## **CARBON FOOTPRINT & CLOUD MIGRATION RECOMMENDATION REPORT**

A detailed comparison of physical server and cloud-based solutions for environmental impact.

### OVERVIEW

This report estimates the total carbon emissions associated with one year of operation for a server, including:

- Manufacturing emissions
- Delivery from factory to end user
- Energy consumption during use
- Emissions from cooling and infrastructure overhead

### **CURRENT SETUP: PHYSICAL SERVER EMISSIONS**

Content:

- Server Specs: Mid-range, Intel i5, ~80W average draw
- Usage Scenario: Continuous operation (24/7) for 356 days
- Location: Kuala Lumpur
- Electricity Emission Factor (Malaysia): ~0.58 kg CO<sub>2</sub>e/kWh
- Power Usage Effectiveness (PUE): 1.5 (typical small-scale setup)

## YEAR 1 CARBON FOOTPRINT ESTIMATE

Category	Description	Estimated Emissions (kg CO <sub>2</sub> e)
🎬 Manufacturing	Emissions from producing the server hardware	~500
🚑 Shipping	Delivery from Shenzhen, China to Kuala Lumpur via sea freight	~0.5
Energy Consumption	Power used during 24/7 operation at 80W load	~396.4
Cooling & Infrastructure	Includes cooling systems and power overhead (PUE 1.5)	~198.2
🔽 Total – 1st Year	Full lifecycle emissions for Year 1	~1,095 kg CO₂e

#### **POST-YEAR 1 OPERATIONAL EMISSIONS**

For continued operation beyond Year 1 (assuming no hardware replacement):

Year	Operation + Cooling Emissions
2	~594.6 kg CO₂e
3	~594.6 kg CO₂e
4	~594.6 kg CO₂e
5	~594.6 kg CO₂e

# **CLOUD COMPUTING ALTERNATIVE**

**Cloud Provider Assumptions:** 

- PUE: ~1.2 (more efficient)
- Server utilization: optimized via autoscaling/shared resources
- Power source: partial to full renewable energy (depends on provider/region)

Cloud Provider	Est. Annual Emissions	Notes
oogle Cloud	~50–100 kg CO₂e	100% renewable energy matched
🗲 AWS / Azure	~100–200 kg CO₂e	High efficiency; improving renewables
On-Prem (Current)	~595 kg CO₂e	Energy & cooling not optimized

### Cloud solutions can reduce emissions by 80-90% annually

### 5-Year Carbon Impact Comparison

Deployment	Year 1 (w/ manufacturing)	Next 4 Years (ops only)	5-Year Total
On-Prem	~1,095 kg	~2,378 kg	~3,473 kg CO <sub>2</sub> e
Cloud	~100 kg (average)	~400 kg	~500 kg CO₂e

Cloud solutions can reduce emissions by 80-90% annually

# RECOMMENDATION

Transition to a cloud solution to significantly reduce carbon emissions and improve operational efficiency. This is especially effective if:

- If your servers are underutilized or idle for long periods
- If you're running multiple workloads that can be containerized or virtualized
- If You want to scale resources easily
- If your business is moving toward sustainability targets or ESG commitments

### SUMMARY TABLE

Item	On-Prem Server	Cloud-Based Solution
1st Year CO₂e	~1,095 kg	~100 kg
Ongoing CO2e / Year	~595 kg	~100–200 kg
5-Year Total	~3,473 kg	~500 kg
Carbon Reduction	—	~85% lower emissions
Efficiency (PUE)	~1.5	~1.1–1.3
Power Source	Grid (fossil-based)	Renewable-backed regions

Migrating to the cloud is not only a cost-effective and scalable solution, but also a significant step toward reducing your carbon footprint and committed to sustainability. Cloud data centers are built for energy efficiency, often powered by renewables, and designed for shared, optimized use.