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The Big Tech in Sustainability Report

How Amazon, Google, and Microsoft are tackling emissions

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Our Most Popular Research on Climate Tech

Tech Market Map Report: Decarbonization Tech In Industrials

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2021 Climate Tech Outlook: Next-gen solutions to cut emissions & reduce resource intensity

State of Energy 2021 Report

The shift to a circular economy: How tech is shaping the future of sustainable retail

Analyzing Amazon's growth strategy: How the tech giant is shaping the future of transportation and logistics

Analyzing FedEx's innovation strategy: How the shipping giant is investing in next-generation technology

Analyzing TotalEnergies' growth strategy: How the energy giant is transitioning away from fossil fuels

Plastic packaging in driving the global waste crisis. Here's how top CPG corporations are tackling the issue.

Carbon capture, utilization, and storage (CCUS) tech funding is soaring in the face of increasing emissions regulations

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Summary of findings

Overview of big tech's activities in climate tech

Big tech's focus on climate tech has ramped up as players set new carbon emissions targets. Amazon, Google, and Microsoft have all made pledges over the past 3 years to reach net-zero carbon emissions. Microsoft is the most aggressive of the bunch, with the goal to be carbon negative by 2030.

- In particular, the group is focused on changing their energy mix, as fossil fuels are a major contributor to their carbon footprint. For example, one of Google's newest goals is to power its operations exclusively with renewable energy by 2030.
- To reach their goals, these big tech players have increased activity in buying carbon offset credits, developing new sustainability-related products in-house, and increasing procurement of renewable energy.

These big tech leaders are making billions of dollars available to climate tech startups through new funds and accelerators.

- In June 2020, Amazon launched its $2B Climate Pledge Fund, which has made 20 investments (as of May 2022) across the climate tech space.
- Microsoft also launched a $1B fund in 2020 to invest in climate tech startups. The fund's 18 direct investments to date focus on carbon removal, including new technologies like direct air capture, carbon utilization, and sustainable aviation fuel (SAFs) production.
- Google's climate tech accelerator, which launched in 2021, has led the bulk of its investment activity. The tech giant has participated in 40+ climate tech deals in the last 5 years.

What's next?

Amazon, Google, and Microsoft's influence encourages climate tech adoption. As these tech behemoths transition to greener practices, their actions may influence company expectations and set standards for competitors. For instance, Amazon's order for 100K electric vans from Rivian made waves in 2019, driving interest in the EV industry.

Since tech giants can provide substantial financial and technical support, their climate tech investments could help accelerate startups' timelines to commercialization. Investors have been skeptical of climate tech in the past, as its return on investment has been uncertain since several startups have failed before launching at scale. However, funds like Amazon's Climate Pledge Fund — which is dedicated to backing climate tech startups — could lead to more support for companies that need extra capital to reach the commercialization stage.

Watch for Amazon, Google, and Microsoft to vie for leadership positions in climate tech software, such as emissions tracking apps. These tech giants' brand recognition and large user bases position them well (with lower adoption hurdles) versus startup entrants in these new tech categories.

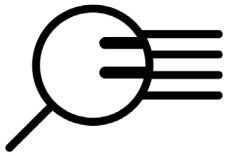
At the same time, big tech will also collaborate with startups in the sector. For example, Google has worked with carbon accounting startup Normative to build a carbon calculator that can help businesses cut emissions. Continue to monitor developments in the carbon accounting and climate risk analysis spaces.

Where big tech is making moves

How big tech is making strides in climate tech

Microsoft	Microsoft has committed to being carbon negative by 2030 and removing its historical carbon emissions by 2050. The tech giant is enhancing its platform by adding carbon accounting and supply chain visibility tools — a growing market segment. Through its $1B Climate Innovation Fund, Microsoft wants to accelerate the development of decarbonization technologies, like carbon offset markets, direct air capture, and sustainable aviation fuels (SAFs).
amazon	Amazon aims to reach net-zero carbon emissions within its operations by 2040. The company also plans to make half of all its shipments net-zero carbon by 2030. To achieve these goals, Amazon is decarbonizing its business lines, focusing on transitioning its delivery fleet to EVs and deploying more sustainable packaging. The tech giant is also investing in climate tech via its $2B Climate Pledge Fund, backing climate tech startups across sectors like manufacturing, transportation, and the circular economy.
Google	Google plans to power its operations exclusively on “carbon-free” energy by 2030, a step up from its previous goals. The tech giant is creating carbon accounting and climate risk analysis tools focused on the city level, which are currently free. Internally, Google’s engineers are working on making the company’s data centers use only renewable energy with tech it calls “carbon-intelligent computing.” The tech giant is backing climate tech deals via its accelerator launched in 2021 and direct investment.

What's driving big tech activity in climate tech?



Increasing pressure to decarbonize

Across the board, companies are facing increased regulatory, investor, and consumer pressure to reduce their carbon footprint. In response, big tech companies have taken steps to establish net-zero goals.

New market opportunity in climate tech

Tech giants are enhancing their in-house products and services to adapt to the growing market opportunity. Specifically, we see positioning in emissions tracking (carbon accounting) and climate risk analysis.

Investing in climate tech to bolster brand

Tech incumbents see decarbonization as a problem that tech can help solve. As such, investing in climate tech will help them to strengthen their brand reputation and attract top talent.

New regulations and investor pressure are forcing big tech to prioritize sustainability

Industry leaders, including big tech players, are facing increasing scrutiny from investors, government officials, and consumers to decarbonize — particularly due to their large size and global reach.

New policies from regulators, like the SEC's in-progress climate-related disclosures, are forcing companies to prepare to share their carbon footprints and mitigation action plans publicly.

SEC to Require Climate-Change Risk Disclosures Under New Plan

March 21, 2022 | Bloomberg

Corporate emitters fall far short of climate goals, investors say

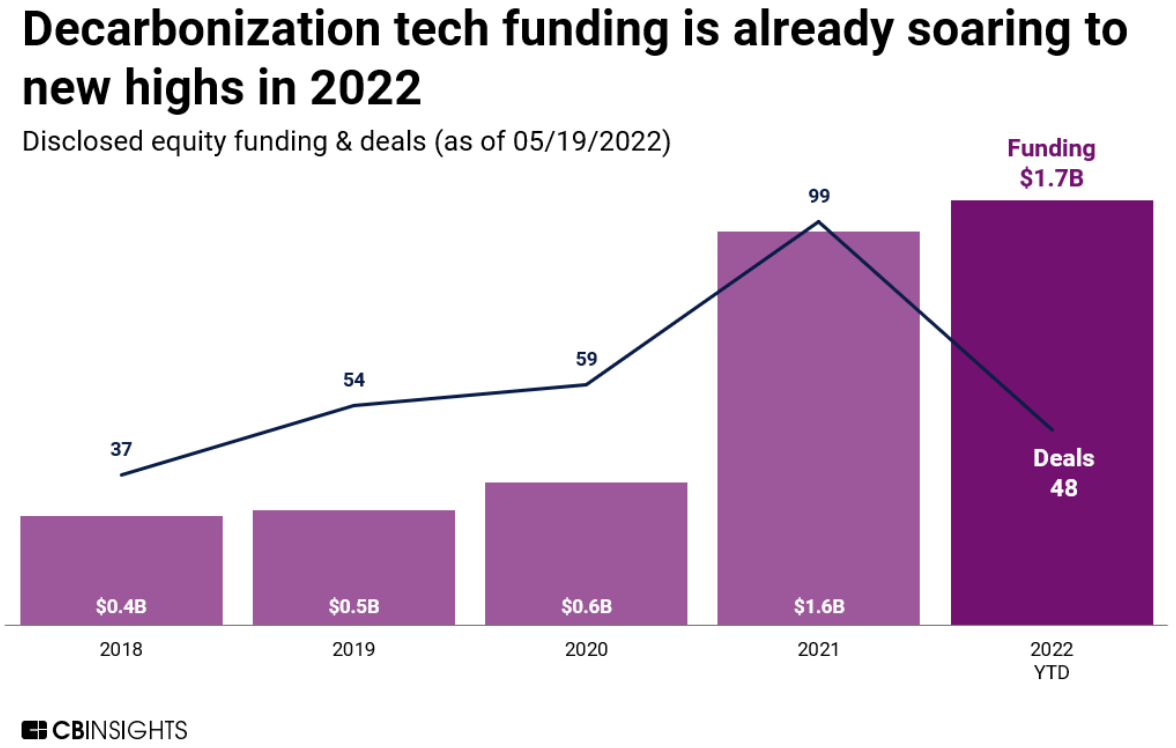
March 31, 2022 | REUTERS®

Tech leaders are racing to serve the demand for decarbonization tech

Seeing the new market opportunity for decarbonization tech, startups are developing products & services across emissions tracking, carbon offsets, carbon capture, and more. They're also seeking out investor backing — at $1.7B, funding to the space has already crossed 2021's mark in 2022 so far.

Tech leaders have kept an eye on this trend: Amazon, Google, and Microsoft have all incorporated decarbonization tech tools into their products & services.

With market leadership still up in the air, big tech giants are vying for a piece of the decarbonization tech pie.



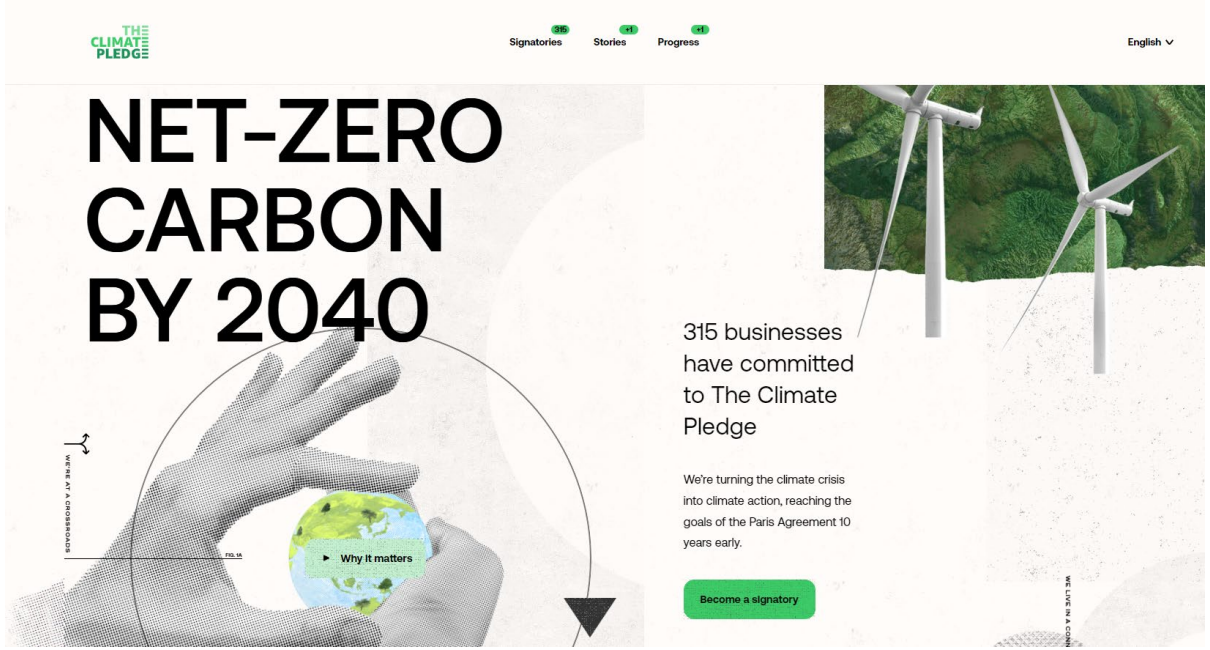
Source: CB Insights

Big tech sees an opportunity in ‘going green’ and funding climate tech startups

By striving toward net-zero goals and supporting climate tech, big tech leaders are positioning themselves as environmentally responsible — which could further their leadership image and attract talent, particularly among millennials and Gen Z.

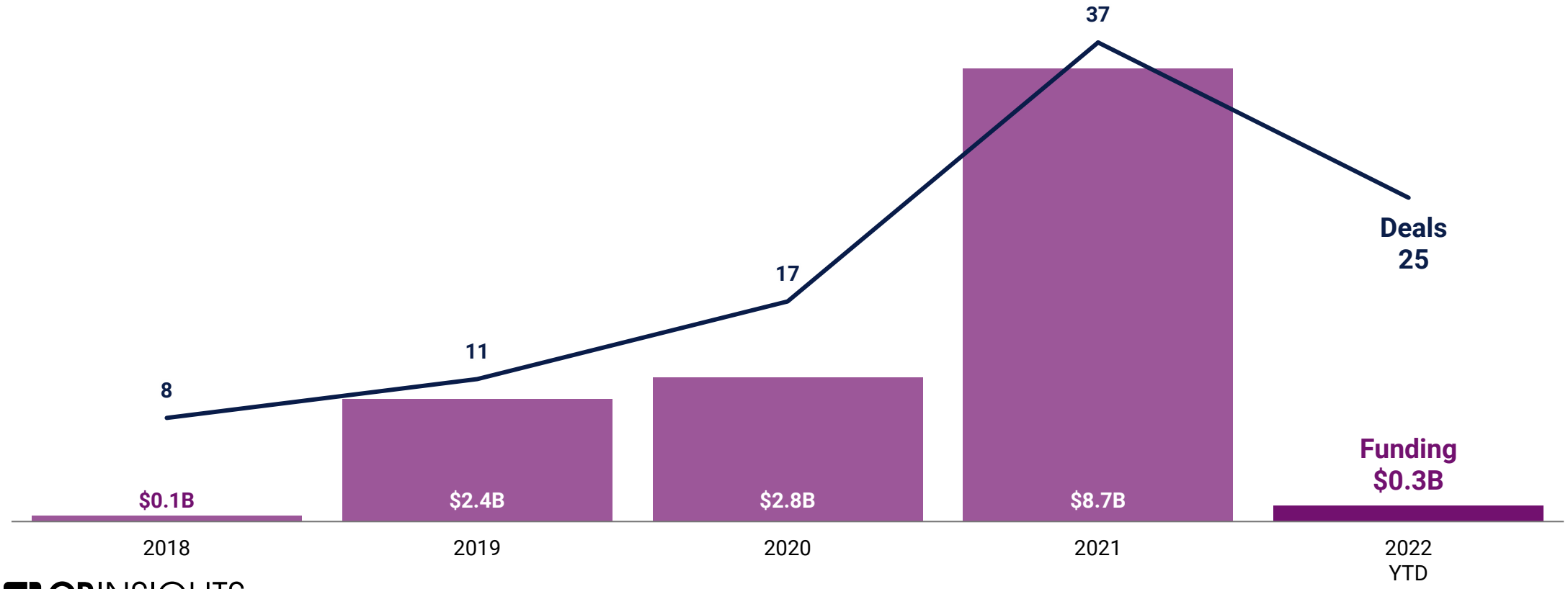
For instance, when setting its 2040 net-zero goal, Amazon co-created The Climate Pledge, in which all signatories also commit to reaching net-zero by 2040. Over 300 companies have signed the pledge, including SAP and Maersk.

Large climate tech-focused funds or accelerators, like Microsoft’s $1B Climate Innovation Fund, also strengthen their brand positioning.



Big tech is ramping up investment in climate tech — though 2022 funding is off to a slow start

Disclosed deals & equity funding with participation from Amazon, Google, and Microsoft* (as of 05/19/22)



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Source: CB Insights | *Includes subsidiaries

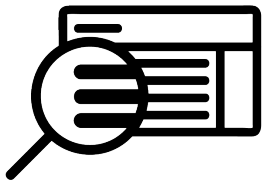
Big tech's largest rounds are in transportation & energy

Company	Amount raised Deal date	Total disclosed funding	Select investors	Description
RIVIAN	$2.5B (07/23/21) + add'l rounds	$11.2B	**Amazon, The Climate Pledge**, Soros Fund Management, Ford Motor Company	Rivian develops and produces electric vehicles, including commercial delivery vans.
REDWOOD MATERIALS	$700M (07/28/21)	$792M	**Amazon (The Climate Pledge),** Breakthrough Energy Ventures, Ford Motor Company	Redwood Materials is focused on recycling batteries, particularly from EVs, and reclaiming valuable materials, like nickel and cobalt.
BETA	$368M (05/18/21)	$744M	**Amazon (The Climate Pledge),** The Rise Fund	Beta Technologies is developing vertical take-off and landing (VTOL) aircraft powered by batteries.
INFINIUM™	$69M (10/27/21)	$69M	**Amazon (The Climate Pledge),** NextEra Energy Resources, Mitsubishi Heavy Industries	Infinium creates low carbon fuels from CO2 emissions.
LanzaJet	$50M (01/13/22)	$100M	**Microsoft**, All Nippon Airways, British Airways, Shell Ventures, Suncor Energy	LanzaJet, a spinoff from LanzaTech, produces sustainable aviation fuels (SAFs) and renewable diesel from CO2 emissions.

Source: CB Insights

Microsoft

Where Microsoft is focusing



Creating emissions-tracking tools in-house

While working toward its own goal of being carbon negative by 2030, Microsoft is also incorporating carbon accounting and supply chain carbon footprint tools into its enterprise offerings.

Investing in decarbonization tech

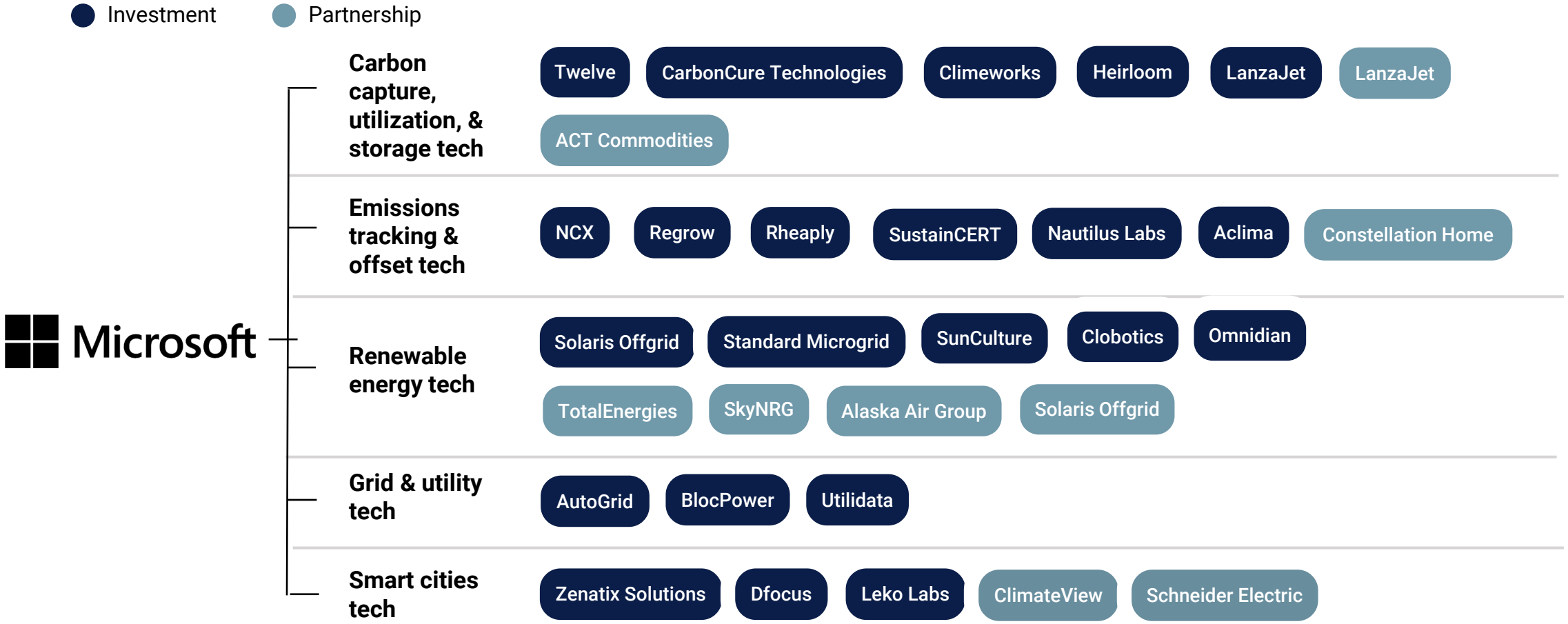
Microsoft is pouring funding into promising startups that can help reduce its carbon footprint — participating in 18, mostly early-stage, deals in the last two years via its Climate Innovation Fund.

Buying carbon offsets

While the tech is still in the early stages, Microsoft has started purchasing offsets from pioneering carbon offset startups.

Microsoft's climate tech strategy map

2018 – 2022 (as of 06/01/2022)



 Source: CB Insights | These designations are not exhaustive of Microsoft's investment and partnership activity in the analyzed period.

Theme 1

Microsoft is creating emissions-tracking tools in-house

Microsoft has built emissions-tracking tools for internal use, clients, and suppliers…

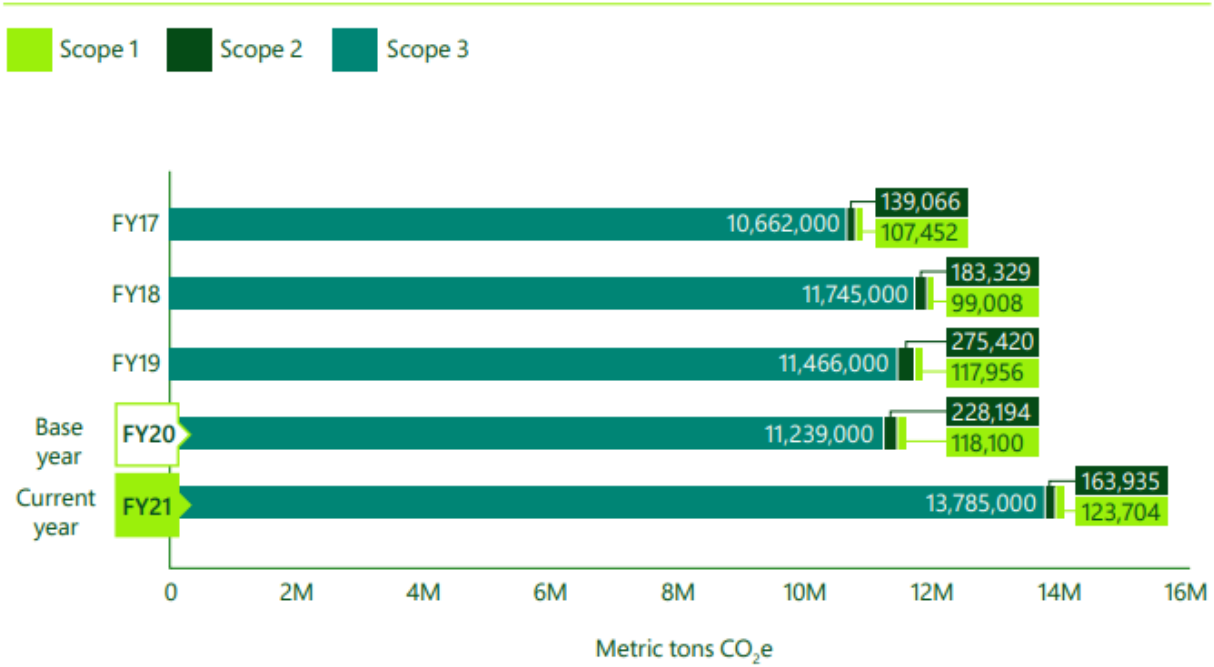
Microsoft intends to remove more carbon than it emits by 2030 — a relatively aggressive goal compared to its peers.

To reach this goal, Microsoft is tracking and reporting its own emissions publicly. It's also launched software features that enable companies to count their emissions and track their supply chain footprints.

A particular challenge Microsoft is targeting (see image) is tracking Scope 3 emissions (also known as value chain emissions), which are emissions indirectly produced by businesses, for example via their supply chains or through consumer usage of their products.

Tracking our yearly emissions across Scopes 1, 2, and 3

In FY21, we reduced our Scope 1 and 2 (market-based) emissions by 16.9 percent. We saw an increase in Scope 3 emissions driven by growth of our cloud services business and an increase in sales and usage of our devices.

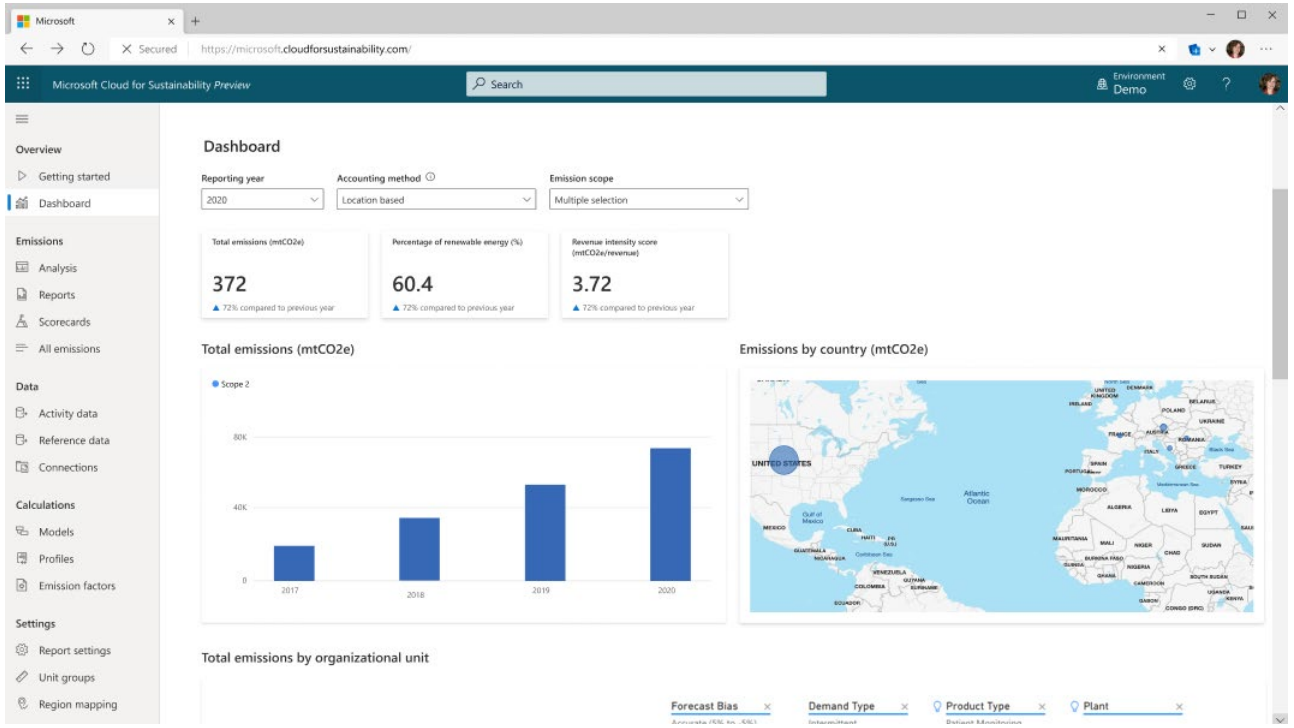


Source: Microsoft's 2021 Environmental Sustainability Report

… and is developing software focused on carbon footprint reduction

Microsoft has been working on new offerings to help companies tackle their carbon footprint, including:

- **Microsoft Cloud for Sustainability** — a cloud offering launched in July 2021 for enterprise carbon accounting. Microsoft is competing with a growing market of startups in the carbon accounting space such as Persefoni, Sweep, and Watershed.
- **Supplier reporting tools** — a collaboration with Engie, WSP, and CDP that allows suppliers to report and strategize to reduce their emissions. Tools like these are crucial for addressing Scope 3 emissions.



The Microsoft Cloud for Sustainability platform

Source: Microsoft Cloud for Sustainability

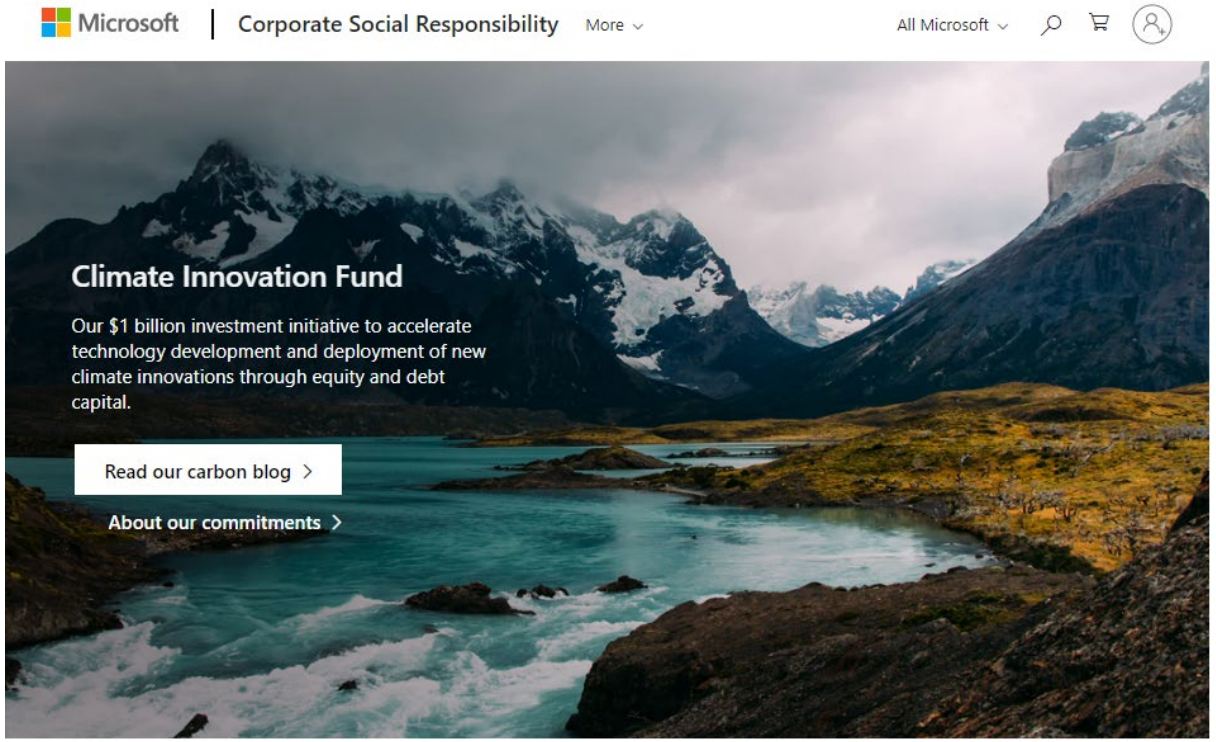
Theme 2

Microsoft is ramping up investments in decarbonization tech

Announced $1B Climate Innovation Fund in 2020

In 2020, Microsoft launched its $1B Climate Innovation Fund (CIF). The fund is aimed at investing in carbon reduction, carbon removal, and climate resilience tech through 2024.

To date (5/26/22), the fund has completed 18 direct investments — ranging from direct air capture companies like Climeworks and Heirloom to energy efficiency optimizers AutoGrid and Utilidata.



Source: Microsoft

Investments span carbon utilization, offset marketplaces, and direct air capture

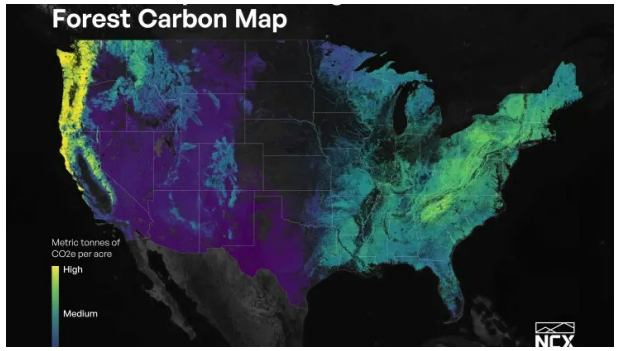
LanzaJet

Round: Unattributed (01/13/22)

Amount: $50M

About: LanzaJet produces sustainable aviation fuels (SAFs) made from CO2 emissions. This round will fund the construction of LanzaJet's new Georgia plant.

NCX



Round: Seed VC - II (05/26/21)

Amount: $20M

About NCX has developed a marketplace connecting forest landowners and developers with buyers looking to purchase carbon offsets.

climeworks

Round: Corp. Minority (01/28/21)

Amount: Undisclosed

About: Climeworks has developed direct air capture technology that pulls CO2 directly from the atmosphere and stores it underground. The company is currently building out large-scale plants globally.

Source: CB Insights

Microsoft partners with climate funds to spread funding strategically

The Microsoft Climate Innovation Fund has made investment commitments in a number of VCs that specialize in climate tech.

Fund managers include Closed Loop Partners, Earthshot Ventures, Energy Impact Partners, and Carbon Direct, among others.

In 2021, Microsoft also contributed $100M to Breakthrough Energy's Catalyst initiative — a public-private network focused on advancing climate tech. Other corporate contributors include American Airlines, ArcelorMittal, Bank of America, BlackRock, BCG, and GM.

Source: Microsoft's 2021 Environmental Sustainability Report

Theme 3

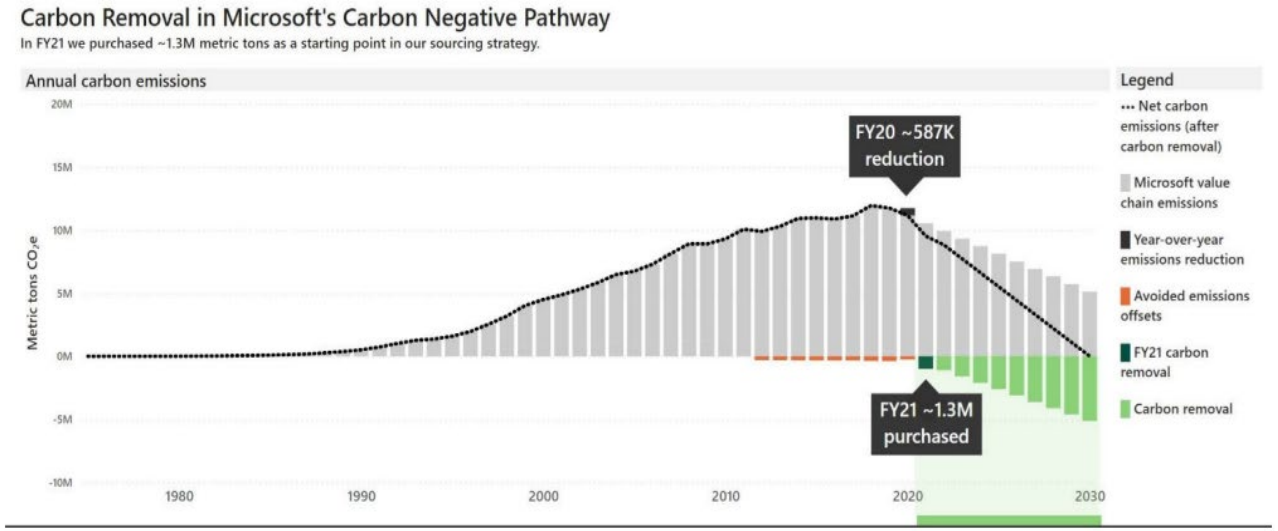
Microsoft is buying carbon offsets as availability increases

Microsoft purchases carbon offsets and creates its own verification group

In FY 2021, Microsoft purchased more than 1.3M metric tons of carbon offsets from 15 organizations (see image to the right).

Carbon offsets are a relatively new product, where corporations pay companies that "draw CO2" out of the atmosphere via forestation projects, wetland restoration, direct air capture, or other innovative methods.

Microsoft has stated that it doesn't trust third-party verification, so the company created its own group of third-party experts from carbon removal-focused advisory firm Carbon Direct and NGO Winrock International to verify its carbon offset criteria. Microsoft has published its CO2 removal guidelines here.



CARBON DIRECT

WINROCK INTERNATIONAL

Source: Microsoft's 2021 Environmental Sustainability Report

Microsoft looks to emerging DAC tech to bolster its carbon removal strategy

A notable emerging technology Microsoft added to its sustainability portfolio in 2021 is direct air capture (DAC) — tech that can draw out and concentrate CO2 from the atmosphere without a CO2 source nearby.

While high costs remain a barrier to broad adoption, DAC tech is becoming more promising as startups work toward scaling up their tech to capture carbon at megaton capacities — the scale needed to make a meaningful impact on global emissions.

In 2021, Microsoft invested in DAC startup Climeworks. The tech giant also purchased carbon offset credits for the removal of 1,400 metric tons of carbon from Climeworks.

The startup appears on track to lead the expansion of DAC plants, as it successfully started up its 4,000-metric-ton capacity DAC plant in Iceland last year. The company recently raised a $650M round to continue expansion.

Clients can learn more about direct air capture tech here.

Sources: Microsoft, Climeworks

Microsoft's plans point to key trends for 2022

	Creating carbon tracking tools in-house	Investing in decarbonization tech	Buying carbon offsets
Summary	Microsoft is expanding its software offerings to include sustainability/ climate tools to help clients collect data, crunch metrics, and create reports.	Microsoft is investing across climate tech via its $1B Climate Innovation Fund (CIF), with a focus on carbon capture and utilization.	Microsoft is engaged in conducting its own due diligence and purchasing carbon offsets, in particular buying credits from the most compelling tech solutions in the carbon removal space.
Implications	Monitor how Microsoft's market share grows in emissions tracking & management (for both regular operations and supply chains). While there are several hot startups in the space (like Persefoni), Microsoft's broad existing userbase is a competitive edge (lower adoption friction).	Anticipate continued acceleration of Microsoft's investments in climate tech, as the company's climate tech annual deal flow has more than doubled in the last two years. The tech giant's support of climate tech refinement and innovation could help it reach its carbon-negative goal. Given its recent track record, expect continued focus in the carbon capture & utilization and energy efficiency areas.	Monitor Microsoft's carbon offset purchase activity — if different from peers that use third-party org. standards, further assess where the gap in criteria is (Microsoft's carbon offset verification criteria could differ from its peers' criteria). Anticipate Microsoft to explore purchasing more DAC carbon offsets down the line as offsets and DAC tech decrease in cost.

Amazon

Where Amazon is focusing

Electrifying its delivery fleet

Amazon is tackling delivery fleet emissions by investing in and deploying electric vehicles.

Investing in transportation & logistics tech

The tech giant launched a $2B climate tech-focused fund and is backing startups developing clean tech, particularly in vehicle electrification and logistics.

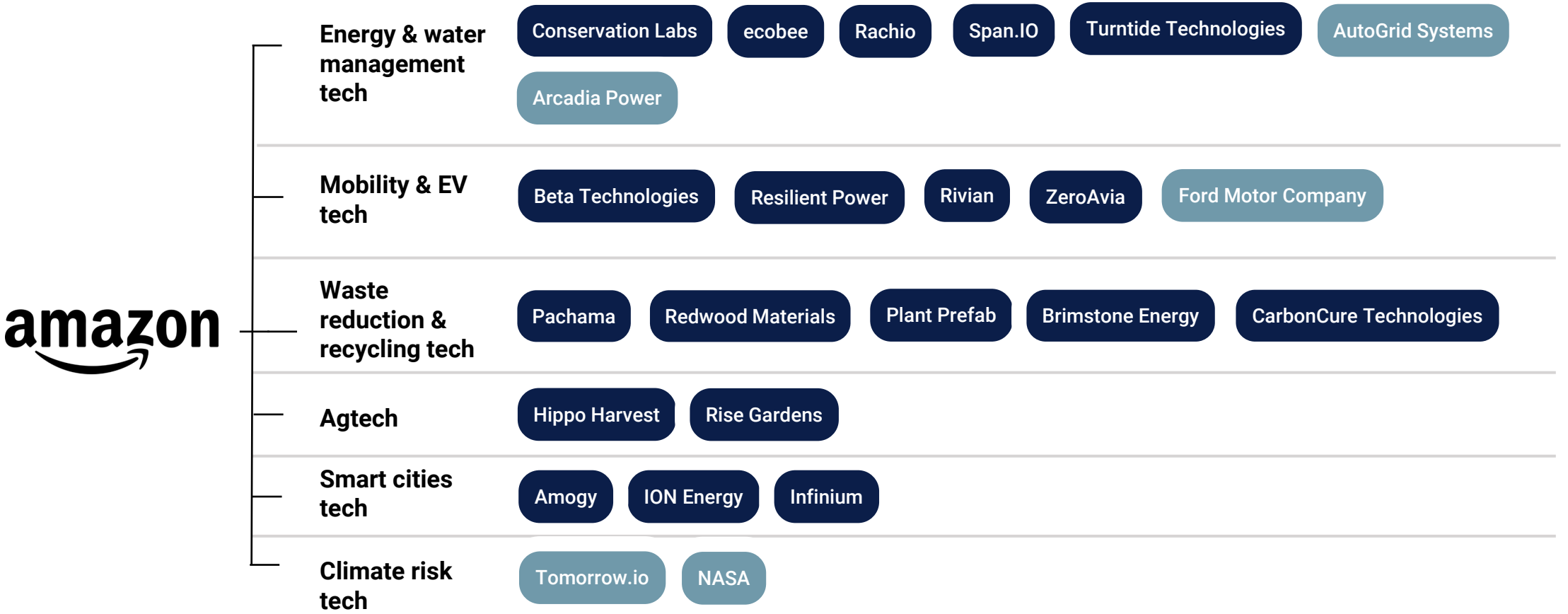
Decreasing its supply chain carbon footprint

Apart from its delivery fleet, Amazon is taking action to partner and back companies creating more sustainable packaging, increasing recycling adoption, and tracking emissions.

Amazon's climate tech strategy map

2018 – 2022 (as of 06/01/2022)

● Investment ● Partnership



Source: CB Insights | These designations are not exhaustive of Amazon's investment and partnership activity in the analyzed period.

Theme 1

Amazon is electrifying its delivery fleet

Amazon orders 100,000 electric delivery vehicles from Rivian

In 2019, Amazon announced it had ordered 100,000 electric delivery vehicles from Rivian. The tech giant's plan is to have all 100,000 on the road by 2030.

This switch was projected to reduce Amazon's carbon footprint by 4M metric tons annually by 2030. This would be a small dent, as its 2020 Scope 3 emissions were 46M metric tons.

Amazon is a top shareholder in Rivian, with an 18% stake as of March 31, 2022.

Sources: Rivian, CB Insights

Rivian partnership is progressing despite pandemic-related hiccups

Since Amazon has pledged that half of its deliveries will be carbon-neutral by 2030, the tech giant is putting pressure on Rivian to meet these goals.

While Rivian started to deliver electric delivery vans to Amazon in Q4’21 and Q1’22, the EV maker is not on track to meet its initial target of delivering 10,000 vehicles to Amazon in 2022

Rivian cited production delays related to Covid-19, parts shortages, and production holdups. Given ongoing global supply chain issues, all parties will likely keep a close eye on how Rivian executes and delivers this year.

Source: Rivian

Amazon diversifies its electric delivery van orders

Amazon wants to transition its ~175,000 delivery fleet to EVs. However, the electric delivery van industry is still working on getting its products to market at scale. As such, the tech giant is placing bets across the industry.

LION ELECTRIC

Amazon has placed an order to procure up to 2,500 electric trucks from Canada-based Lion Electric by 2025. These trucks could improve Amazon's middle-mile capacity.

Mahindra electric

Amazon has also partnered with India-based Mahindra Electric Mobility to purchase and deploy 100 electric 3-wheeled last-mile delivery vehicles within India. This will help Amazon meet its announced goal of utilizing 10,000 EVs by 2025 in India.

STELLANTIS

In early 2022, Amazon announced a partnership with Stellantis to purchase an undisclosed number of electric delivery vans (reportedly in the "thousands") in 2023. The two will also collaborate to develop in-vehicle software for Stellanis' vehicles.

Theme 2

Amazon is investing in transportation & logistics tech via its $2B climate fund

Amazon’s Climate Pledge Fund looks to startups to accelerate the transition to greener operations

In 2020, the tech giant launched its $2B Climate Pledge Fund to invest in companies facilitating “the transition to a low-carbon economy.”

While Amazon has not specified a timeline over which it will deploy its initial $2B in funding, the CVC fund has been actively investing in emerging technologies in the space since its launch.

The Climate Pledge Fund’s (CPF) 20 investments (as of 5/12/22) cross multiple sectors, from renewable energy tech to transportation & logistics.

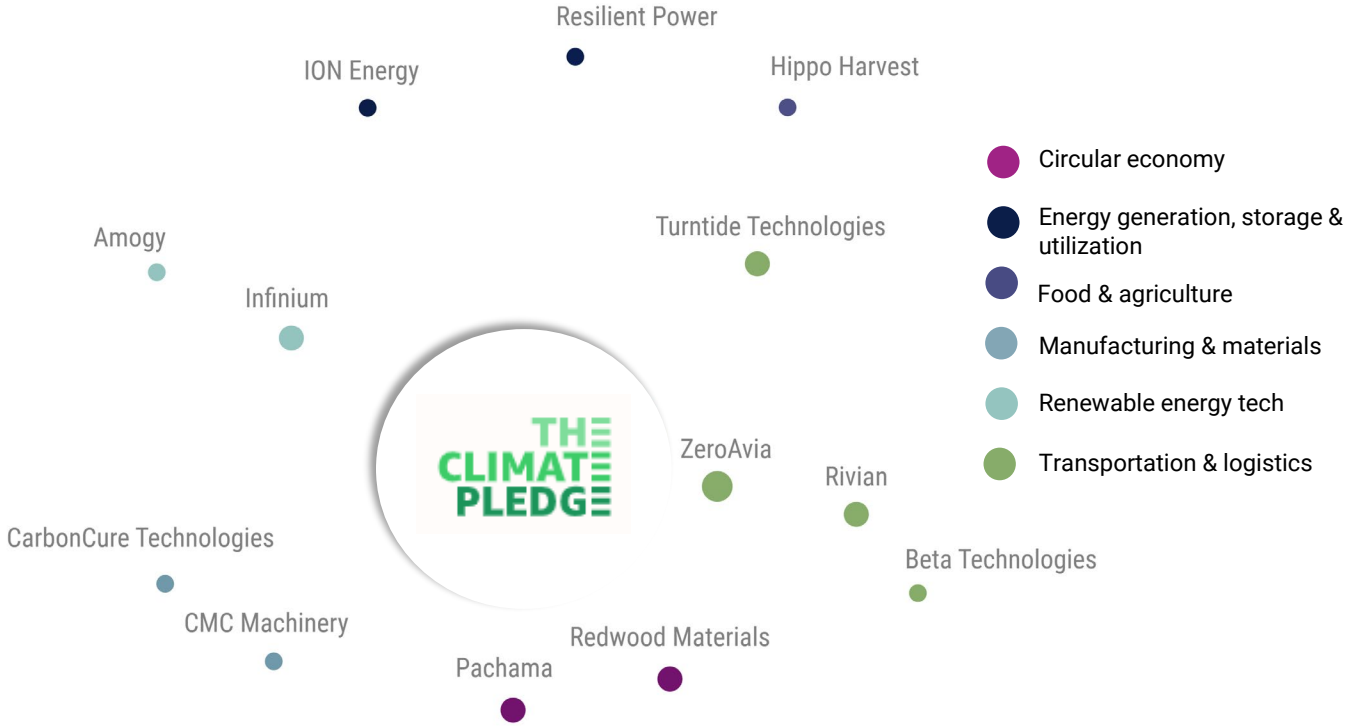
Sources: Amazon

Climate tech investments are broad, with emphasis on transportation & logistics tech

The Climate Pledge Fund has been most active in transportation & logistics, with 40% of the funding rounds its participated in falling in this category. The fund has doubled down by backing multiple rounds to companies like ZeroAvia and Rivian.

Amazon's CVC agenda reflects the tech giant's decarbonization priorities, as shown by its push to deploy electric delivery vehicles.

We take a deeper dive into Amazon's transportation and logistics strategy here.



Bubble size and placement corresponds to total number of Climate Pledge Fund-backed investments in a company, 2020 — 2022 YTD (5/12/22)

Source: CB Insights

Deals concentrated on tech decarbonizing logistics

Round: Corp. Minority (12/13/21)

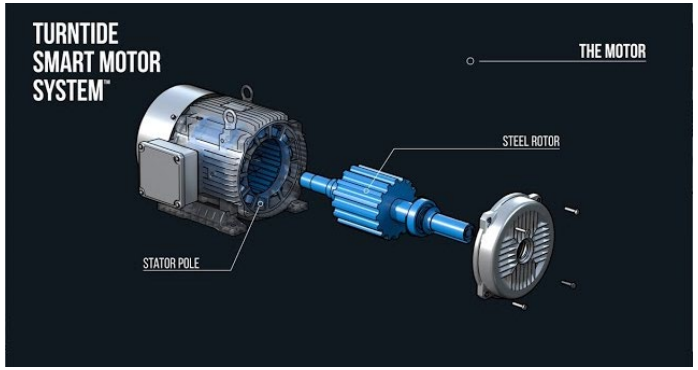
Amount: $35M

About: ZeroAvia is developing hydrogen-powered planes. The startup is currently piloting planes in the US.

Round: Series A (05/18/21)

Amount: $368M

About: Beta Technologies is creating and testing battery-powered aircraft. The startup intends to initially build out a fleet for cargo and logistics.



Round: Series B (12/4/20)

Amount: $80M

About: Turntide Technologies develops electric motor systems meant to replace fossil-fuel-powered counterparts in energy-intensive industries.

Source: CB Insights

Theme 3

Amazon is decreasing its supply chain carbon footprint

Beyond vehicles, Amazon is working on decreasing its footprint in packaging

Decreasing packaging waste is another important priority for Amazon in meeting its Shipment Zero initiative – its goal to make 50% of its shipments net-zero carbon by 2030.

Amazon's actions to decrease its packaging waste include:

- Developing ship-in-own-containers (SIOCs), like its collaboration with P&G to create a shippable Tide Eco-Box
- Developing in-house a recyclable paper-padded mailer to replace plastic mailers by the end of 2022
- Using machine learning algorithms to pick the optimal packaging for parcels (e.g., padded mailers take up less space than boxes), which can optimize the number of packages per trip

Amazon and P&G co-developed the Tide Eco-Box, which is shippable as is.

The inside of Amazon's recyclable paper mailer.

How packaging robustness was considered in one of Amazon's ML studies.

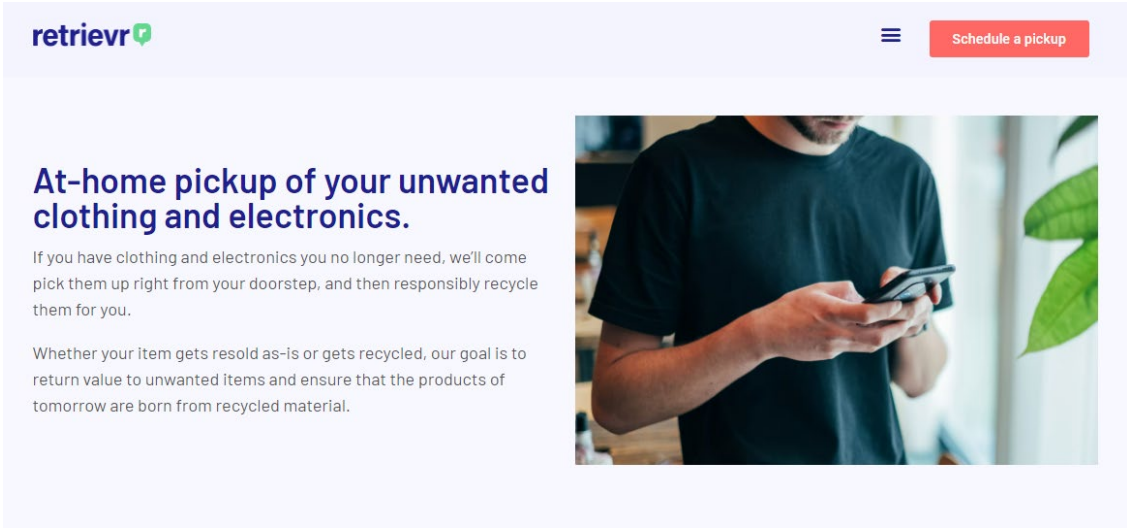
Source: Amazon

Amazon is supporting circular packaging & recycling tech

In 2018, Amazon announced it would invest $10M into the Closed Loop Fund, which is focused on recycling tech and developing the circular economy (a framework to reuse, recycle, and reduce material resource use overall).

Amazon, along with Google, Apple, Dell, and Microsoft, is working with recycling startup Retrievr to pilot its doorstep e-waste and clothing collection and recycling service. Retrievr has received funding from Closed Loop Partners.

The New York-based startup operates in Philadelphia and is piloting its e-waste recycling tech in Denver this year.



Source: Amazon

Digging into carbon offsets via nature-based solutions

To offset the footprint of its supply chain and other business operations, Amazon created its $100M Right Now Climate Fund in 2019. This fund focuses on investing in nature-based carbon offset solutions (restoring forests, wetlands, and grasslands) globally.

This is an interesting approach as several large corporations, including tech giant peers like Microsoft, have invested in other types of carbon offsets (like DAC).

Most recently, in September 2021, Amazon provided $2.4M in funding to the Parco Italia urban forestry program in Italy. The program's goal is to plant 22M trees across Italy to help improve air quality and make cities more "climate-change resilient."

Source: Amazon

Amazon’s climate tech focus areas in 2022

	Electrifying its delivery fleet	Investing in transportation & logistics tech	Decreasing supply chain carbon footprint
Summary	Amazon is working on electrifying its delivery vehicle fleet. EV maker Rivian is a major partner in this mission, as Amazon has ordered 100K vans from the company — though Amazon is also diversifying its orders by buying from Rivian’s competition.	Amazon has increased its investment in climate tech via its new $2B VC arm, The Climate Pledge Fund. Transportation and logistics is a major focus area, with the fund backing startups like Rivian and ZeroAvia.	Amazon is developing more sustainable packaging options, supporting recycling initiatives, and investing in nature-based carbon offsets.
Implications	As Amazon receives electric vehicles, anticipate the tech giant will shore up its charging infrastructure. The timing of fleet electrification and addition of charging infrastructure is unclear, as it is contingent on Rivian’s vehicle production and delivery.	Amazon is actively building its capacity for air freight — and its investments and orders could accelerate the commercialization timeline of aircraft startups like ZeroAvia.	With its increased emphasis on sustainability, the tech giant will continue to pursue, fund, and pilot emerging technologies in the circular economy. Anticipate more recycling and return pilots (like its partnership with Retrievr) in the coming years, as these require extensive testing to understand consumer behavior.

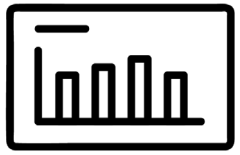
Google

(Alphabet)

Where Google is focusing

Expanding environmental monitoring features

With a library of data and software, Google is helping users to monitor environmental data, like emissions, air quality, and tree canopy.



Making its data centers green(er)

Google is working on ways to make its 20+ energy- and water-guzzling data centers more sustainable.

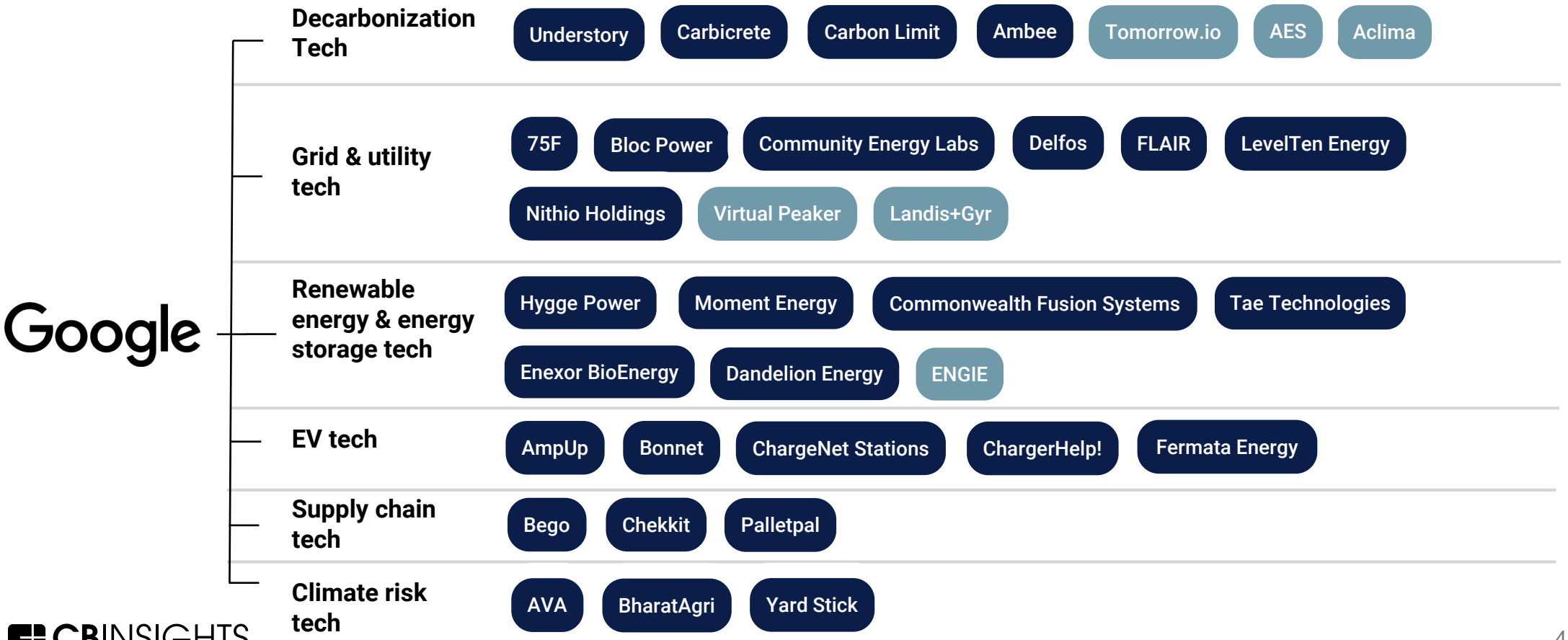
Backing early-stage climate tech startups

The tech giant is primarily backing climate tech startups via its startup accelerator, supporting a variety of climate technologies.

Google's climate tech strategy map

2019 – 2022 (as of 06/01/2022)

● Investment ● Partnership



CB INSIGHTS

Source: CB Insights | These designations are not exhaustive of Google's investment and partnership activity in the analyzed period.

Theme 1

Google is expanding environmental monitoring features

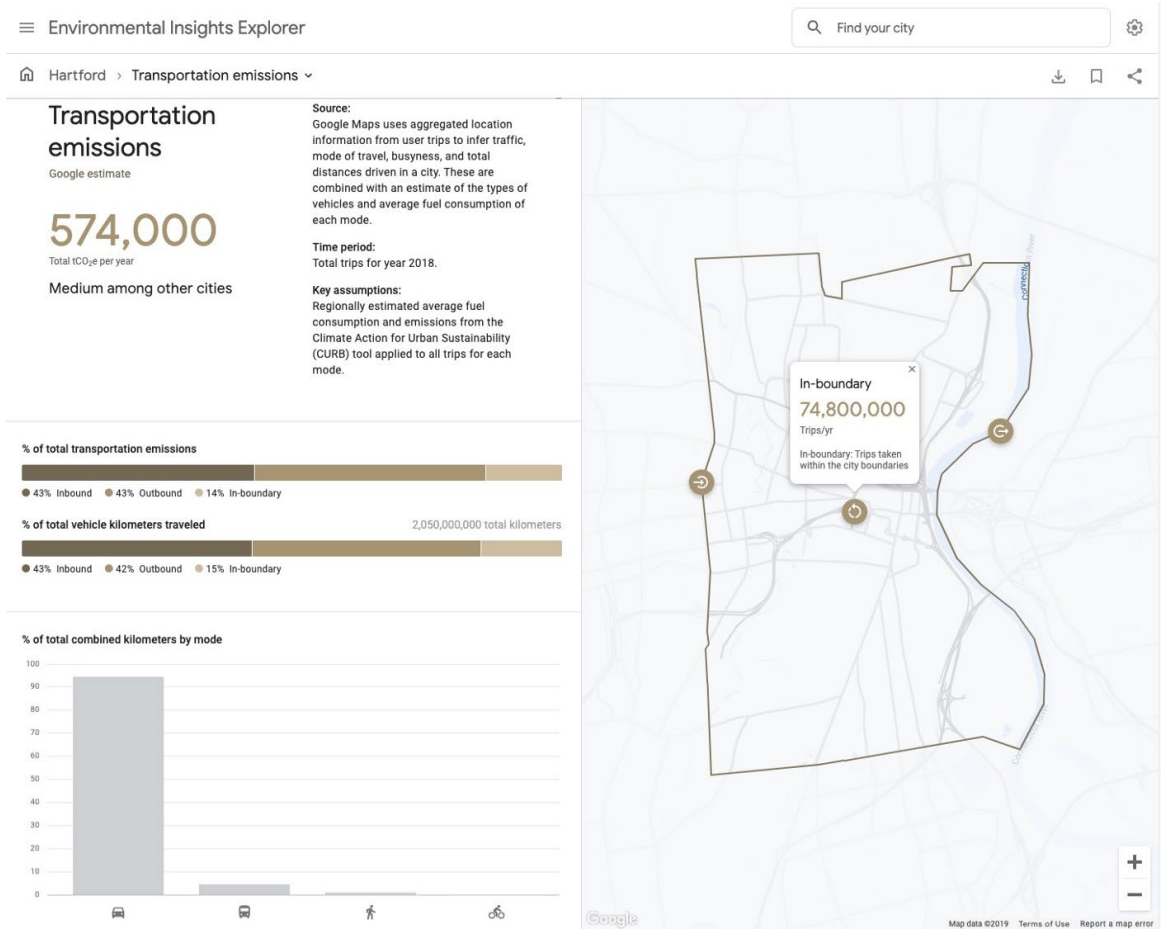
Google adds climate tech features to its platform

Like Microsoft, Google is developing climate tech features for its platform.

One prime example is its Environmental Insights Explorer (EIE) tool, which lives on top of the tech giant's ubiquitous Google Maps tech.

This tool allows cities around the world to track and model their emissions from transportation and buildings within city limits. It also enables them to estimate rooftop solar panel potential.

This service is similar to offerings from carbon accounting startups. However, Google offers this platform for free.

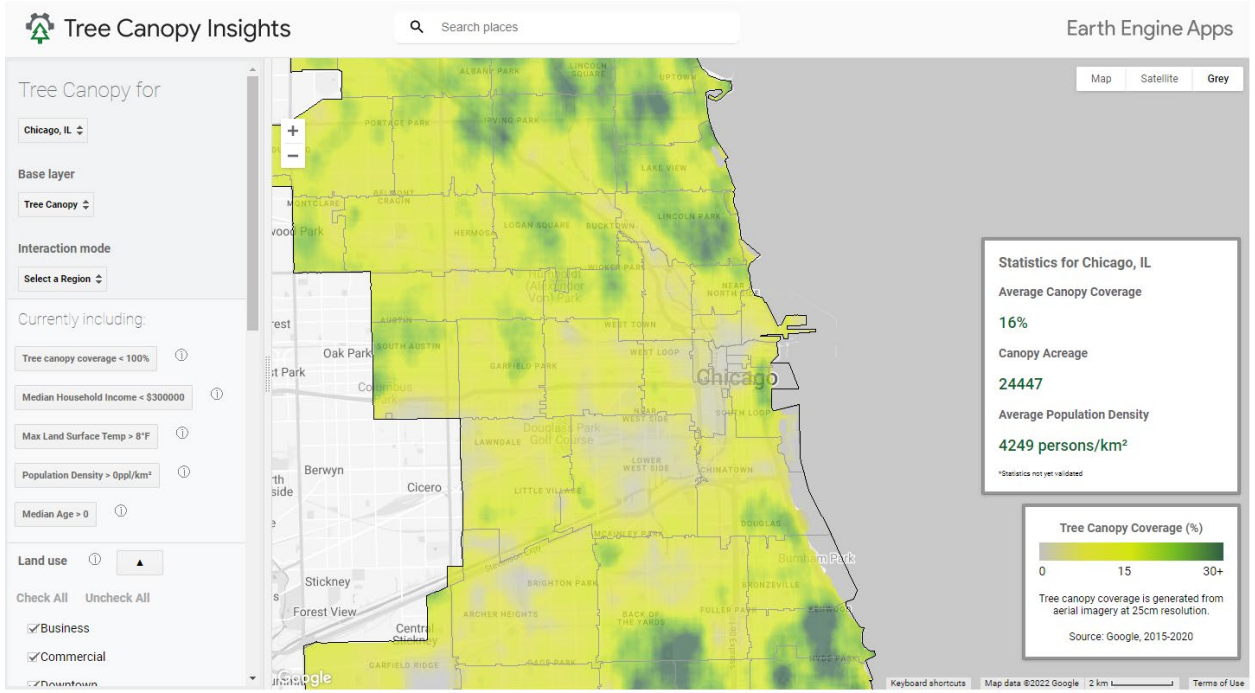


Source: Google

Google’s EIE tool is moving into the climate risk tech space

Since EIE’s initial launch in 2018, Google has expanded the platform to include more geographies globally and data sets, like air quality and tree canopy data (currently in beta mode).

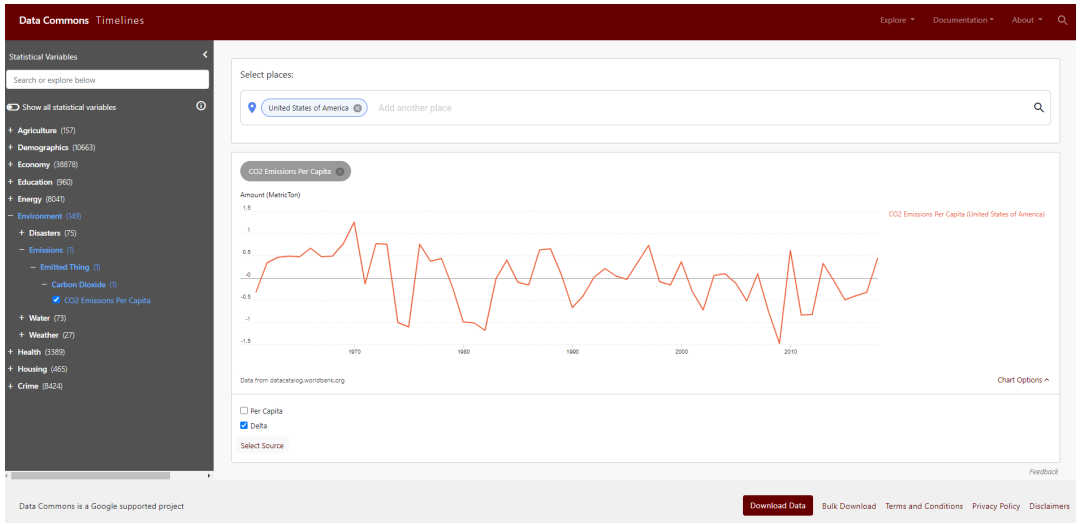
These expansions indicate that Google’s EIE tool is inching into the climate risk tech category — a growing space attracting attention as businesses look to prepare for incoming climate risks, like heat waves and hurricanes.

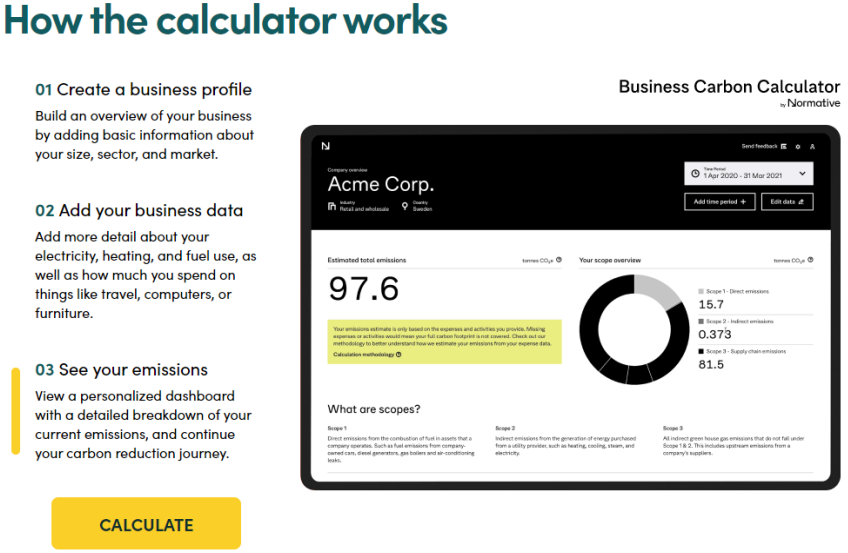


Screenshot from EIE’s tree canopy app showing the tree canopy for Chicago, IL.

Source: Google

Open-source data & carbon calculator added in 2022





Through its (free) standardized data and modeling platform Data Commons, Google is helping make sustainability data more accessible. In April 2022, the company announced that it made data from 100 new data sources about climate, health, food, crops, shelter, and emissions available.

Google collaborated with carbon accounting startup Normative to launch a carbon calculator for small-to-medium enterprises (SMEs) in March 2022. The calculator is free and is available through the SME Climate Hub.

Source: Google

Theme 2

Google is making its data centers green(er)

Working toward goal of powering data centers with carbon-free energy by 2030

Given its massive search and cloud computing operations, Google's data centers have a major carbon footprint.

In 2020, Google announced its goal of powering its data centers with "carbon-free" energy worldwide by 2030.

The company has purchased renewable energy to match its electricity consumption since 2017.

This new goal means that Google is stepping up spending on renewable energy — the company states it was the world's largest corporate purchaser of renewable energy in 2021 (based on renewable electricity purchased in megawatt hours).

	Carbon Neutral *offsets emissions* achieved by purchasing carbon offsets that reduce or prevent global emissions	**100% Renewable** *reduces emissions* achieved by purchasing enough renewable energy to match annual electricity use	**24/7 Carbon-free** *eliminates emissions** achieved by sourcing clean energy for every location and every hour of operation
Google's progress	Since 2007	Since 2017	By 2030
Helps combat climate change	✅	✅	✅
Encourages full-scale transformation of electric grids	❌	❌	✅
Directly reduces carbon emissions associated with electricity use	❌	✅	✅
Eliminates all carbon emissions associated with electricity use	❌	❌	✅
Matches *annual* electricity consumption with clean energy	❌	✅	✅
Matches *hourly* electricity consumption with clean energy	❌	❌	✅
Directly increases amount of clean energy on *some* electric grids where a company operates	❌	✅	✅
Directly increases amount of clean energy on *all* electric grids where a company operates	❌	❌	✅

* Google's 24/7 Carbon-Free Energy program aims to eliminate Scope 2 emissions associated with our operational electricity use. For information on how Google is addressing Scope 1 and 3 emissions, please refer to our 2020 Environmental Report.

Source: Google Environmental Report 2021

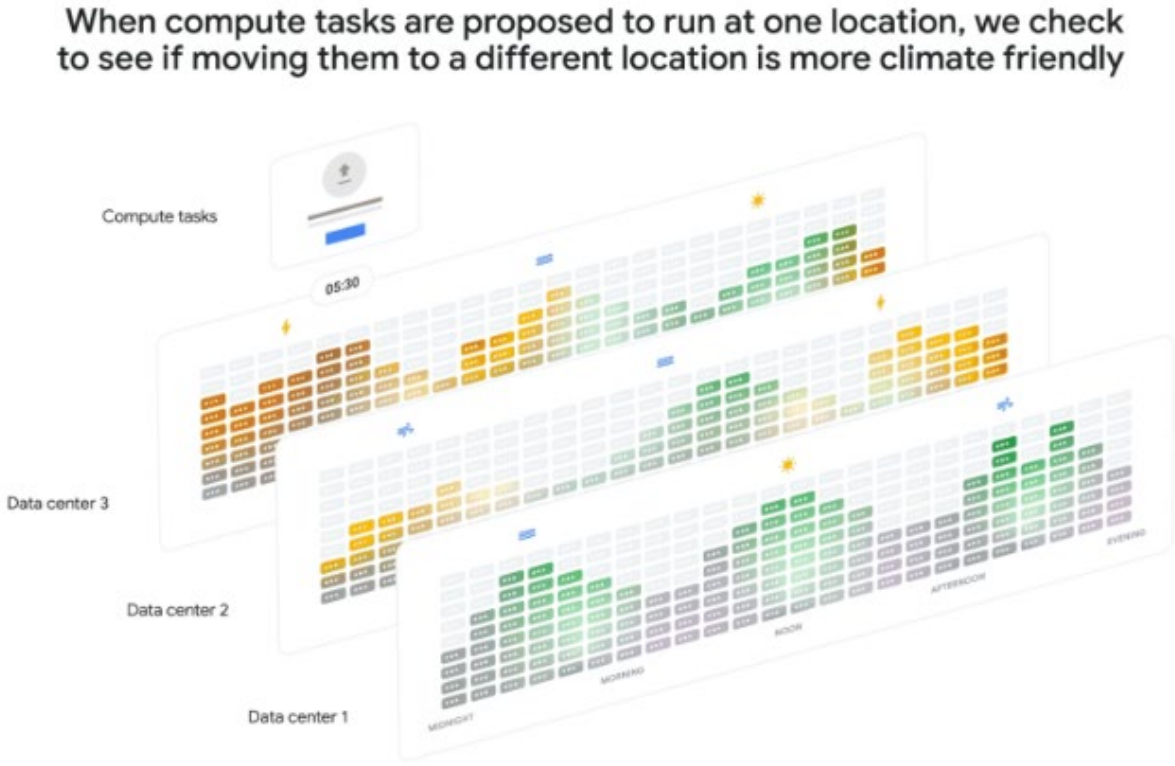
Driving energy efficiency via tech enhancements

Beyond purchasing renewable energy, engineers at Google have worked on optimizing renewable energy consumption at its data centers, resulting in a platform they call carbon-intelligent computing.

Given that renewable energy is intermittent, Google's data systems can move "tasks" to the data centers that have a higher availability of regional hourly renewable energy.

Google uses electricity CO2 data (from provider partner electricityMap) and its own internal electricity usage data to calculate the most efficient time to run these tasks.

Google is first applying this to media-processing tasks, like processing YouTube videos and adding new words to Google Translate, as these tasks are non-urgent (unlike processing searches, Google maps queries, etc.).

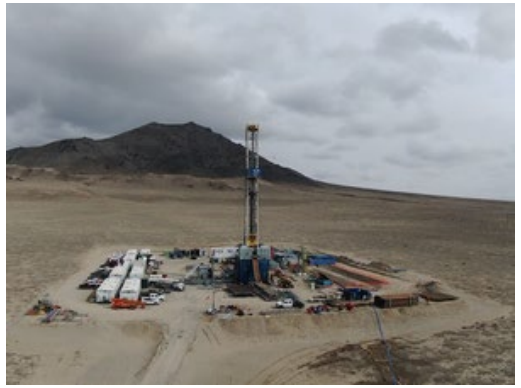


Sources: Google

Google is also focused on energy storage, geothermal tech, and water use

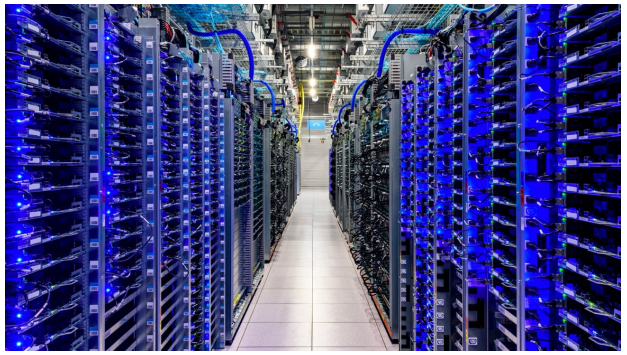
Adding energy storage

In 2020, Google announced that it would install a battery-based backup system for its hyperscale data center in Belgium (which will partially offset the need for diesel generators). This year, it installed and tested the battery system with Centrica Business Solutions and Fluence.



Testing geothermal power

In 2021, the tech giant signed an agreement with cleantech startup Fervo to develop a geothermal power project in Nevada. With Fervo's next-gen geothermal drilling and fiber-optic sensing tech, Google anticipates collaborating to develop AI and machine learning software that could increase geothermal efficiency.



Setting water use targets

Google set a new water target in 2021: replenish 120% of the water it consumes across its offices and data centers (on average). This is a step toward remediating its enormous water usage (used to cool down water centers).

Source: Google

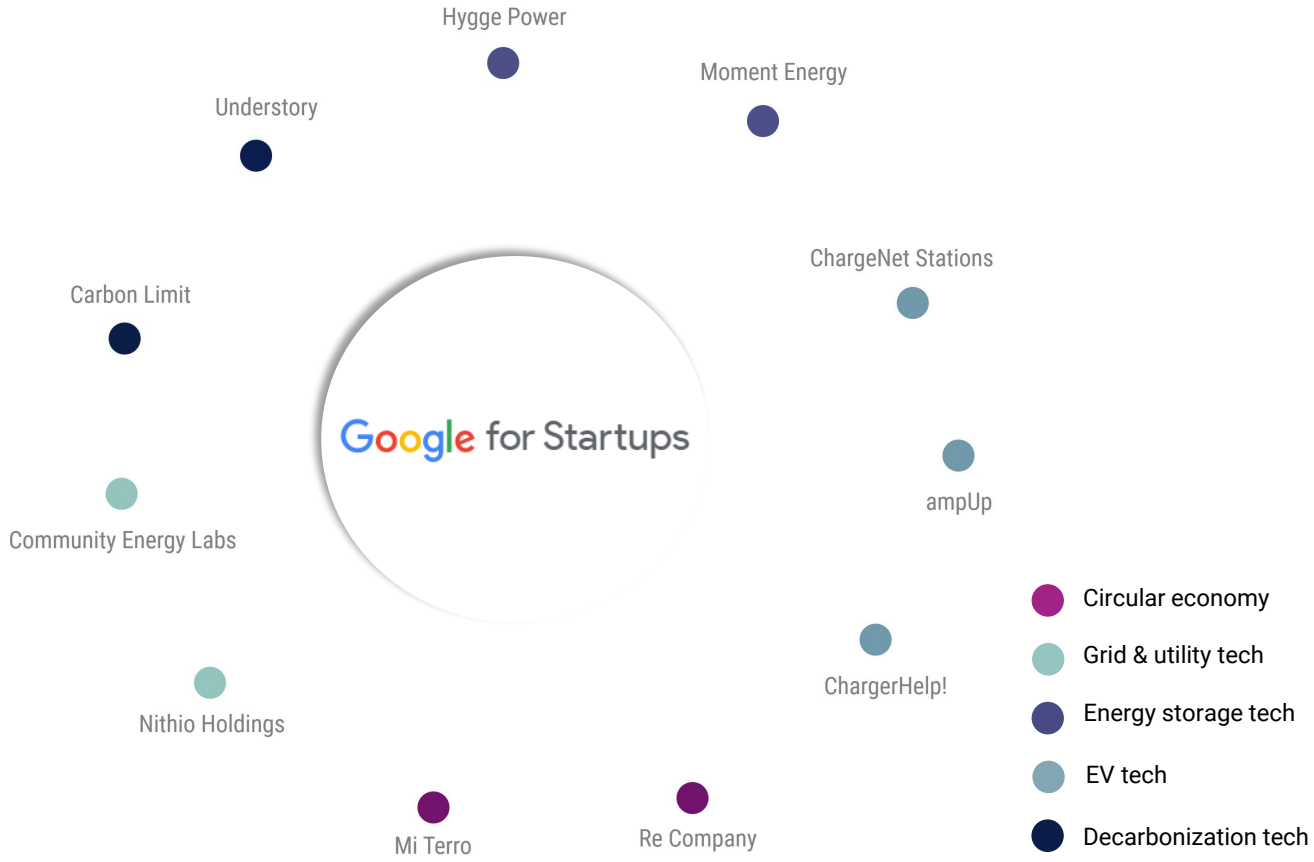
Theme 3

Google is backing early-stage climate tech startups

Google's accelerator has new focus on climate tech

In 2021, Google launched an accelerator for startups focused on climate tech in North America (Google for Startups Accelerator: Climate Change). The program focuses on early-stage companies (seed to series A).

This year, 11 startups were selected for the 10-week accelerator (see graphic). These startups are working on everything from EV to decarbonization tech.

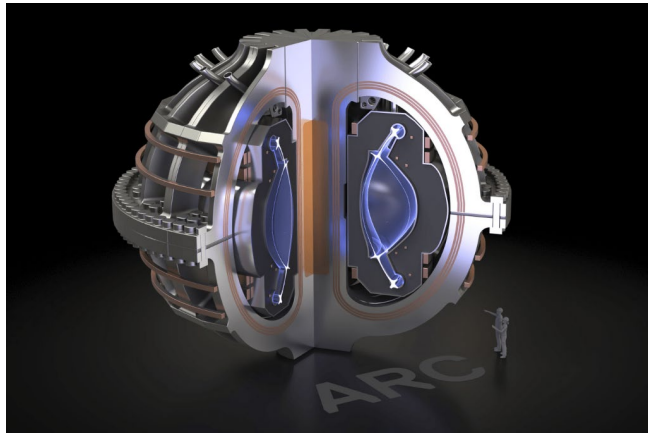


Startups selected for the Google for Startups Accelerator: Climate Tech, 2022 YTD (5/17/22)

Source: CB Insights

Backs 2 nuclear fusion startups' mega-rounds

Commonwealth Fusion Systems



Round: Series B (12/1/21) **Amount:** $1.8B

About: Commonwealth Fusion Systems, an MIT-spinoff, is developing a commercial-scale nuclear fusion machine. The company claims they have created the world's largest magnet, which allows them to produce more energy than consumed in their fusion process at scale.

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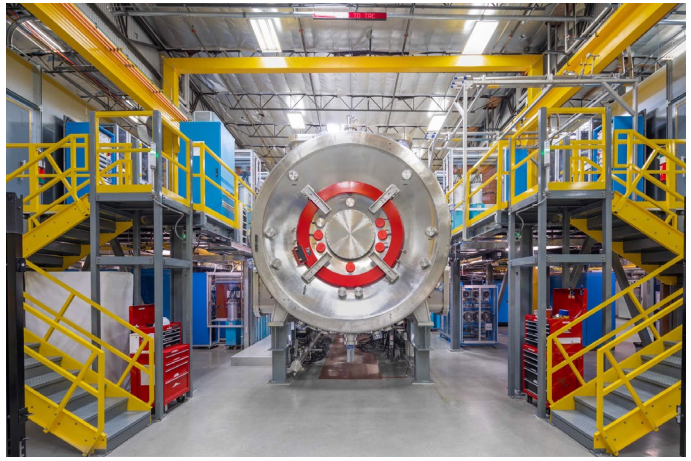


Round: Unattributed VC (4/8/21) **Amount:** $280M

About: California-based Tae Technologies is working on bringing nuclear fusion tech to market. In 2021, the company announced it had reached an important milestone toward commercial viability (producing stable plasma at 50M+ degrees Celsius), where a scaled-up version of its tech is economically viable.

Source: CB Insights

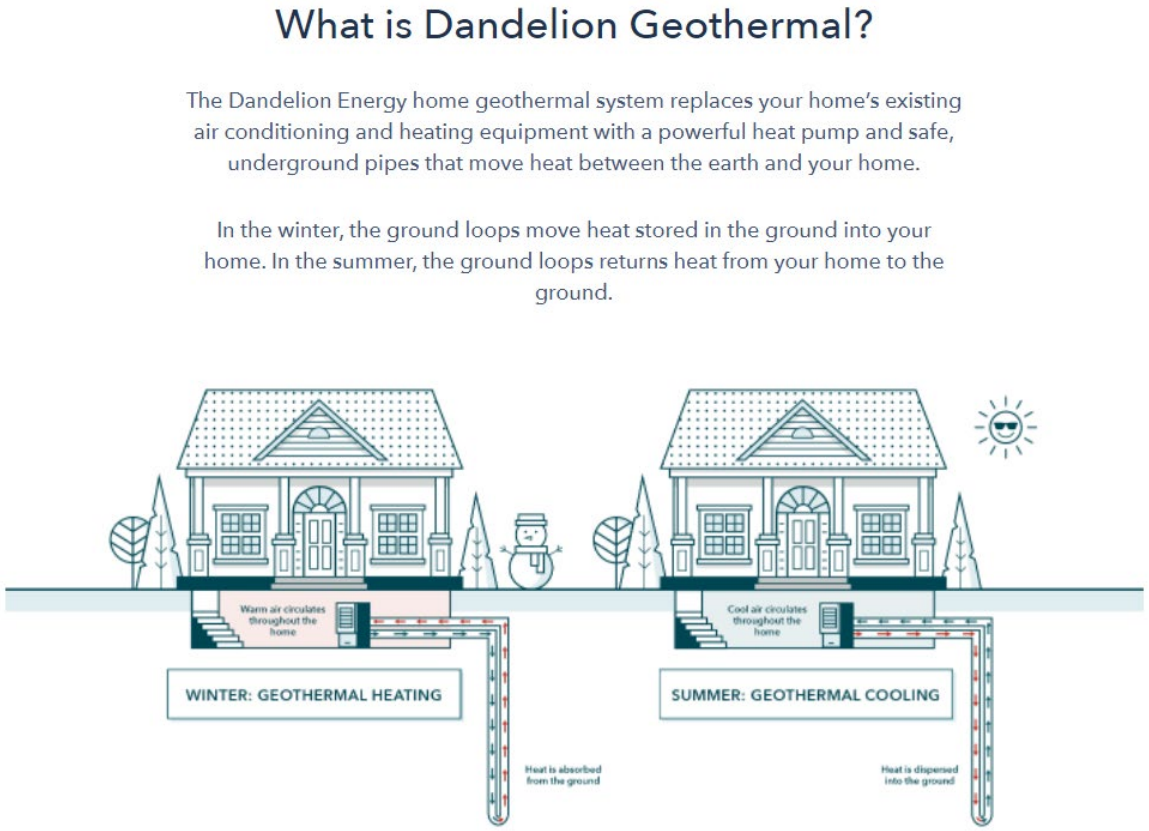
Google continues to support spinoff Dandelion Energy

X is Alphabet's relatively secretive R&D arm — an ecosystem where Googlers are pursuing "moonshots." One notable X-spinoff is residential geothermal startup Dandelion Energy.

The innovative startup implements geothermal systems for residences — a departure from the typical large scale of geothermal energy projects.

Since spinning off in 2017, Dandelion Energy has rolled out its services to 5 states in the US.

Google participated in Dandelion's Series A rounds in 2019 and 2020, aligning with the tech giant's track record of continuing to provide some support to its spinoffs, like Niantic.



Source: Google

Google's plans for tackling sustainability in 2022

	Expanding environmental monitoring features	Making its data centers green(er)	Backing early-stage climate tech startups
Summary	The tech giant is adding emissions tracking and climate risk analysis features to its platforms and creating new applications, including its Environmental Insights Explorer (EIE) and a carbon emissions calculator.	As its number of data centers grows, Google is setting new sustainability goals around them, developing intelligent computing, and implementing new energy tech.	Although it doesn't have a single large fund like its peers, Google is backing emerging climate tech startups through direct investments and via its accelerator.
Implications	Watch for the rising adoption of Google's sustainability apps, particularly its city-focused emissions tracking app. While startups focus on corporate clients, Google could rapidly build a moat around government clients (cities) with its free app.	Anticipate increased energy storage integration (via batteries, fuel cells, etc.) at data centers, as Google's transition to renewable energy will require a steady energy backup to maintain operational stability. Given the spotlight on data centers' footprint, Google could differentiate itself from its peers (like AWS) if it leads in the energy transition process.	Monitor if Google will continue to focus on decarbonization and grid & utility tech, as its deals have concentrated on these sectors recently. Further, watch to see if Google will launch a large-scale climate-focused fund like its peers.

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