, if the user inputs 7, the output will be:

00:00 | 01:14

Copy code

Message ChatGPT

ChatGPT can make mistakes. Check important info.



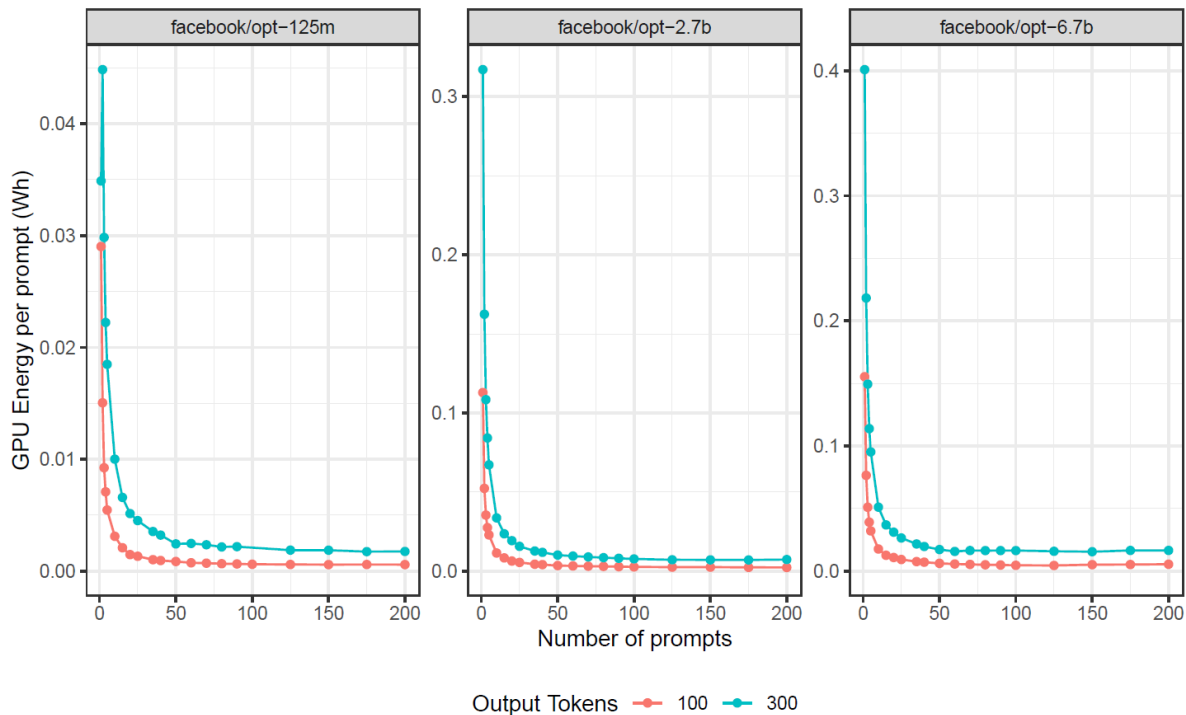


hiili

SOME TIPS

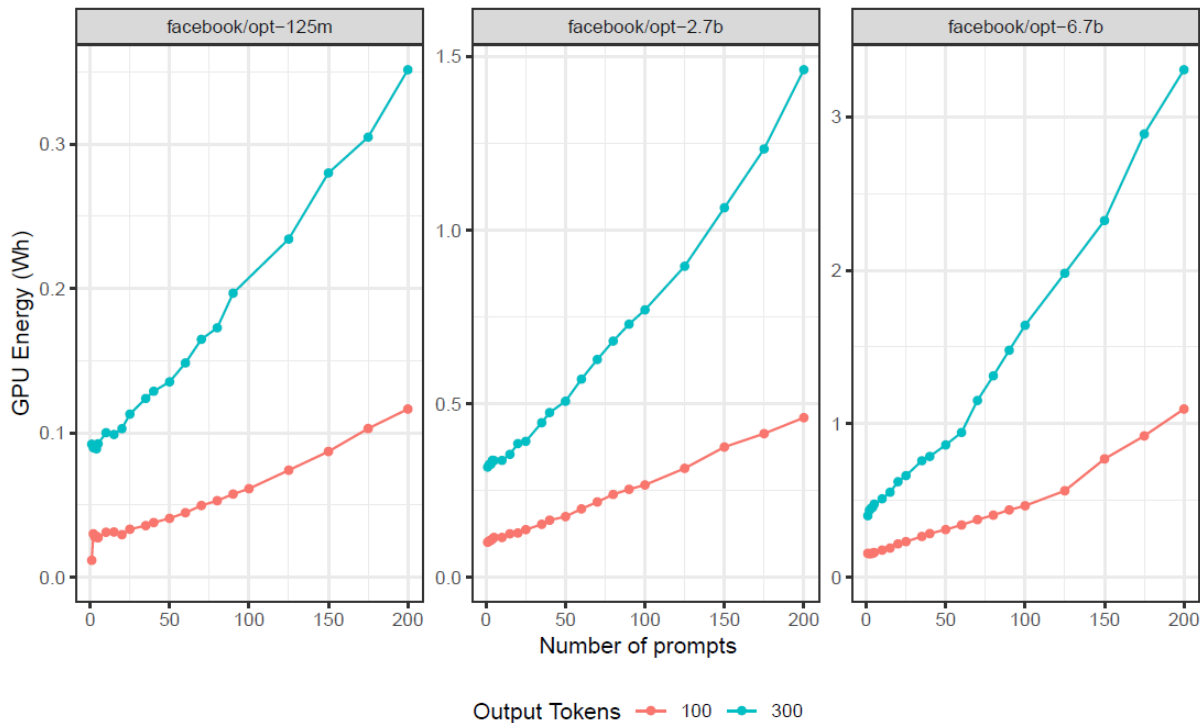


Number of prompts



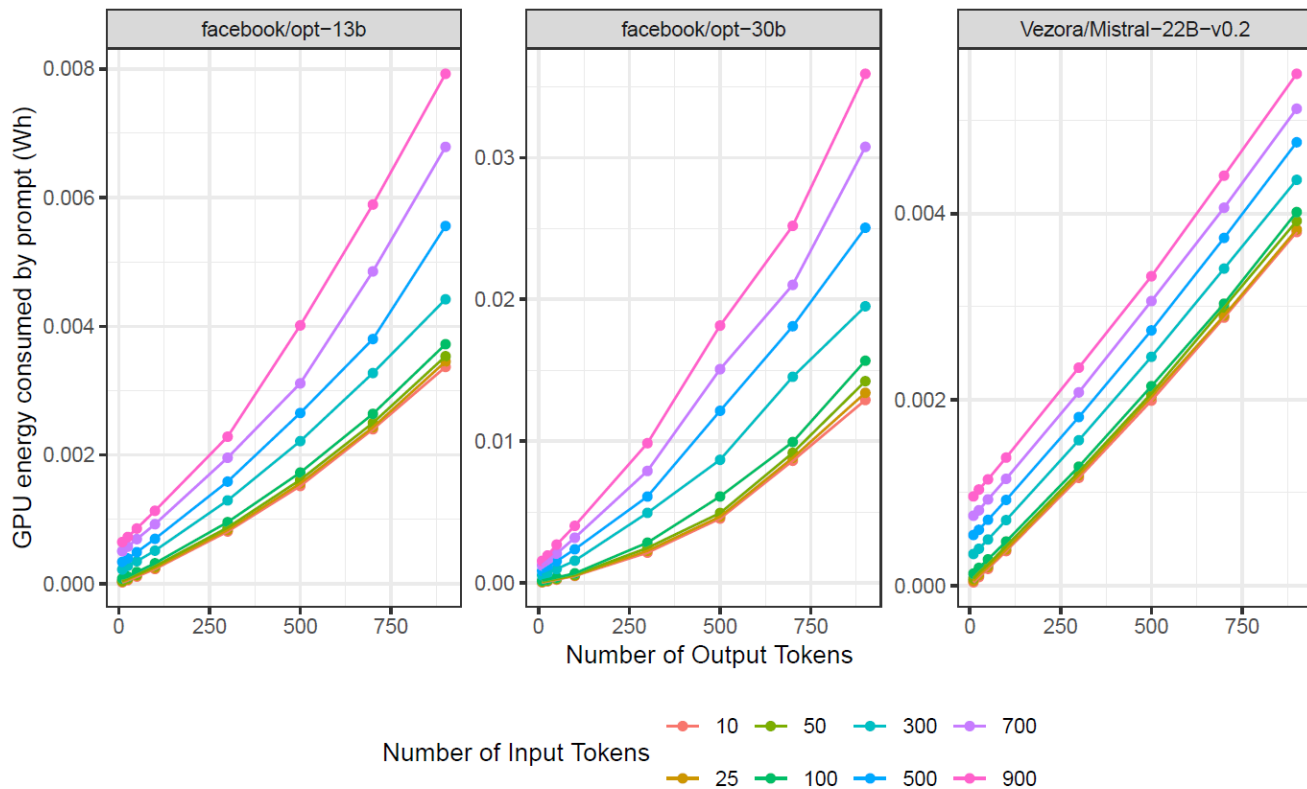


Number of prompts



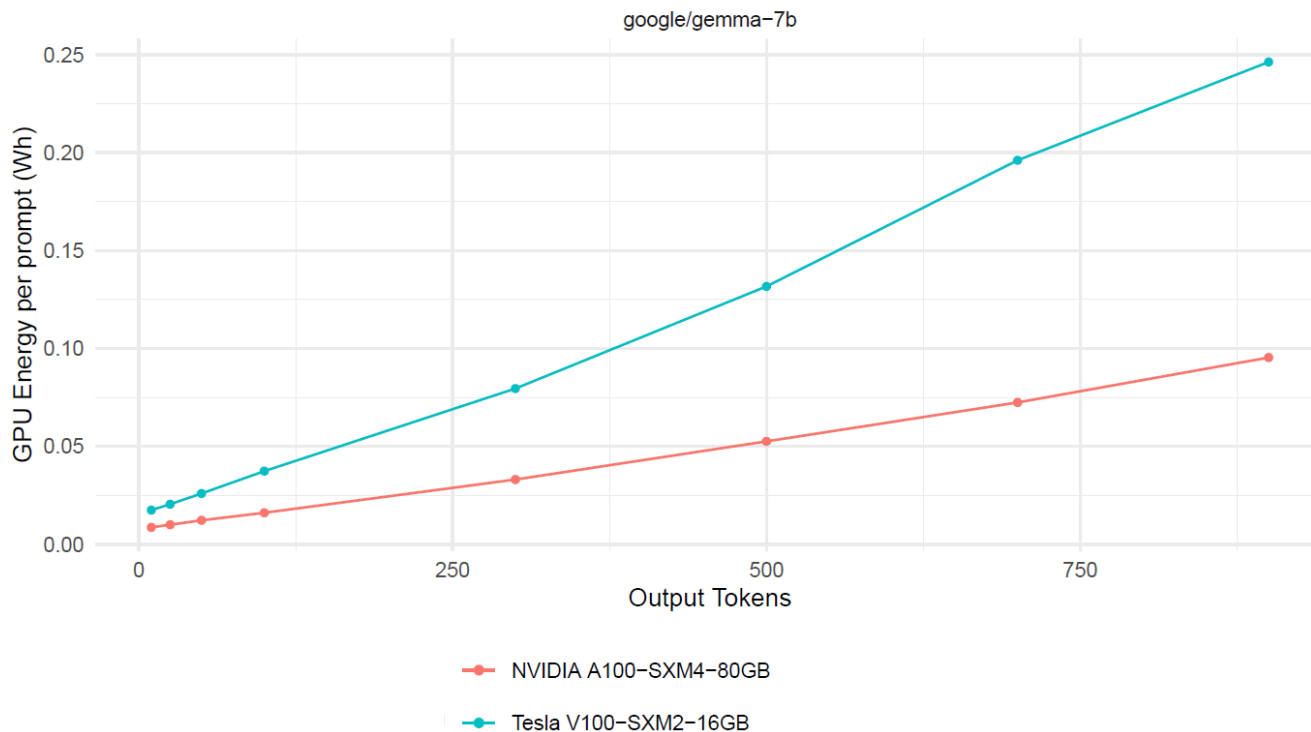


Input/Output tokens





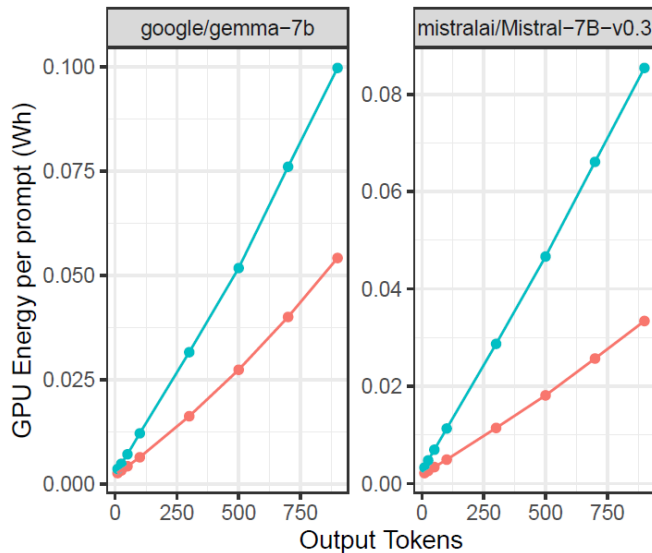
GPU Hardware



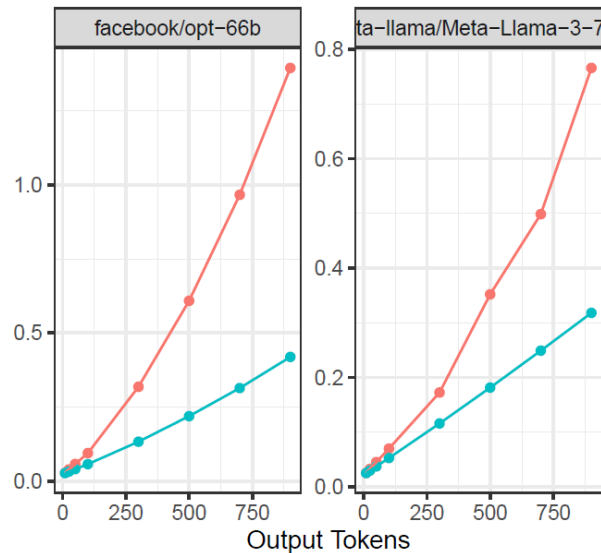


Number of GPUs

Better with less GPUs



Better with more GPUs



1 GPU —●— 1 GPU
4 GPU —●— 4 GPU



***OPEN
PRACTICAL
CHALLENGES***



1. PROPRIETARY AI SOLUTIONS

2. METRICS

- Direct carbon measures may not be enough
- We need to think on metrics that link sustainability and socio-economic factors:
 - Joules Vs productivity
 - Joules VS impact
 - Joules VS €

3. SPECIFICATIONS / STANDARDS

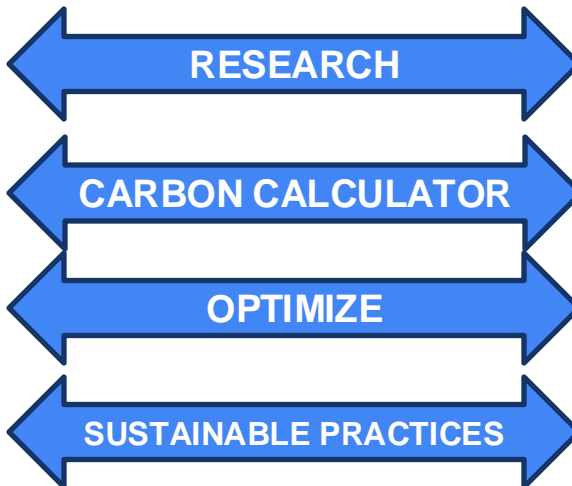
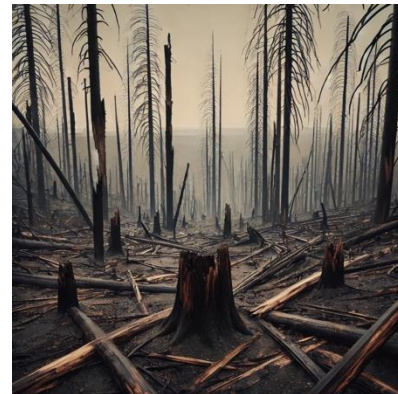
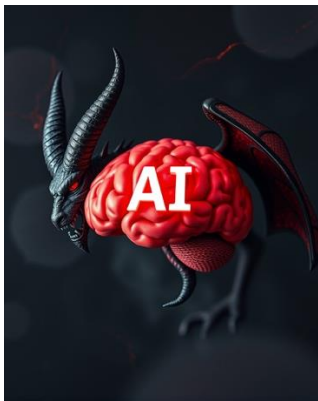
4. CARBON CALCULATOR INTEGRATION

- Instances on end-users (e.g., employers)
- Middleware capturing prompts
- Blind traffic analysis



hiili

CONCLUSION





uc3m

Universidad
Carlos III
de Madrid

SPINOFF

CARBON CALCULATOR FOR GENERATIVE AI

ÁNGEL CUEVAS (angel@hiili.org, acrumin@it.uc3m.es)
RUBÉN CUEVAS (ruben@hiili.org, rcuevas@it.uc3m.es)

GREEN AI

PROGRAMA NACIONAL
DE ALGORITMOS
VERDES