UK Health Security Agency

How Green Ops is helping the UKHSA innovate Green Tech

Ravi Dhirani (QAT Performance Lead, UKHSA)

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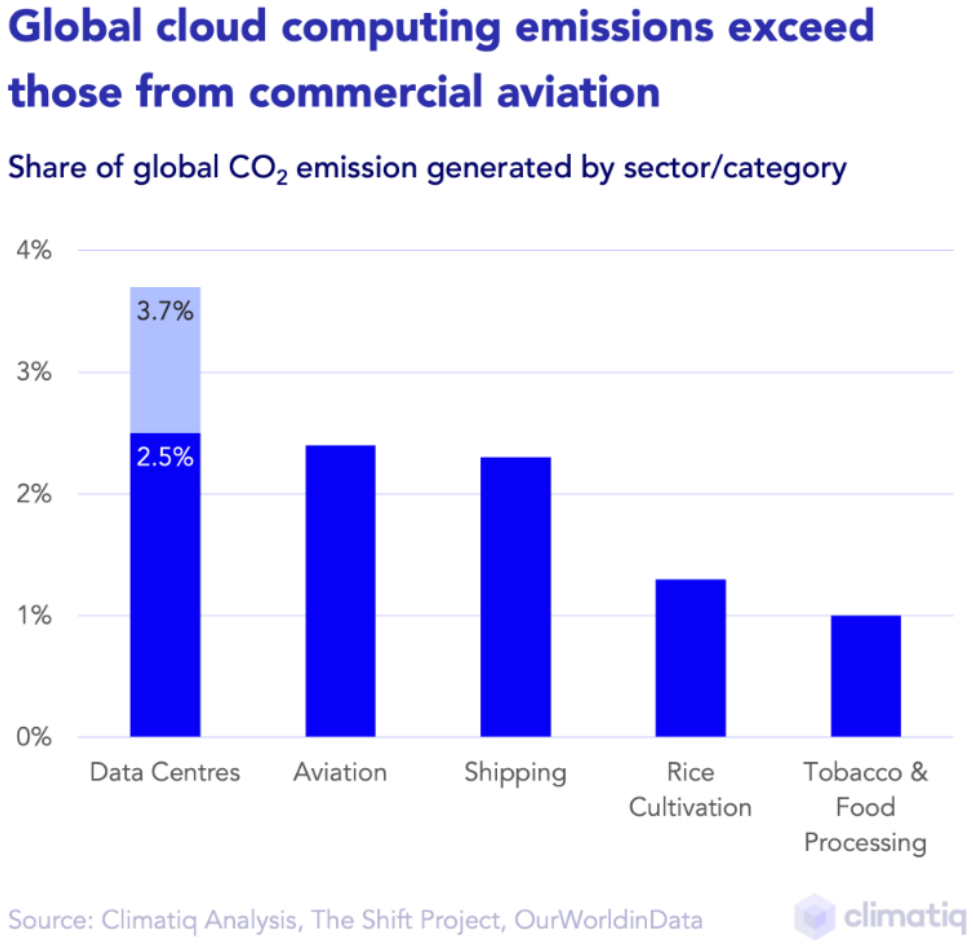
Overview

1. Problem Statement
2. Renewable Energy Overview
3. The Energy Journey
4. Technology to Enable Environmentally Friendly Solutions

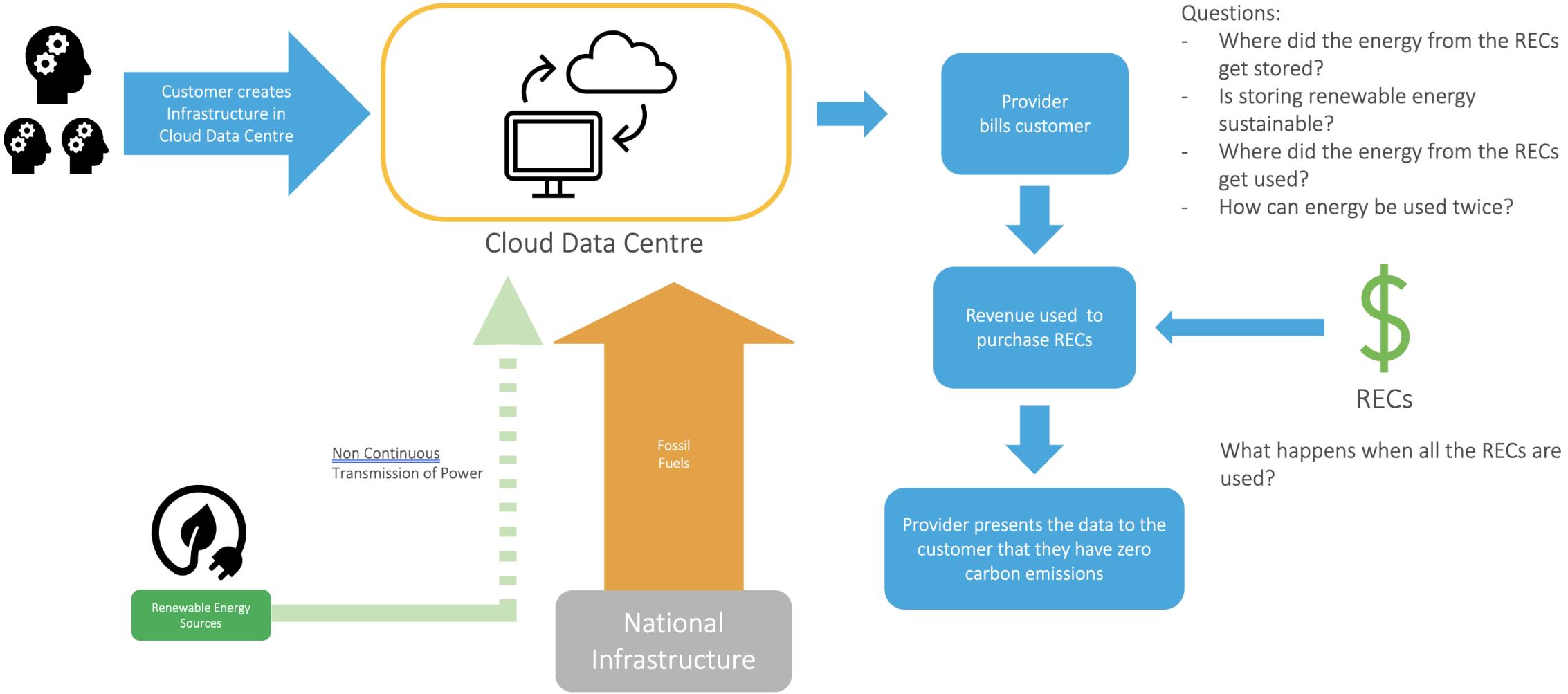
Problem Statement

There are three main issues:

1. Global emissions from Cloud computing ranges from 2.5% to 3.7%. This exceeds both the Aviation and Shipping industries global emissions.
2. Native Cloud Provider telemetry does not give us an accurate picture.
3. Previously at UKHSA the calculations have been manual and time consuming.



The Energy Journey



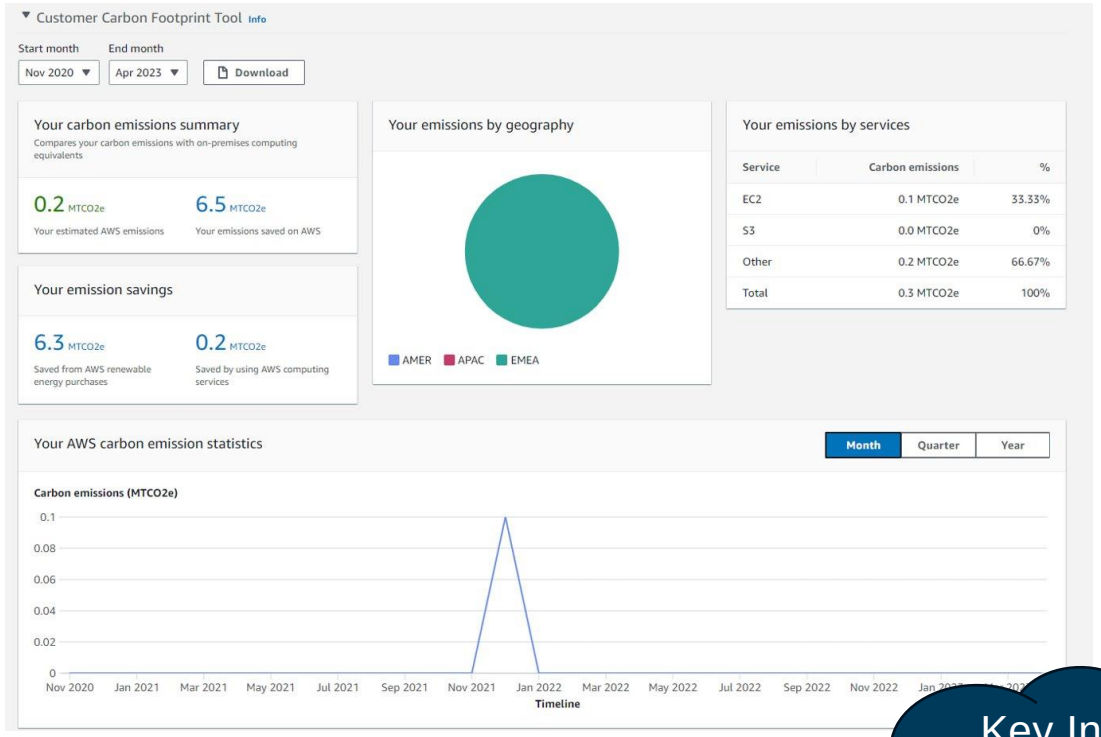
Questions:

- Where did the energy from the RECs get stored?
- Is storing renewable energy sustainable?
- Where did the energy from the RECs get used?
- How can energy be used twice?

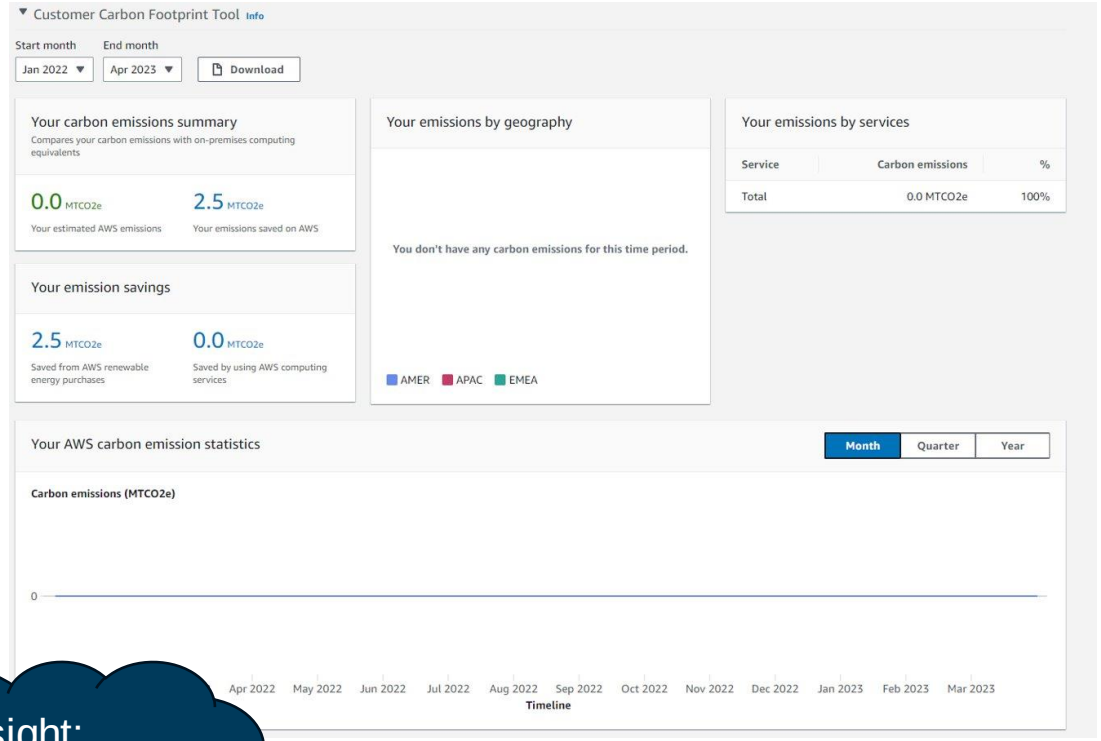
What happens when all the RECs are used?

AWS – Customer Carbon Footprint Tool

Cloud Emissions from an individual Environment to Date



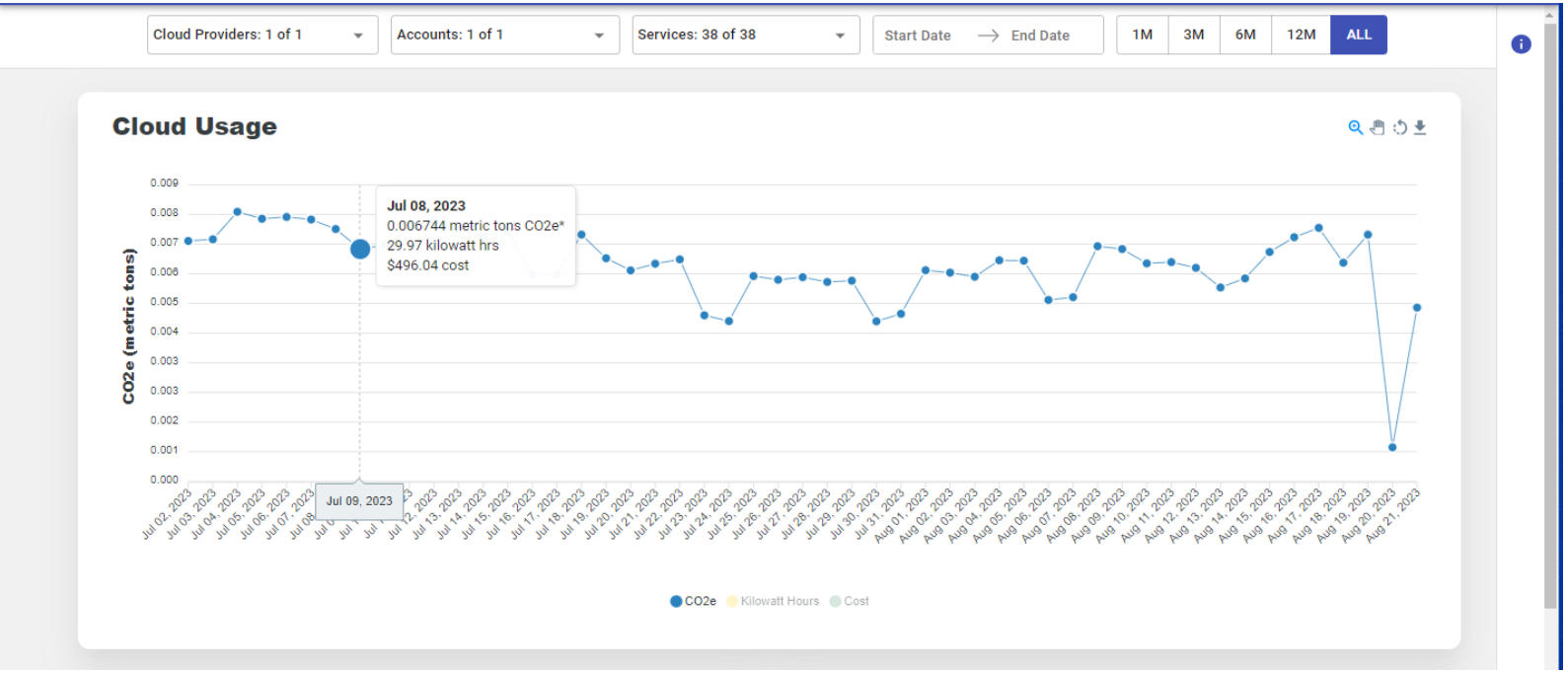
Cloud Emissions from the same environment since 2022

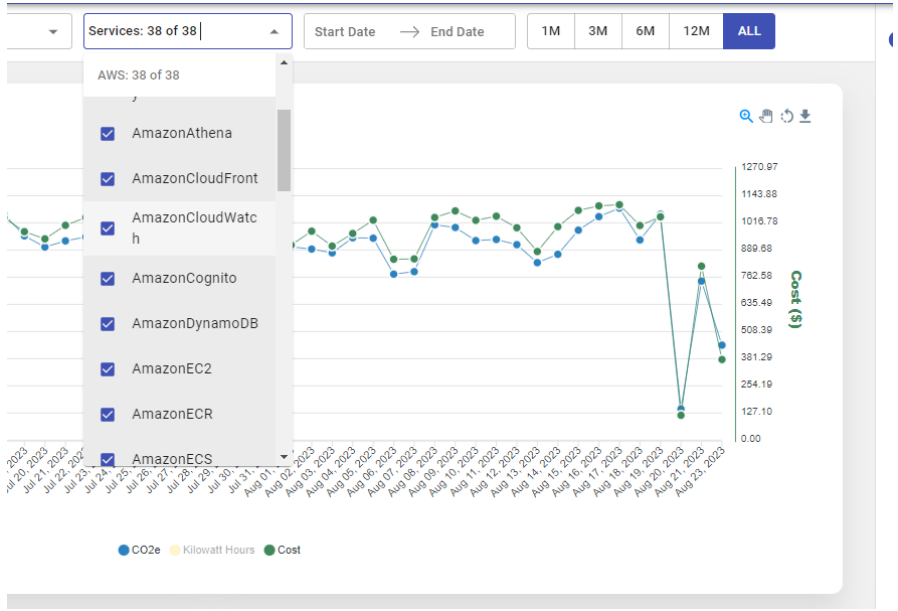


Key Insight:
These stats are inaccurate and not relevant to truly cloud native technologies that were born in the cloud

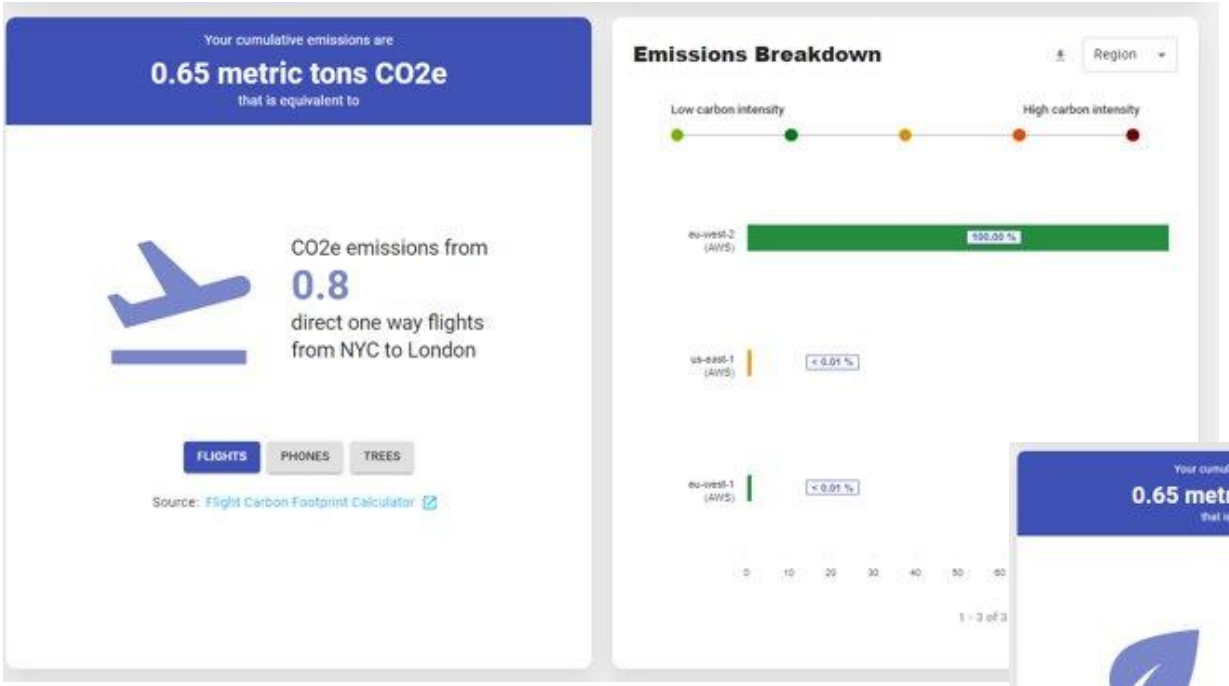
GreenOps Dashboard - Usage

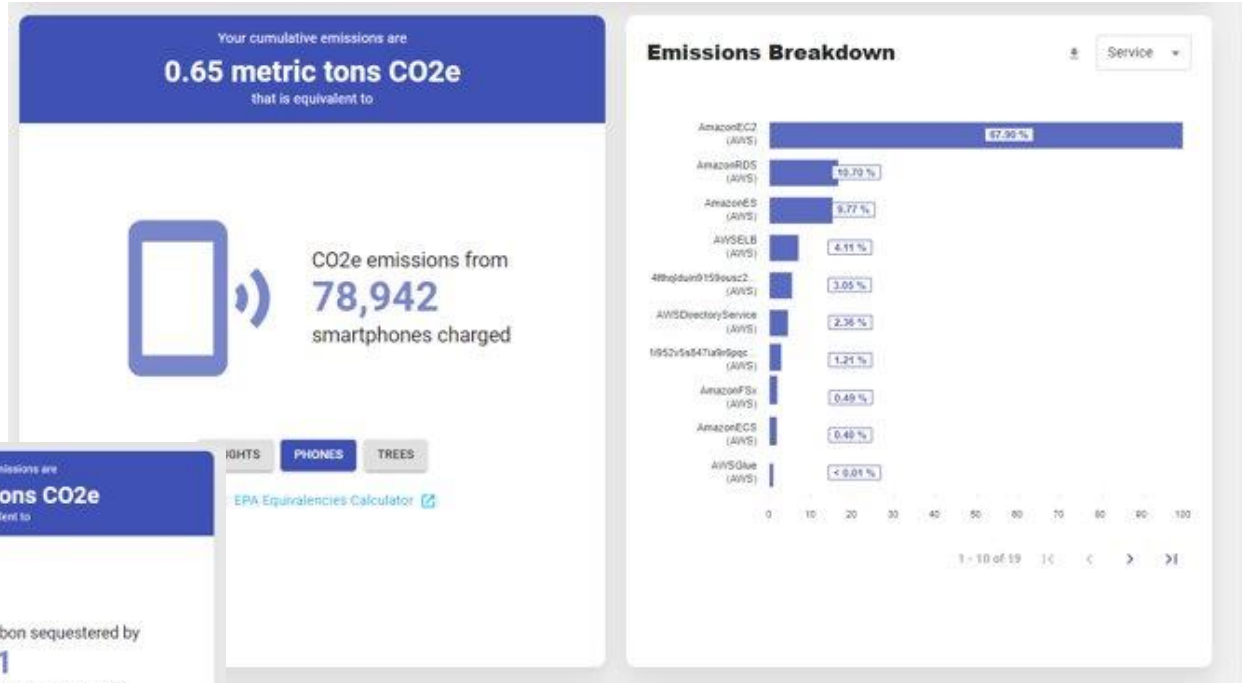
Granular Carbon Emissions that can even be filtered by individual services

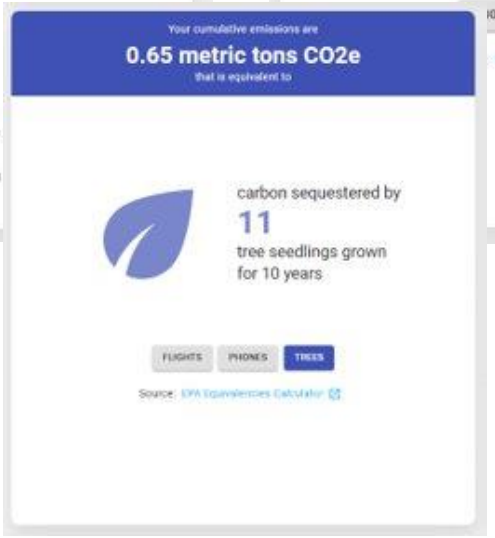




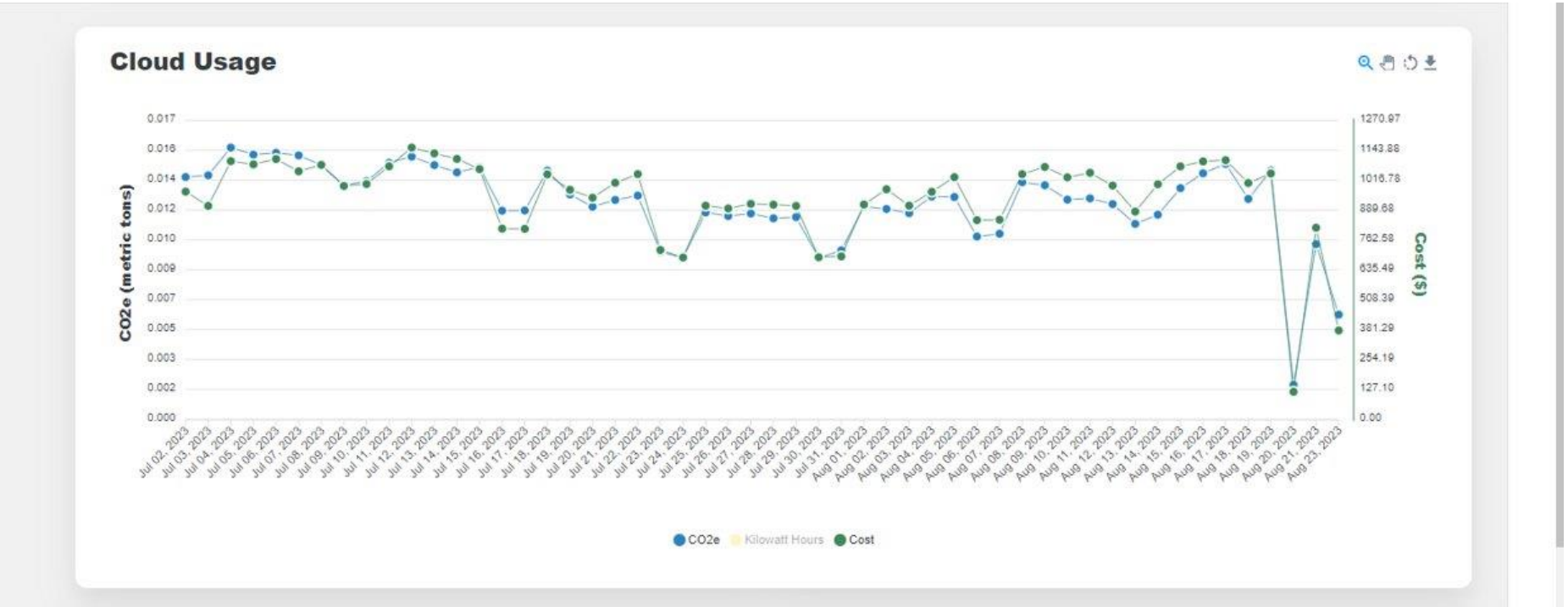
GreenOps Dashboard – Metric Analysis



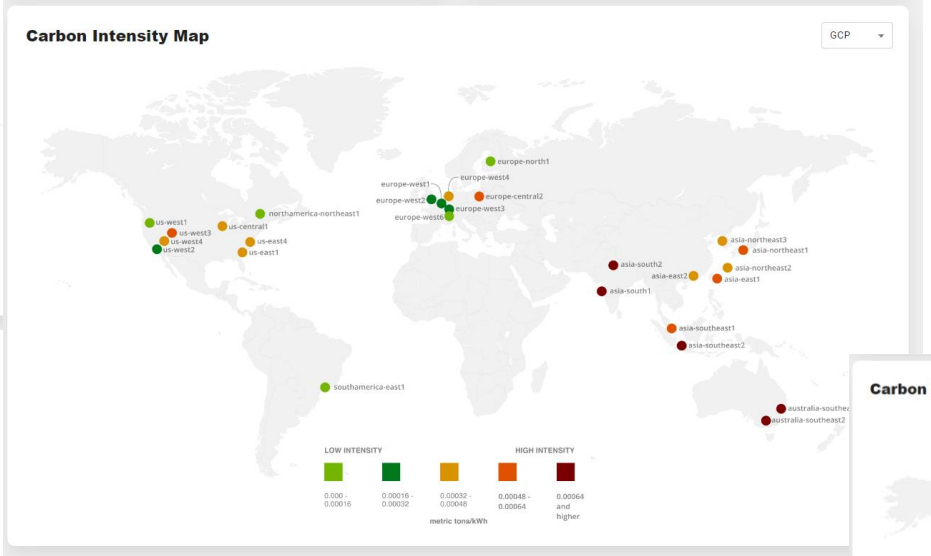




Overlaps between CostOps and GreenOps

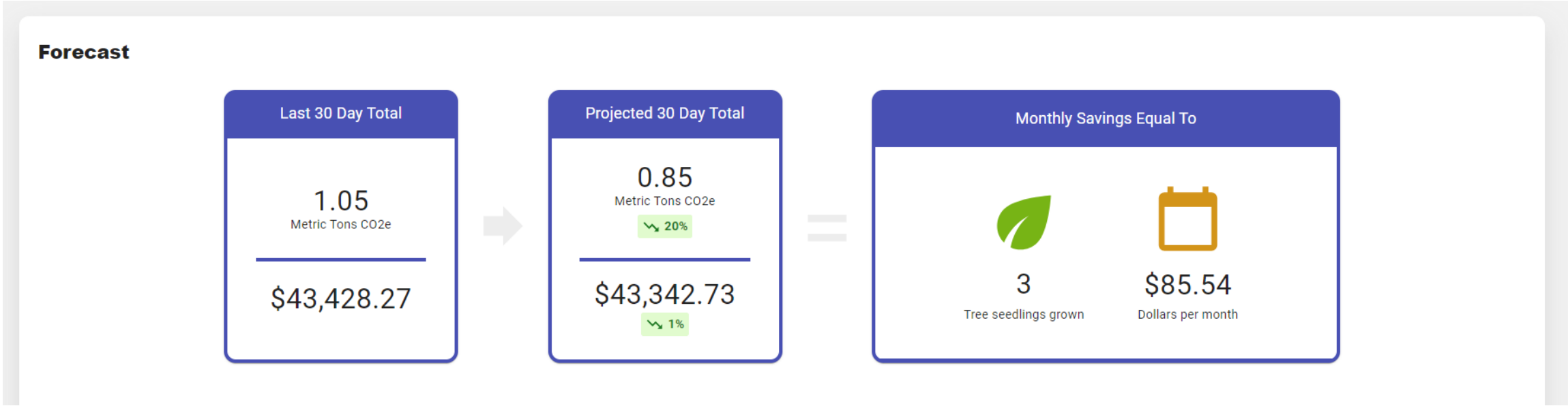


Understanding which providers offer the greenest regions

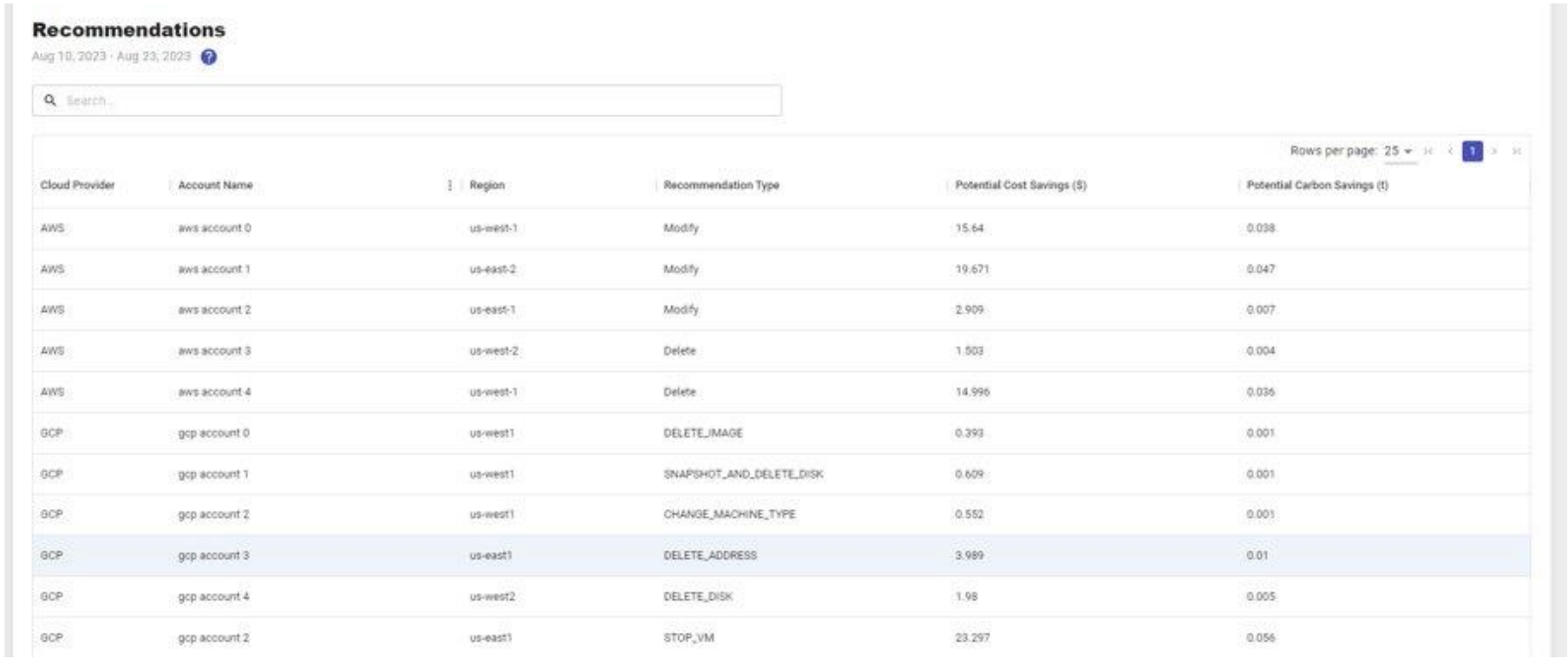


Make informed cloud decisions based on individual data centre efficiencies and carbon intensity figures.

Recommendation and Forecasting Functionality



Automatic Recommendations Based on Usage Reports to Streamline your Cloud Estate



Recommendations

Aug 10, 2023 - Aug 23, 2023

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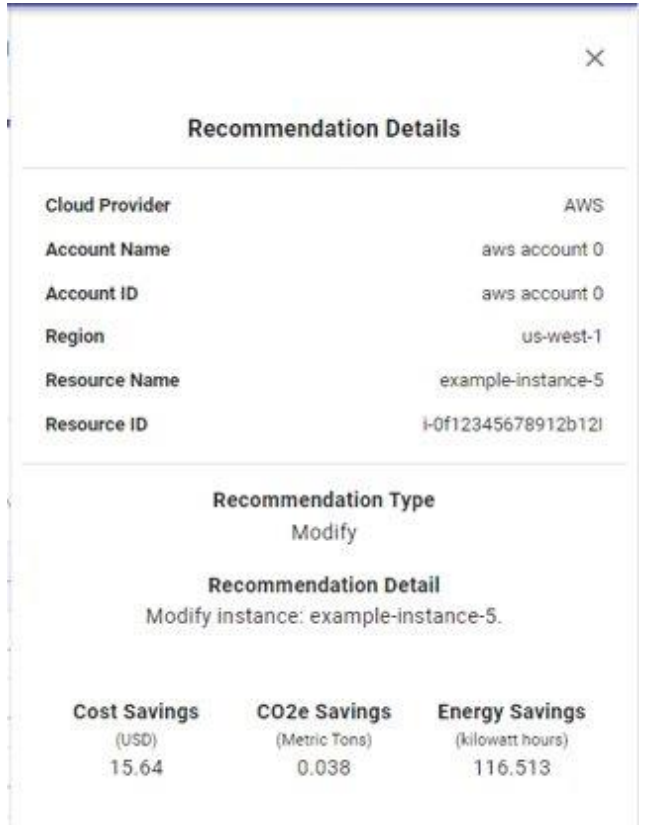
Cloud Provider	Account Name	Region	Recommendation Type	Potential Cost Savings ($)	Potential Carbon Savings (t)
AWS	aws account 0	us-west-1	Modify	15.64	0.038
AWS	aws account 1	us-east-2	Modify	19.671	0.047
AWS	aws account 2	us-east-1	Modify	2.909	0.007
AWS	aws account 3	us-west-2	Delete	1.503	0.004
AWS	aws account 4	us-west-1	Delete	14.996	0.036
GCP	gcp account 0	us-west1	DELETE_IMAGE	0.393	0.001
GCP	gcp account 1	us-west1	SNAPSHOT_AND_DELETE_DISK	0.609	0.001
GCP	gcp account 2	us-west1	CHANGE_MACHINE_TYPE	0.552	0.001
GCP	gcp account 3	us-east1	DELETE_ADDRESS	3.989	0.01
GCP	gcp account 4	us-west2	DELETE_DISK	1.98	0.005
GCP	gcp account 2	us-east1	STOP_VM	23.297	0.056



Recommendation Details

Cloud Provider	AWS
Account Name	aws account 0
Account ID	aws account 0
Region	us-west-1
Resource Name	example-instance-5
Resource ID	i-0f12345678912b12l

Recommendation Type

Modify

Recommendation Detail

Modify instance: example-instance-5.

Cost Savings (USD)	CO2e Savings (Metric Tons)	Energy Savings (kilowatt hours)
15.64	0.038	116.513

Renewable Energy Overview

Renewable Energy Conversion Systems

- Solar
- Wind
- Hydropower

Renewable Energy Credits - RECs

- A token representing a utilities green energy generation.
- RECs are purchased to offset the emissions generated by Data Centres that are still connected to a energy grid that uses fossil fuels.

Renewable Energy Storage

- Huge Battery Banks – Manufacturing of batteries is also detrimental to the environment, but is out of scope.

The Future

To date, cloud data centres consume a large but consistent amount of energy based on current usage.

- What happens when cloud is fully adopted globally and energy usage in data centres increases?
- What happens when energy prices increase further?
- How will that affect the customers?
- How will this affect policy and legislation globally?
- How can you protect your companies' interests?

What happens when the total energy requirements of Data Centres exceeds the total amount of RECs that can be bought?

The most likely scenario:

- Cloud cost will change, dependant on demand and power consumption.
- Preferential rates will be given to data centres that are underutilised.
- They will change T&Cs – customers will become responsible stakeholders of the data centres they're using.
- Cloud Providers will pass on Carbon Emission responsibilities to their customers for their individual usage.

Responding to this change will require:

- Strong DevOps culture
- Cloud Agnostic Technology
- A Cloud Partner that can ensure business continuity.