TAG ENVIRONMENTAL SUSTAINABILITY

Survey Results

April 14, 2023

Survey timeframe October-November 2022

CLOUD NATIVE COMPUTING FOUNDATION

About the TAG Environmental Sustainability

Mission

This TAG's goal is to advocate for, develop, support, and help evaluate environmental sustainability initiatives in cloud native technologies. This TAG will identify values and possible incentives for service providers to reduce their consumption and carbon footprint through cloud native tooling.

Activities

- Identify, define, and develop tooling to assess and improve environmental sustainability approaches, including
  - Quantify the energy consumption of cloud native implementations individually as well as in common integration patterns
  - Recommendations and strategies to develop, package, distribute, deploy, and operate cloud native implementations to reduce energy consumption and carbon as well as the various environments they operate in and which impact their consumption
  - Capabilities, benchmarks, and processes to evaluate technological and architectural health of projects
- Community outreach and engagement on the work of this TAG
- Collaboration with other environmental or sustainability organizations, initiatives, activities, and efforts that may fall outside of the CNCF (Cloud Native Computing Foundation)

Executive Summary

55% of survey respondents who are taking action on environmental sustainability within their IT combine different practices to optimize their systems. This reflects the awareness of the community that a holistic approach is necessary to achieve great results.

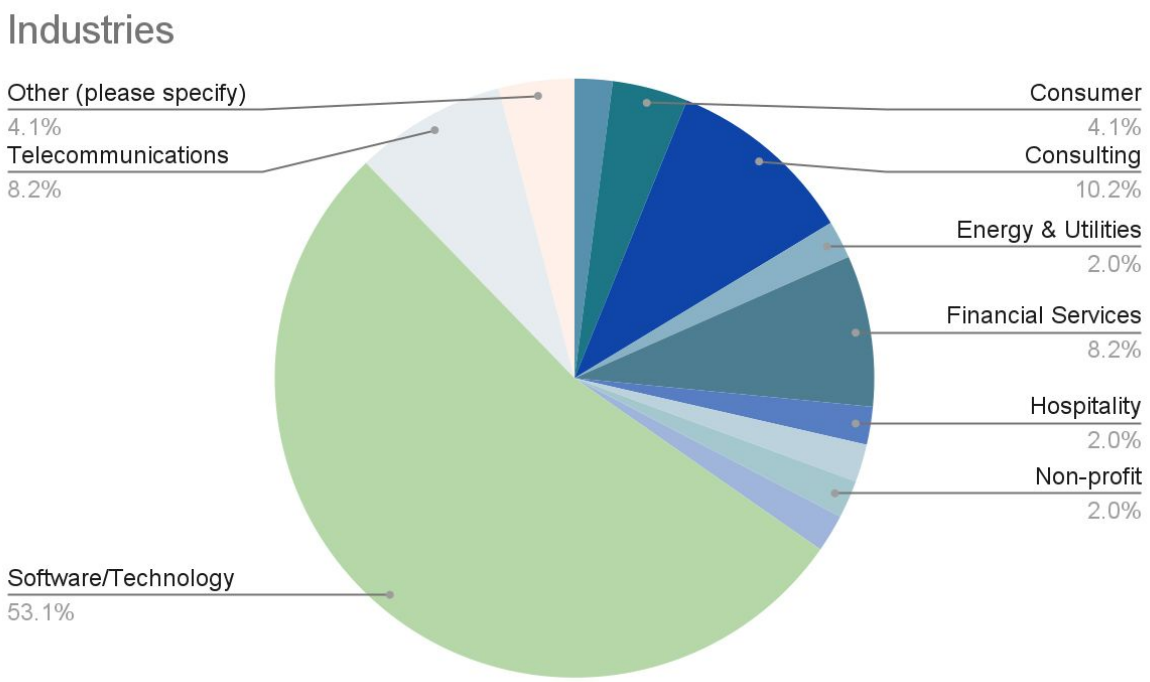
Collecting relevant metrics is the major challenge. 71% of respondents use horizontal pod autoscaling. One-third combine it with vertical pod autoscaling, serverless, and event-driven scaling. All of this tools require metrics or events. However, fewer than 5% combine the needed data. 7% are waiting for the CO2e information of the Cloud Service Provider (CSP), which is not useful with a delay of couple of months.

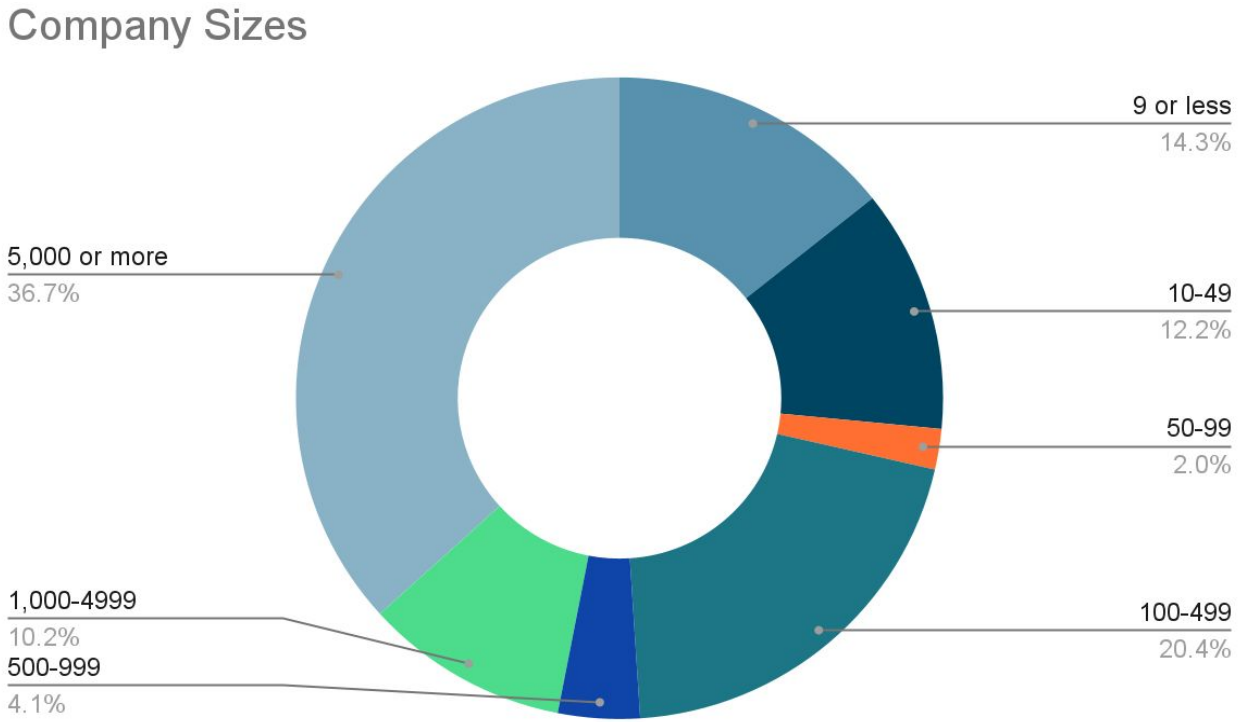
While 66.6% are using global cloud service providers, many are using private data centers (DCs), shared DCs, and regional cloud providers. Developing end-to-end visibility is important and will require a modular or building-block approach, to suit every Computing Service Provider.

The key challenges encountering in pursuing sustainability-related objectives are insufficient easy-to-use products & tools, operational costs of research, and competing/other business priorities. We have to find persuasive arguments for including sustainability into the iron triangle of cost, quality and speed.

Q1-3. Participants & Demographics

- 49 responses:
  - 67% Europe
  - 24% North America
  - 4% Asia
  - 4% Australia & Oceania

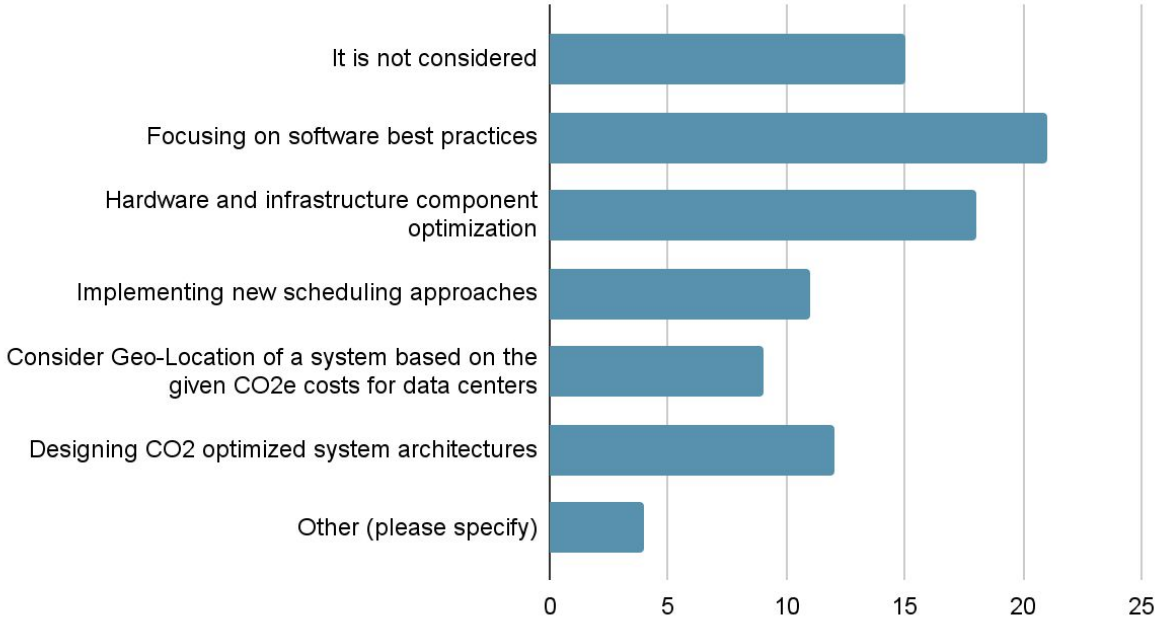




Q4. How do you consider sustainability within your systems architecture and solution design?

55% Focus on software best practices, consider hardware/infrastructure optimizations, and/or implement new scheduling approaches

Only **6%** consider all of the activities listed in the table

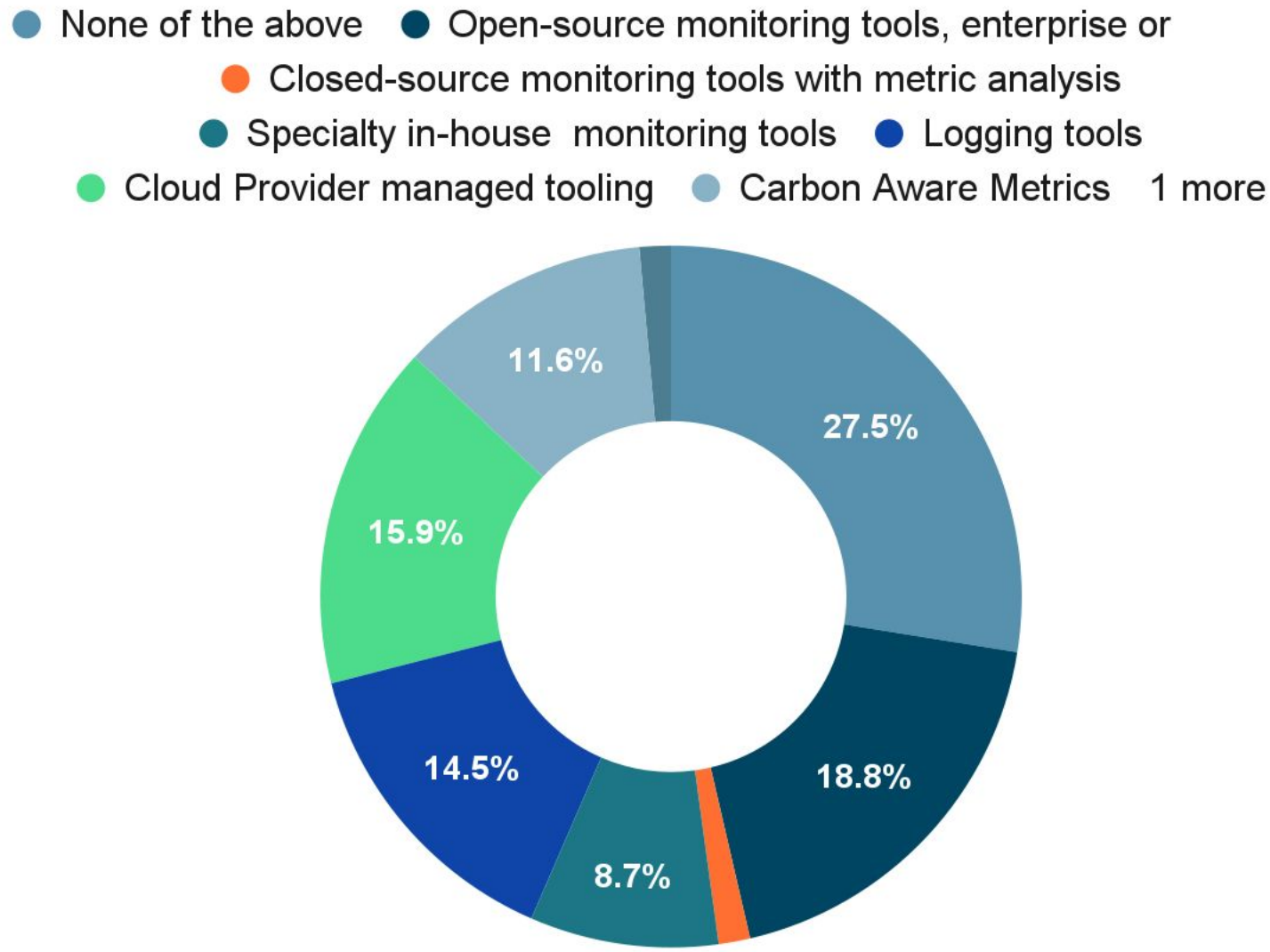


Other actions: utilize WebAssembly, provide software support for older hardware, publish tools to help other companies, consider recycled products and materials

Q5. How do you collect metrics regarding carbon use in your system?

Over ¼ do not track any relevant data.

Only **16.6%** use multiple tools to achieve this.

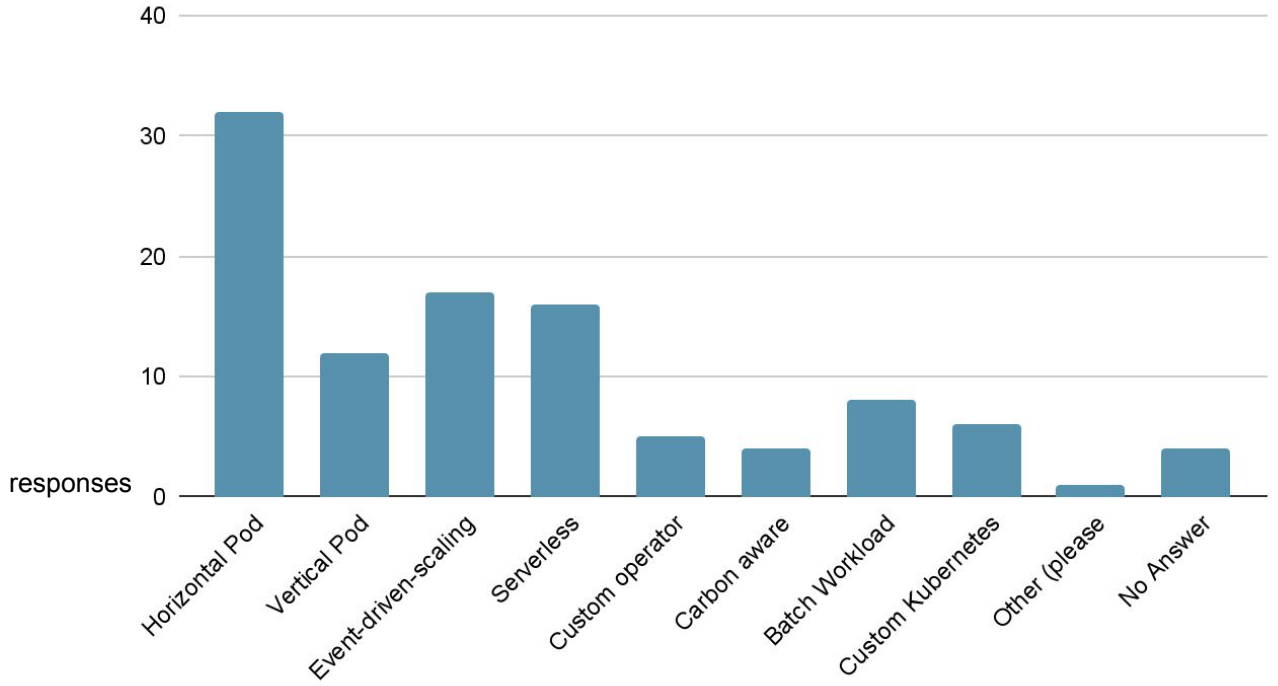


Q6. Which tools/methods do you use to optimize your workload?

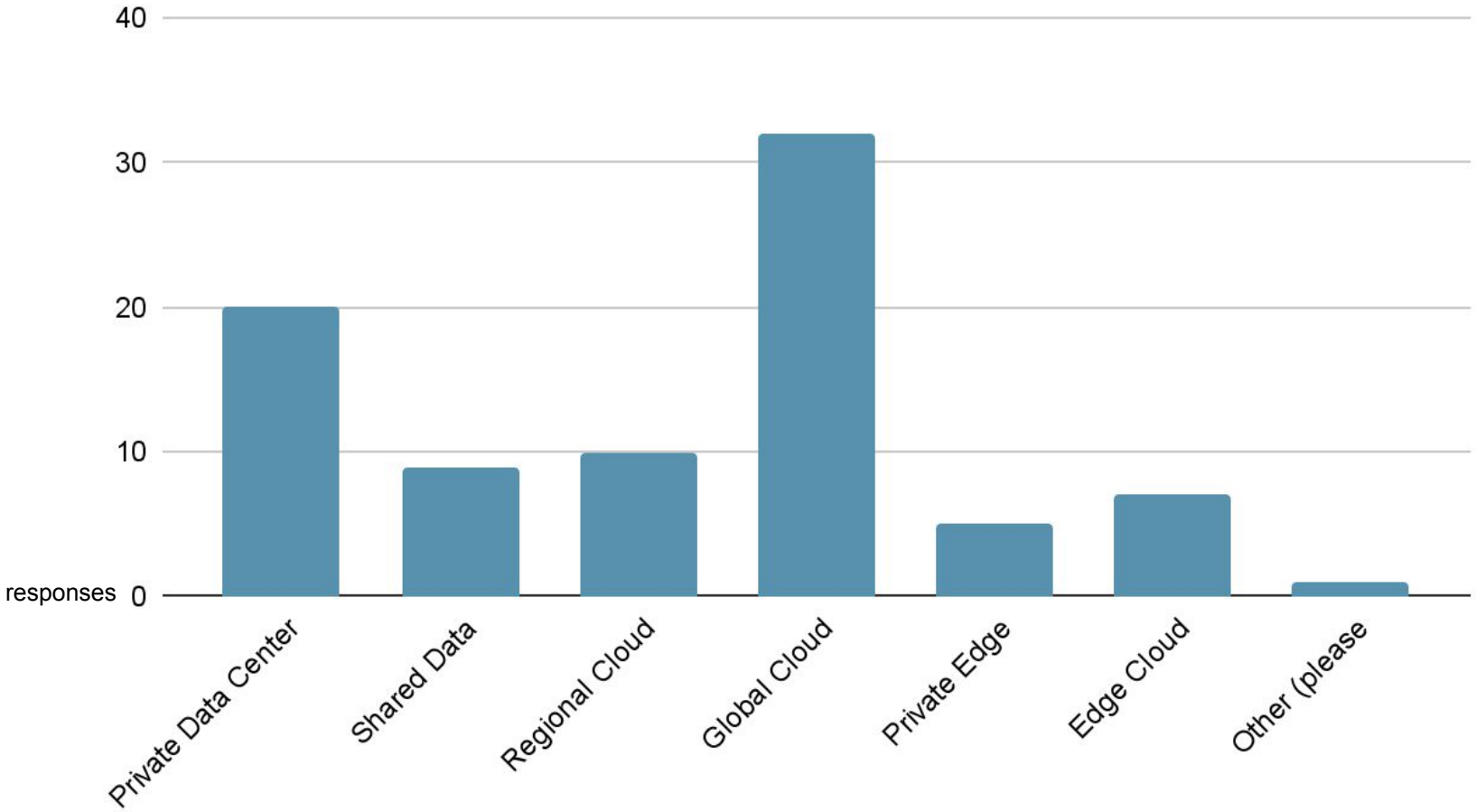
57% use two or more approaches

40% use event-driven scaling and serverless simultaneously

17% use batch processing, making it third among actions (after HPA/VPA and EDS/Serverless)



Q7. Which of the following data center types does your company/organization use?



The average has **1.75** different DC types. With 66.6%, global CSP are most used.

22.9% combine Private DC with a global cloud provider.

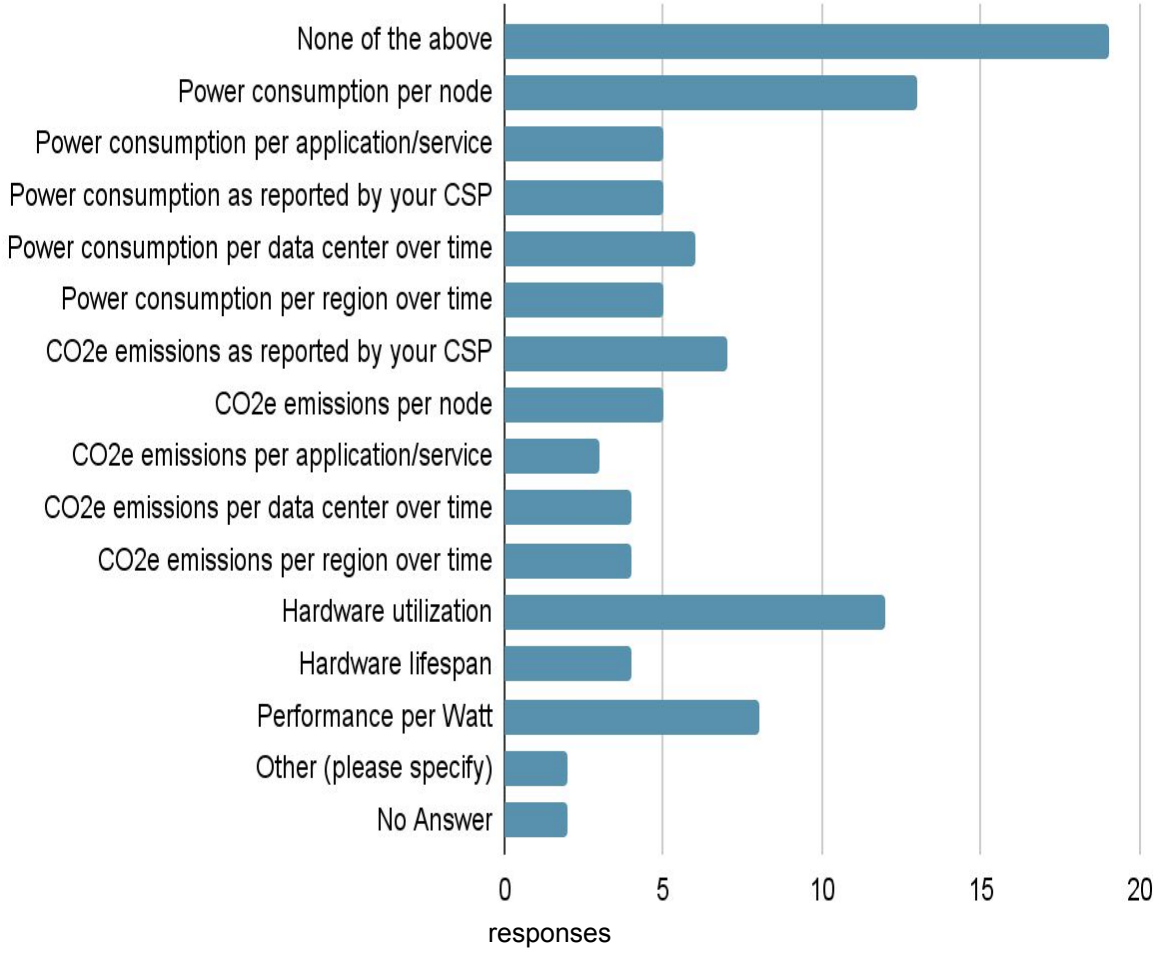
Combined, DC & regional CSP are as common as Private DCs.

Q8. What sustainability-related metrics do you collect for your infrastructure?

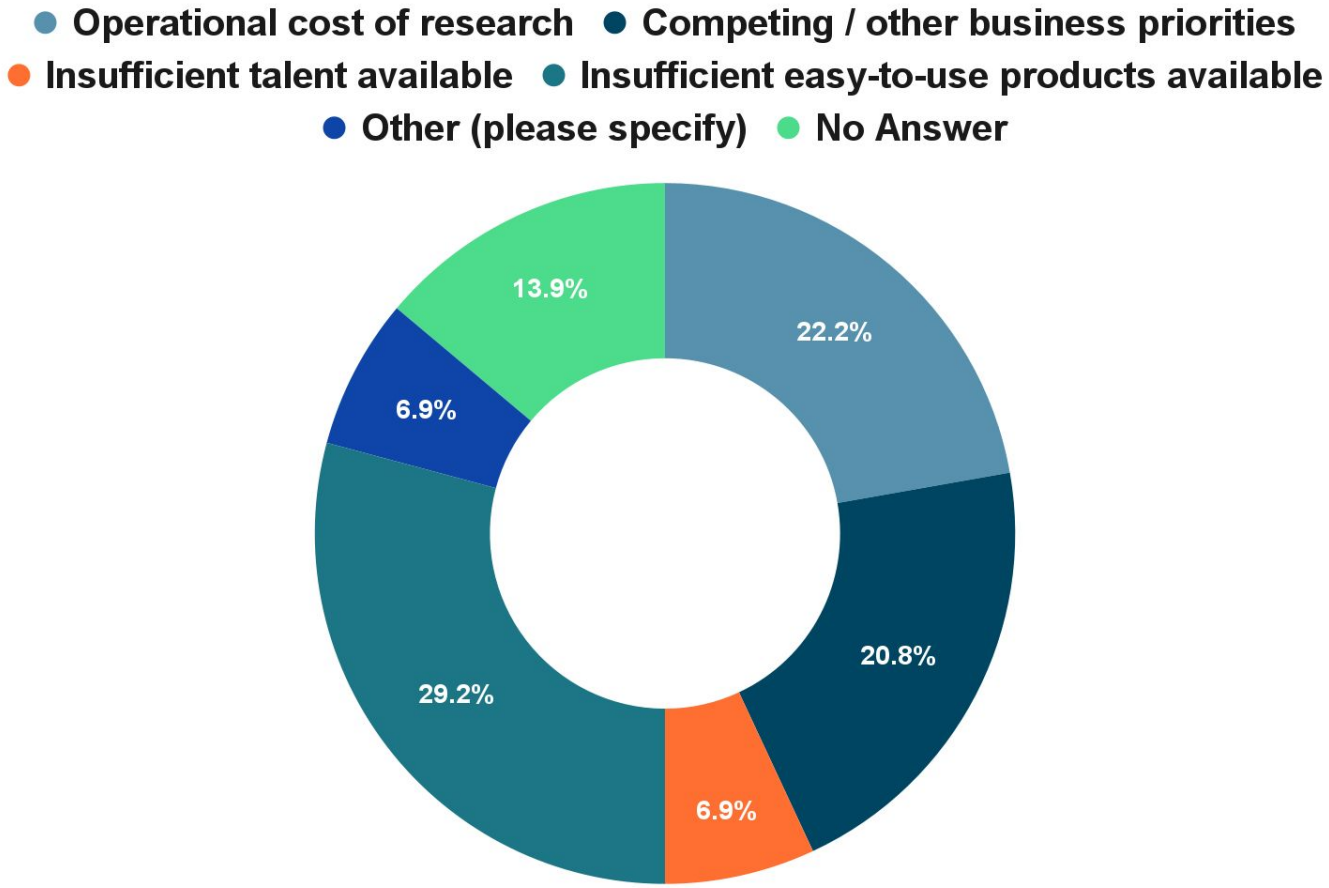
Generally, collecting metrics on power consumption and CO2e emissions is challenging.

40% don't collect any sustainable-related metrics.

Measuring direct node power consumption & HW utilization show promise.



Q9. What challenges are you encountering in pursuing your sustainability-related objectives?



Other challenges:

- Lack of skills
- No objectives
- Lack of real-time energy usage data from CSP
- Poor CO2 reports on CSP

Q10. What is the cost of cooling for your data centers as a percentage of total energy cost?

77.5% don’t know or didn’t answer.

Do you have anything else to add?

It's hard to identify where we could reduce relevant amounts of emissions through a lack of overview and data on details (breaking it down to one lambda, one service, one feature) with cloud, serverless and SaaS like Circle CI, GitHub, DataDog, etc.

I don't specifically focus on this, but it is constantly reinforced that this is of the highest priority from the most senior level of leadership.

I know kube-green which is meant to reduce carbon footprint for unused workloads

We use kube-green (open source operator on GitHub) to stop the unnecessary running pods, save electricity and reduce carbon emissions

Great would be a browser addon or a cookie to tell the backend to not scale up for minimizing latency but instead minimizing for co2

Survey Results and next steps

- Survey respondents seek information on how to reduce the carbon footprint and optimize infrastructure, primarily on public cloud providers.
- Reducing and conserving resources, and reacting more dynamically to demands, are key interests.

For future surveys we will adjust some questions and consider splitting them into two surveys—one focused on cloud-native/cloud-oriented, and another on physical data centers (maybe we can collaborate with other orgs here).

To publish the survey at KubeCon we might need to use sliding windows, user ID based re-evaluations, or similar.

Next Steps:

1. **Improve the survey:** please tell us your ideas
2. **Spread it further:** Follow our activities and group for communications and opportunities to contribute
3. **Discuss:** at KubeCon+CloudNative Con Europe on Tuesday, April 18, the TAG Environmental Sustainability Project Meeting will discuss and define next steps

Thank you for your input & time

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How to get in touch?

GitHub: https://github.com/cncf/tag-env-sustainability

Mailing List: cncf-tag-env-sustainability@lists.cncf.io

CNCF Slack: #tag-environmental-sustainability

We meet every 1st and 3rd Wednesday of the month, feel free to join us. Meeting notes and dial in can be found here.

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