Data Center Workgroup

Recommendations for Presentation at Final Workgroup Meeting on February 8th, 2024

Next steps

Date	Topic
February 8th	Final review and full workgroup feedback on recommendations
March 1	Final workgroup report completed and submitted

General Considerations & Recommendations

During the course of the committee and full workgroup meetings, several issues and considerations were raised that did not fall under a single committee for consideration and/or were beyond the purview of the workgroup. In some cases, the County will not be able to address without state or regional input and support.

- **“Define the Opportunity”** the County should consider putting an overall top limit on data center growth, whether based on square footage, total acreage, or another metric in order to reduce resource impacts and reduce the risk to the county of becoming too financially dependent on a single industry.
- **Power consumption and climate goals**: data center power consumption and corresponding emissions will impact the ability of the state and county to meet climate and renewable energy goals without commitments to bring additional renewable energy (wind and solar) online.
- **Power generation**: the county is required by the state to meet 14.5% of power generation through renewable energy. The significant increase in power consumption from data centers will require the development of significantly more renewable energy in the county.
- **Power transmission**: costs to expand transmission infrastructure are borne by all ratepayers on a proportional basis (should be explored further to understand the likely cost impact).

General Considerations & Recommendations, cont.

- **Water consumption**: data centers that use water for cooling may use hundreds of thousands of gallons per day. Current APFO for Quantum Loophole allows 1.1 MGD for first phase of buildout. If additional water is needed, state and regional approval is needed to draw additional water from the Potomac River. Use of treated effluent or “gray water” should be prioritized and use of potable water minimized as much as possible.
- **Review Process**: require that the CDI ordinance be reviewed on a regular basis (possibly biannually) in order to apply lessons learned and adjust to technological changes and advancements.
- **Monitoring**: Include periodic and reliable monitoring of all performance metrics (sound, air quality, water use, stormwater management, etc.) and consider requiring 3rd party monitoring and impactful enforcement.
- **Emergency Response**: Provide appropriate training, equipment, and personnel for emergency responders

General Considerations & Recommendations, cont.

- Detailed information on General Considerations & Recommendations mentioned in the previous slides are included here.

Siting

Siting Committee Members:

- Harry George
- Brian Sweeney
- Kraig Walsleben

Detailed Siting Recommendations can be found here: here

Siting Committee Recommendations

Siting recommendations fall into 3 categories:

1. Where data centers should be sited, based on infrastructure, zoning, the adopted Comprehensive Plan and the Livable Frederick Master Plan (LFMP)
2. Where they should not go, based on the goals expressed in the LFMP
3. How they should be sited in the areas where they can be located

Siting Parameters - Acceptable Use

In considering where data centers should be an acceptable use, the siting committee identified the following parameters:

1. Close proximity to existing or currently planned electrical transmission infrastructure (high-voltage lines)
2. Access to current or planned municipal water and sewer
3. Access to treated effluent from a water treatment facility (“gray water”) if water will be used for cooling (potable water should not be used for cooling except as augmentation or backup to non-potable water)
4. Within access to current or planned fiber infrastructure
5. Within a designated growth area as delineated in the LFMP
6. Within an area zoned for general- or limited-industrial use (GI or LI)

Siting Parameters - Unacceptable Use

Data centers should not be an acceptable use in the following areas as designated on the County's Land Use Plan and cannot be overridden by a floating zone application in these designated areas unless the area is included in and evaluated pursuant to a future Area or Corridor Plan

1. Rural legacy
2. Priority Preservation
3. Agricultural Preservation
4. Those portions of properties designated Green Infrastructure
5. Those portions of properties designated Natural Resource Lands
6. Treasured Landscape Management

Siting Committee Zoning Recommendation

Based on the criteria listed in the previous slides, the Siting Committee reviewed maps of the southern portion of the County and identified 3 areas that appear to meet the criteria for data center development. Those 3 areas total roughly 10,000 acres. For the approval process for the establishment of data centers, the group proposes the creation of a CDI Floating Zone, only applicable to land zoned GI or LI and meeting all the parameters described in the previous slides.

Justification: Based on the availability of data center infrastructure, three receiving areas have been proposed by the siting committee in the southwest portion of the County within growth areas identified by the Livable Frederick Master Plan. These three receiving areas (generally in and around Brunswick, Adamstown and Urbana) representing the opportunity for 3 clusters of data center uses would comprise a total of no more than 10,000 acres.

Floating zones are applicant driven and must meet the criteria and standards for siting as established by the County through the existing CDI ordinance, an amended CDI ordinance, or a replacement CDI ordinance. Further, requires public notice, public hearings at the Planning Commission level, and public hearings and approval by the County Council for each applicant.

A map showing areas that meet the criteria for data center development is provided here

Siting Committee Recommendations, Cont.

Recommended changes to current CDI ordinance:

1. Increase setback requirements to be 100 feet
2. Amend vegetative screening requirements to replace any plantings that fail within 90 days of failure or notification of failure
3. Amend exterior lighting to adhere to the Five Principles for Responsible Outdoor Lighting published by the Dark Sky and the Illuminating Engineering Society

Siting Committee Recommendations, Cont.

Other considerations to include in planning and siting of data centers:

1. Protection of land that has a high percentage of Prime soil classes I - III
2. Impact to the viewshed
3. Impact to recreational areas, including municipal, County, State, and National parks
4. Impact to nearby fragile ecosystems/watersheds
5. Proximity to schools, daycare centers, health care facilities, and residential developments
6. Environmental justice (consideration of housing that has been previously impacted by industrial or other environmental issues, and avoid compounding of these issues).

Sustainability

Committee members:

- Faith Klareich
- Mike McHale
- Paul Walker

Sustainability Committee Mission & Vision

Mission

Develop recommendations to be considered for inclusion in the CDI Ordinance to ensure that all data center developments in Frederick County adhere to sustainability best practices and seek to continuously improve sustainability metrics over time.

Vision

- Frederick County is a business friendly location for owners/operators of digital infrastructure and like enterprises, including data centers
- All such business located in the county set and achieve the highest possible standards for all categories of environmental sustainability in their operations
- Existing natural resources, which are critical to ecosystems and a high quality of life for all residents, are not adversely affected by the presence of digital infrastructure

Sustainability Concerns

Major Sustainability Concerns

Data centers use massive amounts of water and energy, creating greenhouse gas (GHG) emissions and e-waste as significant byproducts. Continuous focus and commitment to enhanced operational sustainability will be required to avoid adverse impacts to the community and local resources.

- **Water**: Rowan's 156 acre site is allocated 440k gallons of cooling water daily; Quantum Loophole's APFO letter of understanding allows for use of 1.1 Million gallons of water per day (first phase).
- **Power**: Data center electricity demand in VA requires >20% of the state's electricity supply.
- **Emissions:** Power generation from non-renewable sources creates GHG emissions and threatens attainment of emission reduction goals.
- **Backup Power**: standard backup power is supplied by diesel generators, which are loud and produce GHG and other air pollutants.
- **Noise**: Cooling equipment, backup generators and other mechanical equipment used in data centers operate 24/7 and can cause excessive noise pollution without sound abatement measures.
- **Embodied Carbon**: Embodied Carbon in data center equipment, construction materials, and e-waste should be a consideration in evaluating impacts and climate footprint.

Drivers of Data Center Sustainability

A great deal of work has been done by policy makers as well as the data center industry to develop sustainability standards for the industry. Some relevant examples that may be leveraged by Frederick County in developing its own standards include:

- Public policy in place and under development calling for publication of Climate Threats & Impacts from operations and metrics for data center operators as part of ESG reporting (US SEC, EU).
- Buildings-based energy efficiency standards (i.e., BEPS) and regulatory rules at component level (ENERGY STAR and EU Ecodesign Regulations for servers and data storage products)
- Industry sustainability goals for carbon neutral operations and publicly reported metrics on progress announced by major members (GOOG, MSFT, AWS).
- Open CDI industry groups (The Green Grid, iMason's) and corporate leaders (Iron Mountain, Schneider Electric) "create tools, provide technical expertise, and advocate....optimization of energy and resource efficiency of Data Center ecosystems which enable a low carbon economy."
- **Quantum Loophole is a member of iMason's Climate Accord (250 companies, 130 countries, $6T market cap).** "We have reimagined the way data centers can be developed in concert with natural resources, for sustainability within the industry and our planet." Josh Snowhorn, QL CEO & Founder

Recommendations

To ensure that Data Centers and similar facilities operate in a sustainable manner, the County should update the existing CDI ordinance to include:

1. A requirement for data center development applicants to submit the following at initiation of site plan review and approval process:
    a. An operational sustainability plan, which names a program office charged with its administration
    b. Commitment that the sustainability program adheres to at least one industry-accepted sustainability framework with published goals and performance metrics aimed toward continuous improvement in sustainability metrics. At a minimum, the program should include energy & water use, local ecology, zero waste, and Climate Solutions Now Act zero emissions attainment goals.
2. Economic levers (incentives) should be defined and included in the CDI ordinance
3. In developing amendments to the CDI ordinance, staff and legislators should review and incorporate elements from these sources for data center environmental sustainability practices:
    a. IEA Tracking Data Centres and Data Transmission Network, updated July, 2023 (https://www.iea.org/energy-system/buildings/data-centres-and-data-transmission-networks#overview_
    b. Guide to Environmental Sustainability Metrics for Data Centers (https://download.schneider-electric.com/files?p_Doc_Ref=WP67_SPD_EN)

Recommendations - Noise

Noise is one of the most frequently cited community concerns regarding data center developments. As such, a more detailed recommendation on noise has been prepared and can be found here. Key points are summarized below:

1. A robust framework for testing, monitoring, and reporting on sound from data center sites should be developed and implemented. This frameworks should include:
    a. Baseline testing to determine ambient sound levels prior to construction
    b. Specified reporting intervals
    c. Process & procedures for the County to require additional testing and reporting if complaints are reported
2. Consideration should be given to a penalty for ongoing neglect to address cited violation of the ordinance. Those proceeds should be placed in a noise abatement fund
3. Noise levels at property boundaries should not exceed 55 dBA, except under specified conditions and times (i.e., construction)
4. Sensitive facilities such as schools, healthcare facilities, etc. should be located in such a way as to minimize likelihood of sound traveling to those facilities; efforts may need to be made to mitigate excessive noise in facilities that predate data center developments. A noise abatement fund should be established by data center owners/operators to be used for mitigation of any issues
5. An overall approach to noise abatement should be required as part of planning applications
6. County should plan for staff training and/or expansion to conduct separate monitoring efforts, especially for complaint investigations.

Recommendations - Incentivizing Outcomes

In many areas of the country, including the State of Maryland, governments have introduced tax and other incentives to encourage data center development. More recently, other jurisdictions have begun developing incentive structures to encourage sustainability best practices given that data centers consume 10-50 times the energy per unit of floor space of a typical commercial office building and account for 2% of U.S. energy use (DOE). Key points from the detailed recommendation are shared here:

1. Incentivize Tier 4 data center equipment (highest levels of energy efficiency, noise mitigation, water conservation).
2. The County should consider amplifying federal tax credits for energy efficiency and renewable energy/energy storage solutions
3. The County should recognize and plan for engaging with at least 4 distinct industry roles in a data center management (Infrastructure Manager, Owner/Builder, Operator, Customer)
4. Reporting and compliance responsibilities for each of these 4 roles should be clearly defined
5. Consider implementation of environmental escrow accounts
6. Consider incentives for Data Center operations that exceed state BEPS requirements
7. Additional information on data center tax incentives can be found here: https://docs.google.com/spreadsheets/d/1RT28DSlXn5ayUMOJ2S4HUg-afljkA00z/edit?usp=share_link&ouid=105989974292829811709 5&rtpof=true&sd=true

Other Sustainability Issues Identified

Additional Sustainability considerations have been identified by the Siting committee and others during the course of workgroup deliberations. These are captured here for consideration for final recommendations

1. Water
    a. Maximize pervious surfaces
    b. Prohibit use of groundwater/well water on site
    c. Consider retention of water runoff for onsite usage
    d. Diffuse rain or stored water runoff prior to entering streams or tributaries
    e. Ensure storm drains are not in proximity to fuel storage
    f. Utilize submerged ground wetlands for cooling runoff to reduce thermal load on groundwater recharge
2. Backup Power
    a. Require use of Tier IV generators
    b. Prioritize use of alternative fuels such as HVO or Green Hydrogen when possible
    c. Minimize backup power testing and duration. Restrict to business hours
    d. Evaluate and establish parameters for possible connection of backup power source to grid for possible emergency use
    e. Evaluate use of load banks for testing
    f. Require above-ground storage of backup fuel
3. Noise
    a. Require noise attenuation on mechanical equipment (generators, chillers, air handlers, etc.)
    b. Install mechanical equipment at ground level rather than on rooftops to reduce noise impacts

Other Sustainability Issues Identified, cont.

Additional Sustainability considerations have been identified by the Siting committee and others during the course of workgroup deliberations. These are captured here for consideration for final recommendations

1. Power
    a. Require disclosure of power purchase agreements
    b. Require purchase of renewable energy to the extent possible
    c. Install solar where feasible (rooftops, parking canopies, etc.)
2. Management of buildings at end of life
    a. Require that buildings be repurposed or demolished at end of useful life

Frederick County Executive's Data Centers Workgroup (DCWG) Environmental Sustainability Subgroup CO2E Emissions and Social Cost Analysis from Data Center Energy Demand

Prepared by: Paul, Faith, Mike

February 8, 2024

DCWG Environmental Sustainability CO2E emissions estimate - Assumptions

Greenhouse gas emissions:

- **"1 gigawatt of power could add approximately 1.4 million MTCO2e (same as 250,000-300,000 homes)"**

Source: Frederick County DEE, Data Centers and the Environment August 2, 2023

QL site data center power consumption will ramp to 2.4GW by 2035 at full build out

- **2027 - 40% "full"; site uses 1 GW → 2035 - 100% full; site uses 2.4GW.**

RPS

- **Requires 50% renewable electricity by 2030, 100% by 2035.**
- **Assuming RPS targets are met, discount CO2E projected by 50% in 2030 -> 100% by 2035**

Social Cost of Carbon

- **2020 $51/MT CO2E IWG/EPA(cost used in Obama administration)**
- **2022 $190/MT Updated 2023 recommendation by IWG/EPA**
- **December 31, 2023 $203/MT Maryland's Climate Pollution Reduction Plan**

DCWG Environmental Sustainability Subgroup - CO2E Social Cost (@$51/$190 MT)

Year	Power (GW)	Emissions (MMT)	1-renewable % = discount	(E x R)	SCC per MT	Social Cost of Emissions		SCC per MT	Social Cost of Emissions
2027	1	1,400,000	0.67	938,000	$51.00	$47,838,000		$190.00	$178,220,000
2028	1	1,400,000	0.6	840,000	$51.00	$42,840,000		$190.00	$159,600,000
2029	1	1,400,000	0.55	770,000	$51.00	$39,270,000		$190.00	$146,300,000
2030	1.5	2,100,000	0.5	1,050,000	$51.00	$53,550,000		$190.00	$199,500,000
2031	1.5	2,100,000	0.4	840,000	$51.00	$42,840,000		$190.00	$159,600,000
2032	2	2,800,000	0.3	840,000	$51.00	$42,840,000		$190.00	$159,600,000
2033	2	2,800,000	0.2	560,000	$51.00	$28,560,000		$190.00	$106,400,000
2034	2.4	3,360,000	0.1	336,000	$51.00	$17,136,000		$190.00	$63,840,000
2035	2.4	3,360,000	0	0	$51.00	$0		$190.00	$0
2036	2.4	3,360,000	0	0	$51.00	$0		$190.00	$0
				6,174,000		$314,874,000			$1,173,060,000

DCWG Environmental Sustainability Data Center Cost Considerations

I. **Emissions and social cost of same**

- **This analysis informs us emissions from QL site energy consumption are estimated to be 6.2 MT from 2027-2034, unless RECs or renewables are sourced to support the demand. Efforts were made to discount emissions and be conservative with assumptions.**
  - **Associated social cost of those emissions, using $51/MT, is $315m over that time period.**

- **Considering sites which meet criteria defined by the siting group, the magnitude of built out data centers in the county could increase the emissions and costs above by a factor of FOUR.**

I. **Utility rate increases**

- **Some portion of grid enhancements required by the data center industry demand in this region WILL be passed to ratepayers. An estimate has been requested but is not available at this time.**
- **PJM has published costs above $5B as total.**
- **A reasonable estimate for cost to Frederick County ratepayers is in the hundreds of millions.**

Community Benefits

- Daryl Boffman
- Kelly Schulz
- Chris Vigliotti

Community Benefits - Mission

The Community Benefits Subcommittee was tasked with identifying the ways in which the incorporation of data centers into the local economy would benefit the residents of Frederick County. Neighboring jurisdictions in Northern Virginia have realized large amounts of tax revenue and other non-monetary forms of benefit from data center development. With the understanding that the tax systems and land development processes differ between Maryland and Virginia, two different tax revenue sources were identified, and they are included in these recommendations.

Full recommendation can be found here

Identified Local Benefits

1. **Site Improvement**- repurposing and revitalizing GI (General Industrial) and LI (Light Industrial) zoning areas, brownfields
2. **Low Impact on County Services**- expanding commercial tax base with less burden than other types of development
3. **Potential Infrastructure Enhancements**- roads, water, sewer, network fiber, electrical infrastructure
4. **Real Property Taxes**- Maryland Tech Council Report estimated Frederick County realizing approximately $41 million annually when the operating phase is reached, assuming a rate of $2.00 per $100 of Assessed Value (AV). This revenue can be realized with no additional taxes or fees imposed.

Recommendations

1. **Personal Property Tax**- The County should establish a Personal Property Tax with a regionally competitive rate. To the extent possible, this tax should be data center focused.

2. **Community Benefit Agreements (CBA)**- The County should require Community Benefit Agreements to be included in the Site Plan approval process.

3. **High Energy Use Surcharge**- This could be imposed to encourage the employment of energy efficient building standards and cooling technologies. No revenue projections were given to the subgroup. This concept is in place in Montgomery County.

Community Benefit Agreements (CBA)

1. Utilized by other jurisdictions with other industries to delineate and formalize agreements of mutual benefit.
2. These agreements would be developed and refined for each company, not just Quantum Loophole.

Potential CBA Opportunities

1. Education and Workforce Development
2. Scholarship Programs
3. Internship Opportunities
4. Workforce Training Programs
5. Job Creation
6. Local Hiring Initiatives
7. Job Fairs
8. Non-Profit Contributions
9. Financial Contributions
10. In-Kind Support

Appendix

Sustainability Committee Appendix

DCWG Environmental Sustainability Subgroup

A Table of Sustainability Metrics (P 7-8), two comprehensive frameworks (p 9-12), and two pages of the Google Environmental Annual Report Executive Summary from 2023 (p 13-14) follow for reference.

Details on Public Policy and Industry initiatives (p 15-17)

DCWG Environmental Sustainability Subgroup - Schneider Whitepaper

1. **“Guide to Environmental Sustainability Metrics for Data Centers”**
   White Paper 67, Version 2, June, 2023
   Energy Management Research Center
   by Paul Lin, Robert Bunger, Victor Avelar, Schneider Electric

Table on next page defines five sustainability categories to be addressed:

Energy use, GHG emissions, water, waste, and local ecosystems.

Key metrics to be implemented at three different stages along the sustainability journey are also prescribed.

DCWG Environmental Sustainability Subgroup - Schneider White Paper

Table 1

28 key metrics for reporting environmental sustainability

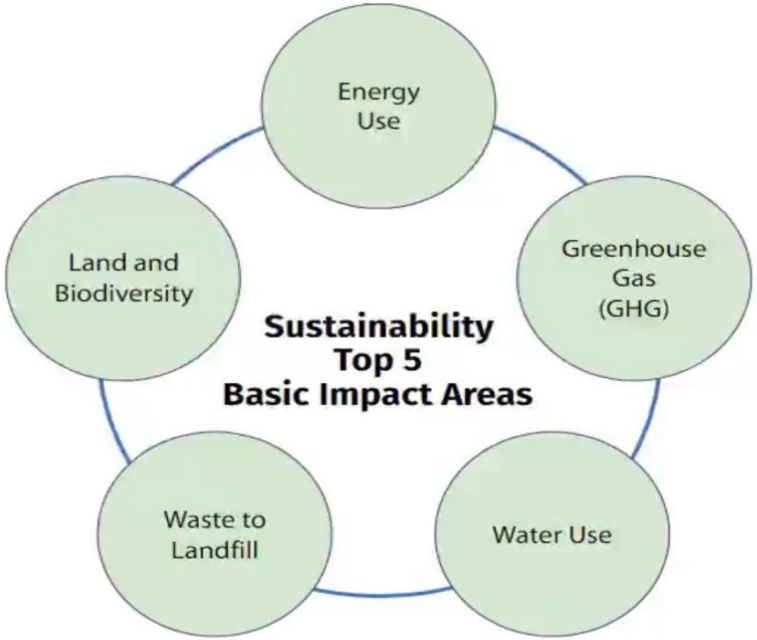
Metric categories	Key metrics	Units	Recommendations		
			Beginning (6)	Advanced (18)	Leading (28)
Energy (6)	• Total energy consumption	kWh	✓	✓	✓
	• Power usage effectiveness (PUE)	Ratio	✓	✓	✓
	• Total renewable energy consumption	kWh		✓	✓
	• Renewable energy factor (REF)	Ratio			✓
	• Energy Reuse Factor (ERF)	Ratio			✓
	• Server utilization ($ITEU_{sv}$)	%		✓	✓
GHG emissions (7)	• Scope 1				
	o GHG emissions	$mtCO_2e$	✓	✓	✓
	• Scope 2				
	o Location-based GHG emissions	$mtCO_2e$	✓	✓	✓
	o Market-based GHG emissions	$mtCO_2e$	✓	✓	✓
	• Scope 3				
	o GHG emissions	$mtCO_2e$			✓
	• Carbon usage effectiveness (CUE)	kg CO_2e/kWh		✓	✓
	• Total carbon offsets	$mtCO_2e$		✓	✓
	• Hourly renewable supply & consumption matching	%			✓
Water (5)	• Total site water usage	m^3	✓	✓	✓
	• Total source energy water usage	m^3			✓
	• Water usage effectiveness (WUE)	m^3/MWh		✓	✓
	• Water replenishment	m^3			✓
	• Total water use in supply chain	m^3			✓
Waste (6)	• Waste generated				
	o Total waste	Metric ton			✓
	o E-waste	Metric ton		✓	✓
	o Battery	Metric ton		✓	✓
	• Waste diversion rate				
	o Total waste	Ratio			✓
	o E-waste	Ratio		✓	✓
	o Battery	Ratio		✓	✓
Local ecosystem (4)	• Land				
	o Total land use	m^2		✓	✓
	o Land-use intensity	kW/m^2		✓	✓
	• Outdoor noise	dB(A)		✓	✓
	• Mean species abundance (MSA)	MSA/km^2			✓

$mtCO_2e$ = Metric ton of carbon dioxide equivalent

DCWG Environmental Sustainability Subgroup-Iron Mountain “Categories”

IMDC Beyond Greenwashing Webinar

Sustainability Components and Measurements



Fundamental Metrics for Measuring

(all derive from ISO/IEC 30134 the underlying standard that guides how metrics should be measured in order to build consistency in the industry)

Percentage of power from renewable sources

Power Usage Effectiveness (PUE)

Energy Reuse Factor

Carbon Usage Effectiveness (CUE)

Water Usage Effectiveness (WUE)

Green Building Certifications

IRON MOUNTAIN® DATA CENTERS

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1x

DCWG Environmental Sustainability Subgroup-

Iron Mountain Sustainability Goals and reporting methodologies

Our Commitment	Published Goal	How We Will Measure
Zero Waste	Establish certified diversion rate by 2023	UL 2799 ISO 14001 US Dept. Of Energy - Waste Challenge
Carbon Neutral	Climate Neutral Data Centers by 2030	ISO 50001 ISO 14001
Green Buildings	All new colocation sites achieve BREEAM certification	BREEAM EnergyStar SS564 (SGP)
Responsible Water and Power Use	WUE and PUE per Climate Neutral Data Center Pact	ISO 50001 ISO 14001 US Dept. of Energy - Better Buildings
Renewable Energy	100% annual now, 24/7 Carbon Free by 2040	ISO 50001 ISO 14001 US Dept. of Energy - Better Buildings

DCWG (ENVIRONMENTAL) Sustainability Subgroup - iMason's

1. **iMasons Sustainability Framework (i=Infrastructure)**

   iMason's Climate Accord: https://climateaccord.org/#model

   a. **Sustainability is a growing topic of interest and concern for the data center industry and its stakeholders. Hyperscale and global enterprises are insisting on a more sustainable and carbon-neutral future.**

   b. **iMasons Sustainability Committee created the "Every Click Improves the Future" campaign that includes the following initiatives:**

      1. **Unify the industry on a sustainability vision and outline specific actions**
      2. **Make renewable energy available everywhere**
      3. **Define a sustainable data center framework**
      4. **Drive sustainability through procurement**
      5. **Achieve radical efficiency through innovation**

   c. **To measure progress toward sustainability, a common definition of "sustainable data center" is necessary. Below are four primary areas of sustainability currently focused on by the industry:**

      1. **PUE — as a measure of energy effectiveness**
      2. **Use of Renewable Energy — direct use or through acquiring PPAs, RECs, etc**
      3. **WUE — to minimize water usage**
      4. **Waste — i.e., how much is recycled**

DCWG Environmental Sustainability Subgroup - iMason's

iMasons Sustainability Framework (i=Infrastructure) continued

iMason's Climate Accord: https://climateaccord.org/#model

DIGITAL INFRASTRUCTURE MATURITY MODEL

Companies participating in the (iMason's) Climate Accord agree to an open standard and governance to report carbon impact in materials, products, and power across digital infrastructure. The Digital Infrastructure Maturity Model is a standardized framework used to measure progress in reducing:

- **embodied carbon in materials used to build data centers,**
- **embodied carbon of equipment deployed in data centers, and the**
- **hourly carbon intensity of source power used to operate data centers.**
-

The goal is global carbon accounting for each unique data center location over its lifetime.

Participating companies will support a carbon label schema for products and data center buildings in conjunction with source power carbon-intensity tracking. All carbon data will be electronically accessible.

DCWG Environmental Sustainability Subgroup

Google Environmental Annual Report Executive Summary 2023

About the 2023 Environmental Report: Executive Summary

This executive summary is an abridged version of our 2023 Environmental Report.

Google's 2023 Environmental Report provides an overview of our environmental sustainability strategy and targets and our annual progress towards them.[1] This report features data, performance highlights, and progress against our targets from our 2022 fiscal year (January 1 to December 31, 2022). It also mentions some notable achievements from the first half of 2023.

REPORT RESOURCES

- Full 2023 Environmental Report
- 2023 Environmental data tables

ADDITIONAL RESOURCES

- Sustainability.google
- Sustainability reports
- Sustainability blog
- Our commitments
- Alphabet environmental, social, and governance (ESG)
- About Google

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DCWG Environmental Sustainability Subgroup

Google Environmental Annual Report Executive Summary 2023

		Topic	Target	Unit	2021	2022	Target year	Status
Product impact		Products	**Help 1 billion people make more sustainable choices through our products by 2022**	Users	N/A	**More than 1 billion**[13]	2022	Achieve
Operational targets	**Net-zero carbon**		**Achieve net-zero emissions across all of our operations and value chain by 2030**					
		Carbon reduction	**Reduce 50% of our combined Scope 1, 2 (market-based), and 3 absolute emissions (versus our 2019 baseline) before 2030**	tCO_2e emissions	N/A	**10.2 million**[14]	before 2030	Ongoing
		Carbon-free energy	**Run on 24/7 carbon-free energy on every grid where we operate by 2030**	% carbon-free energy	66%	**64%**[15]	2030	Ongoing
	Water stewardship		**Replenish more water than we consume and help improve water quality and ecosystem health in the communities where we operate**					
		Water replenishment	**Replenish 120% of the freshwater volume we consume, on average, across our offices and data centers by 2030**	% freshwater replenished	N/A	**6%**	2030	Ongoing
	Circular economy		**Maximize the reuse of finite resources across our operations, products, and supply chains**					
		Data centers	**Achieve Zero Waste to Landfill for our global data center operations**	% of data centers at Zero Waste to Landfill	30%	**38%**	N/A	Ongoing
		Offices	**Divert all food waste from landfill by 2025**	% food waste diverted	N/A	**85%**	2025	Ongoing
		Consumer hardware products	**Use recycled or renewable material in at least 50% of plastic used across our consumer hardware product portfolio by 2025**	% recycled/ renewable material	36%	**41%**	2025	Ongoing
			Make product packaging 100% plastic-free by 2025	% plastic-free packaging	97%	**96%**	2025	Ongoing
			Achieve UL 2799 Zero Waste to Landfill certification at all final					Significa

DCWG Environmental Sustainability Subgroup

Public Policy

Increased requirements for transparency may focus attention on reduced energy use and associated GHG emissions from data centres.

- Regulatory and voluntary schemes to improve energy efficiency at the component level (e.g. servers, data storage, heating, ventilation and air conditioning [HVAC]) such as ENERGY STAR and EU Ecodesign Regulations for servers and data storage products.

- Buildings-based data centre energy efficiency guidance standards: the EU Code of Conduct on Data Centre Energy Efficiency, CLC/TS 50600-5-1, BREEAM SD 5068 (United Kingdom) and IGBC Green Data Center Rating System (India).

- The Corporate Sustainability Reporting Directive (CSRD) effective in the EC from 2024 onwards requires large organisations … to report sustainability indicators, energy, and carbon emissions.
  - ► In the US , similar reporting mandates are underway at the state level in Oregon and Virginia

(1) **Tracking Data Centres and Data Transmission Network,** updated July, 2023 https://www.iea.org/energy-system/buildings/data-centres-and-data-transmission-networks#overview

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Public Policy, continued

- The US SEC has proposed guidelines for public companies to disclose climate-related risks in data centers including Scope 1, 2, 3 GHG emissions; Metrics and targets for GHG reductions, & Governance for managing climate-related risks.(1)

- The Energy Efficiency Directive (EED), will introduce energy and sustainability reporting requirements for data centres in the EU from May 2024. Data centres with installed capacity > 500 kW will report total energy consumption – including the renewables share – water usage, and waste heat utilisation. (2)

- In China, the government has called for average power use effectiveness (PUE) of 1.25 in the east and 1.2 in the west of the country as part of its Eastern Data and Western Computing project. Major cities have minimum PUE requirements for new data centres.(2)

(1) **Executive Brief: Climate Risk Disclosures in Data Centers: A Review of the Proposed SEC Guidelines Nlyte Software, 2023 p4 ©2023 Carrier**

(1) **Tracking Data Centres and Data Transmission Network**, updated July, 2023

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Private sector initiatives

Several initiatives to measure, track and reduce the environmental impacts of digital infrastructure:

- In January 2021 data centre operators and industry associations in Europe launched the Climate Neutral Data Centre Pact, pledging to make data centres climate-neutral by 2030 with intermediate (2025) targets for power usage effectiveness and carbon-free energy.

- The Open Compute Project is a collaborative community focused on redesigning hardware technology to efficiently support the growing demands on computing infrastructure.

- The 24/7 Carbon-free Energy Compact, coordinated by Sustainable Energy for All and the United Nations, includes three data centre operators: Google, Microsoft and Iron Mountain.

Tracking Data Centres and Data Transmission Network, updated July, 2023

https://www.iea.org/energy-system/buildings/data-centres-and-data-transmission-networks#overview