ESG + Transparency in Cloud Service Providers

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Intro: Me

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enjoys: reading, writing, hiking, new music, grilled cheese

Intro: Project

- Data centers represent almost 2% of the world's energy consumption

- Many companies claim data centers run on 100% renewable

- In reality, most data centers are run using energy off the local grid

- Companies offset data center energy usage with Virtual Power Purchase Agreements (VPPAs)

Project goal: Compare true renewable energy usage of data centers to renewable energy claims

Environmental Jargon

Power Purchase Agreement (PPA)

Instead of investing your own capital and resources in installing renewable technology, you can buy renewable power through a PPA on a kWh basis.

Virtual Power Purchase Agreement (VPPA)

Companies buy renewable power from a provider that is then given to a grid, but the location between the provider and consumer might not be the same — but the consumer still gets "ownership" over that renewable energy

Renewable Energy Credit/Certificate (REC)

Verify that a business support for renewable energy has an impact on the grid

Motivation: ESG

- ESG: Environmental, Social, and Governance
- Method of evaluating companies w.r.t. how 'socially impactful' they are, rather than/in addition to traditional economic metrics
- Kaushik provided the idea of looking into cloud service providers

Previous work in this area

Starting point: [Greenpeace Clicking Clean Virginia](#)

Focus: energy usage/sourcing for data centers located in Virginia

|	Companies	Location	Year
GP	Cloud, colocation, social media, etc…	"Data Center Alley" in Virginia	2019
Maya	Major cloud service providers	California and Oregon	2021 – 2022

Part 1: Selecting Companies

1) Looked at top cloud service providers based on market share + reports from various online sources

2) Cross-referenced companies with data-center location (looking for locations that had many data centers from many top companies)

3) First settled on AWS, Microsoft Azure, Google, Alibaba, IBM, Oracle

4) Removed Alibaba, IBM, Oracle because difficult to find information

4a) Alibaba is not an American company, wasn't super clear on laws/energy regulation in China compared to America

Cloud Service Providers Market Share

Others 23.2%
IBM 1.8%
Google 4.0%
Alibaba 7.7%
Microsoft Azure 15.5%
AWS 47.8%
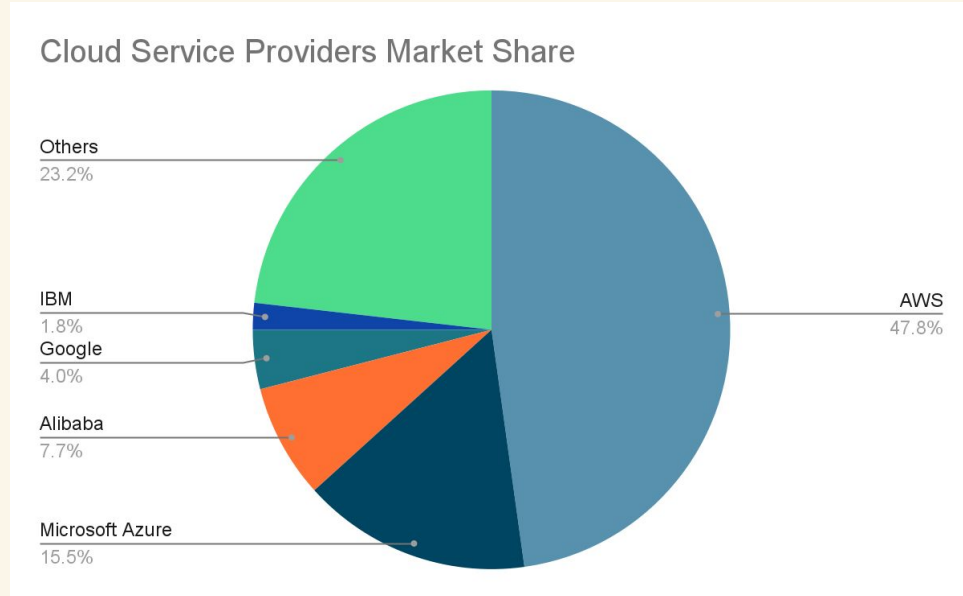
Source: Gartner Group, 2018

Part 2: Company Sustainability Goals

Overall Company Goals & Initiatives

Which companies actually claim to be 100% renewable?

Which companies are actually doing something about it?

Sustainability Goals

Overall Company Goals:

– be net zero Carbon by 2040

– power all operations with 100% renewable energy by 2025

Tangible items:

– buys energy from 47 MW wind farm in Kern County, CA

– owns 100 MW/70 MW solar generation/storage farm in Imperial, CA

Microsoft Azure

Sustainability Goals

Overall Company Goals:

– carbon negative by 2030

– shift to 100% supply of renewable energy (VPPAs for 100% of carbon-emitting electricity) by 2025

Tangible items:

– carbon tax for all company emissions paid by each division

– purchased 5.8 GW of renewable energy through VPPAs

– new data center in Sweden will be first Microsoft region to use low-carbon fuel for power

Google
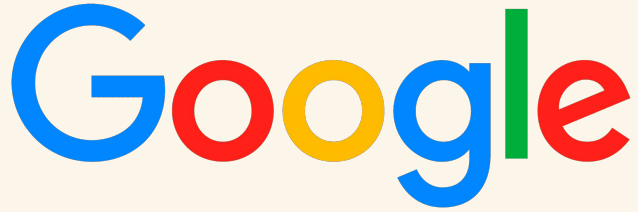
Overall Company Goals:

– goal: operate on carbon–free energy on an hourly basis by 2030, on same grid where energy is consumed

Tangible items:

– has been carbon neutral since 2007

– matches 100% of electricity use with renewable energy purchases since 2017

– in 2020, 67% of data center electricity usage matched with carbon–free sources on hourly basis

Part 3a: methodology

- Most companies are **<u>not</u>** transparent about data center location or energy usage
  - security/competition reasons
- Relied on company-reported data when possible
- If not, contacted local government offices for backup generator capability information
  - Sometimes even local governments were held under an NDA

Part 3: Data Center Energy Capacity

AWS	Microsoft	Google
N California (1) – 76.8 MW	California – 77 MW	The Dalles, Oregon (1) – ?
N California (2) – 76.8 MW		The Dalles, Oregon (2) – ?
N California (3) – 76.8 MW		
Oregon (1) – ?		
Oregon (2) – ?		
Oregon (3) – ?		
Oregon (4) – ?		

Part 3: Data Center Green Mix Estimate

AWS	Microsoft	Google
N California (1) – 33%	California – 33%	The Dalles, Oregon (1) – 90%
N California (2) – 33%		The Dalles, Oregon (2) – 90%
N California (3) – 33%		
Oregon (1) – ?		
Oregon (2) – ?		
Oregon (3) – ?		
Oregon (4) – ?		

Results

Microsoft Azure

Most honest about shortcomings

Most concrete actions/plans for sustainability

Google

Most far ahead in renewable energy goals – even if most have been accomplished through VPPAs, moving beyond that

Most consistent in reporting

AWS

Absolutely **no** transparency, no report of progress towards goals

Barely any information, to their detriment

Final comments/deliverables

- Will be compiling this into a report and submitting to Greenpeace
- Future work: analyze company involvement with policy/lobbying

Quad Chart

Topic: Analyze cloud service provider transparency and environmental impact	**Ideas:** "100% Renewable" Data center energy usage is getting bigger and bigger
Process: Analyzing sustainability reports & company-reported data Contacting government offices & electricity providers	**Next Steps:** Compile into white paper Analyze company involvement with governance and policy

Acknowledgments

- Professor Leonard Kleinrock
- Professor Peter Reiher
- Professor Rajit Gadh + UCLA Smart Grid Energy Research Center
- Venky Harinarayan
- Bill Wu
- Fellow IRI research cohort

Thank you!