

## **ABSTRACT/SUMMARY**

# Realizing NetZero Carbon in Datacenters

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There are approximately 11,000 datacenters worldwide as of December 2023 [1]. The electricity demand of datacenters in 2022 was 710 TWh with a Greenhouse Gas (GHG) emissions footprint of 330 Million tons annually [2].

Datacenters manage their renewable power generation to demand gap with the aggressive acquisition of Renewable Energy Certificates (RECs) [3] through Power Purchase Agreements (PPAs) [4], [5], [6]. PPAs dislocate energy supply from areas of energy demand. Unlike the traditional electricity grid, PPAs are not required to match generation supply to demand.

Datacenters are obligated by regulation to file annual Corporate Sustainability Reports (CSR)s [7] based on the GHG protocol [8]. We reviewed the CSRs of a few leading datacenters and present information from Google's CSR as an example.

Google's CSR [9] claims the company reached 64% carbon-free energy globally in 2022. A deeper look at their 2022 CSR filing [10] reveals a mere 0.04% of electricity demand was met by on-site renewable electricity generation while a whopping 77% was met through PPAs requiring no in-grid generation. This wide gap in demand with actual renewable supply is due to the lack of tracking tools.

Our contribution will deliver an end-to-end integrated datacenter NetZero (dcNZ) software stack open sourced to the industry. dcNZ will track actual renewable energy generation to datacenter electricity demand.

We will use dcNZ to extend the GHG protocol standards enabling datacenters to publish realistic carbon emissions in their annual CSRs.

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