CASE STUDY

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Understanding product transactional CO2 emissions

Using the Green Metrics Tool enabled client to market API request emissions

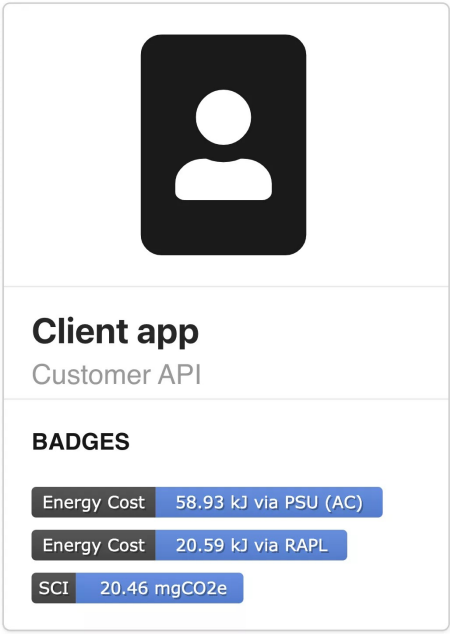
Challenge

Our client, a german software developer with it's own product, has recently begun the transformation of it's company to a sustainable one.

The client started out with taking a B-Corp certification, calculating the company CO2 footprint and also introducing employment CO2 reduction programs by incentivising low carbon travel options and home office options.

A current blind spot in the clients overall emissions was the digital footprint of it's own software that he was selling to clients as a SaaS.

The clients were environmentally aware companies and wanted to know how much emissions an API requests was incurring and if they had also any means in reducing the emissions from the client side.



About Us

As a company for consulting, contract research and development in the field of sustainable software, Green Coding Solutions GmbH has a team of developers with many years of experience in web and performance engineering.

Through numerous conference contributions and publications on the subject of green coding, we are known as a German and European specialist with cooperation in the SDIA and Green Software Foundation as well as cooperation with renowned universities on the subject such as the Umweltcampus Birkenfeld or the HTW Berlin.

The focus is on the development of open source solutions for SMEs for energy measurement of cloud and container systems, as well as CI/CD pipelines and software lifecycle assessments, including their accounting methods in accordance with ISO 14001 and the GHG Protocol.

Green Coding Solutions is also the main organizer of the Eco Compute Conference - a green tech conference with internationally renowned speakers on the topic of sustainability in the digital economy (software / hardware / data centers)

> We at Green Coding Solutions believe that knowing your product footprint is vital for marketing an environmentally conscious product.
>
> You cannot say "my product is carbon neutral" or "climate positive" if you just purchase green electricity or if your product is just doing climate positive effects cross-sector if you do not know how much the digital infrastructure is consuming in the first place. - Arne Tarara, CEO Green Coding Solutions

95% ▼ Data transfer reduction

0% ▲ downtime

40% ▼ compute time reduced

100% ▲ transparency increase

Technical Details

The users were accessing the SaaS in a hosted solution that was mainly utilized via API requests. The volume ranged from 20 requests per day to 40,000 requests per day.

All requests were handled by a Python web API with multiple redundant servers handling the web responses and one centralized database.

Solution

We began by analyzing the infrastructure with our Green Metrics Tool to find out where we would have the most gains in the infrastructure and which phase to target.

The first outcome, before the analysis was carbon profile per API request ranging between 1 mgCO2e and 20 mgCO2e per API request.

It showed that the deployments and thus container builds and updates were quite infrequent and could be neglected.

Also the database backend, a PostgreSQL database was already a good fit for the workload and showed a good utilization and memory profile.
The most consuming parts were the data transfer of the API and some API endpoints that showed 20x the consumption of other API requests.

To combat the 20x requests we decided to move the processing logic into the database and away from Python.

The other API requests showed that the culprit is not in the compute, but the data transfer. Here we employed Cloudflare route caching to reduce data transfer and thus network CO2 by 95%.

Application carbon profiling enabled

up to 95% decrease in CO2e

Client satisfaction increased

Summary

We employed our Green Metrics Tool to understand the transactional CO2 cost per API request and find optimization potentials in a targeted manner.

- Swapping code logic where programming language was sub-par
- Utilizing caching for applicable routes to reduce CO2 by 95%
- Only targeting infrastructure and Code where savings were expected
- Keeping integration effort minimal and
- Integrating quality gates into DevOps to spot future carbon anomalies on every commit

Using automated tools to find CO2 hotspots in your application has become an efficient and targeted solutions for companies.

We love the fact that companies are empowered to act in reducing digital emissions and understand the transparency about it as a company value and not as a regulatory effort

Arne Tarara
CEO

GREEN CODING;
Green Coding Solutions GmbH
Making software sustainable