## Quantifying the Carbon Footprint of AI: Challenges and Opportunities in Sustainable Machine Learning

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Introduction

# **Estimated Energy Consumption**



Methodology

# LLM Carbon Overview







FastAPI - Swagger UI

https://arxiv.org/abs/2011.02839 https://arxiv.org/abs/2309.14393

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## Table 1: The comparison of LLMCarbon against prior work.

scheme	predictive modeling	MoE support	architectural parameters	specialized hardware	operationa carbon
mlco2 others <b>LLMCarbon</b>	✓ × ✓	× × ✓	× × ✓	× × ✓	×

## **Current Focus**

	S FastAPI - Swagger UI x +
í	← → C (i) localhost:5000/docs#/terminal/desktop_impact_v1_terminal_desktop_get
	Archetype     Allocation
	Parameters
	Name Description
	archetype string (query) verbose boolean (query) true ~
	duration number (query)
	criteria array(string) (query) adp - pe - Add string item
	Execute
	Responses
	Code Description
	200 Successful Response
	Media type       application/json       Controls Accept header.   Example Value   Schema
	🦢 Menu 🚃 💆 🖢 Terminal 🛛 [Terminal] 🧔 FastAPI - Swagger U
Terminal	

tatus":"ARCHETYPE","unit":"W","min":100.0,"max":450.0},"usage location":{"value":"EEE","status":"DEFAULT","unit":"CodSP3 - NCS Country Codes - NATO"} value":52560.0,"status":"ARCHETYPE","unit":"hours","min":52560.0,"max":52560.0},"gwp factor":{"value":0.38,"status":"DEFAULT","unit":"kg 'S0306261921012149","min":0.023,"max":1.13161},"adp factor":{"value":6.42317e-08,"status":"DEFAULT","unit":"kg Sbeg/kWh","source":"ADEME Base IMPACTS ®","min":1.324e-08,"max":2.65575e-07},"pe facto alue":12.873,"status":"DEFAULT","unit":"MJ/kWh","source":"ADPf / (1-%renewable energy)","min":0.013,"max":468.15},"units":{"value":1,"status":"ARCHETYPE","min":1,"max":1},"type":{"value":"pro",'

088e-05,"max":0.001884},"unit":"kqSbeq","description":"Use of minerals and fossil ressources"},"pe":{"embedded":"not implemented","use":{

### References

Gupta, U., Kim, Y. G., Lee, S., Tse, J., Lee, H.-H. S., Wei, G.-Y., Brooks, D., & Wu, C.-J. (2020, October 28). Chasing carbon: The elusive environmental footprint of computing. arXiv.org.

Results should be interpreted with caution (see min and max values)"]},"unit":"MJ","description":"Consumption of primary energy

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### Acknowledgments







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