



Hydrogen and Smart Energy Storage in Datacenters



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A photograph of a forest fire. Thick white and grey smoke rises from the ground, partially obscuring the view. In the background, bright orange and red flames are visible through the trunks of several tall, dark trees. The foreground shows dark, charred ground with some smoke rising from it.

A planet-sized challenge

Microsoft's Sustainability Pledge

Microsoft will be carbon negative by 2030

Jan 16, 2020 | Brad Smith - President



<https://blogs.microsoft.com/blog/2020/01/16/microsoft-will-be-carbon-negative-by-2030/#:~:text=By%202030%20Microsoft%20will%20be%20carbon%20negative%2C%20and,electrical%20consumption%20since%20it%20was%20founded%20in%201975.>

Blog / Updates

Aiming for more than just net zero

Posted on July 27, 2020



Noelle Walsh, Corporate Vice-President, Cloud Operations + Innovation

Climate experts across the globe agree: if we can't drastically reduce carbon emissions, our planet will face catastrophic consequences. Microsoft has operated carbon neutral since 2012, and in January 2020 Brad Smith announced our commitment to going [carbon negative by 2030](#). This isn't a goal we can reach in one easy swoop—it will take time, dedication, and many small steps that coalesce into something greater.

As the cloud business grows, our datacenter footprint grows. In our journey toward carbon negative, Microsoft is taking steps to roll back the effect datacenters have on the environment. Reaching this goal will take many steps, along with the implementation of innovative technologies that have yet to be developed.

Many companies are reaching for net zero emissions, but we're taking it even further. We're not just reducing our output to zero. We're committed to reducing our emissions by half, and then removing the carbon we've emitted since 1975, to truly go carbon negative.

The journey to carbon negative

A big part of going carbon negative means completely changing the way datacenters operate. Datacenters have adopted some sustainable methods around cooling, including open-air and adiabatic cooling. These methods have helped to drastically reduce the water and energy consumption of datacenters, but they're not enough. Currently, datacenters and the backup that powers them in peak load times depend on fossil fuels like diesel. Microsoft is working to change that.

Our ambitious goals to cut down our carbon footprint have necessitated exploration into various technologies. With each kind of technology, we're determining the best combination to implement based on our overall goal as well as the specific datacenter locations and their local needs.

https://azure.microsoft.com/en-us/blog/aiming-for-more-than-just-net-zero/?_inc=ee318ef5-10ea-49b0-85d3-a58259f16cad

2 Mil

kilometers
intra-datacenter fiber

>1GW

installed
capacity

55

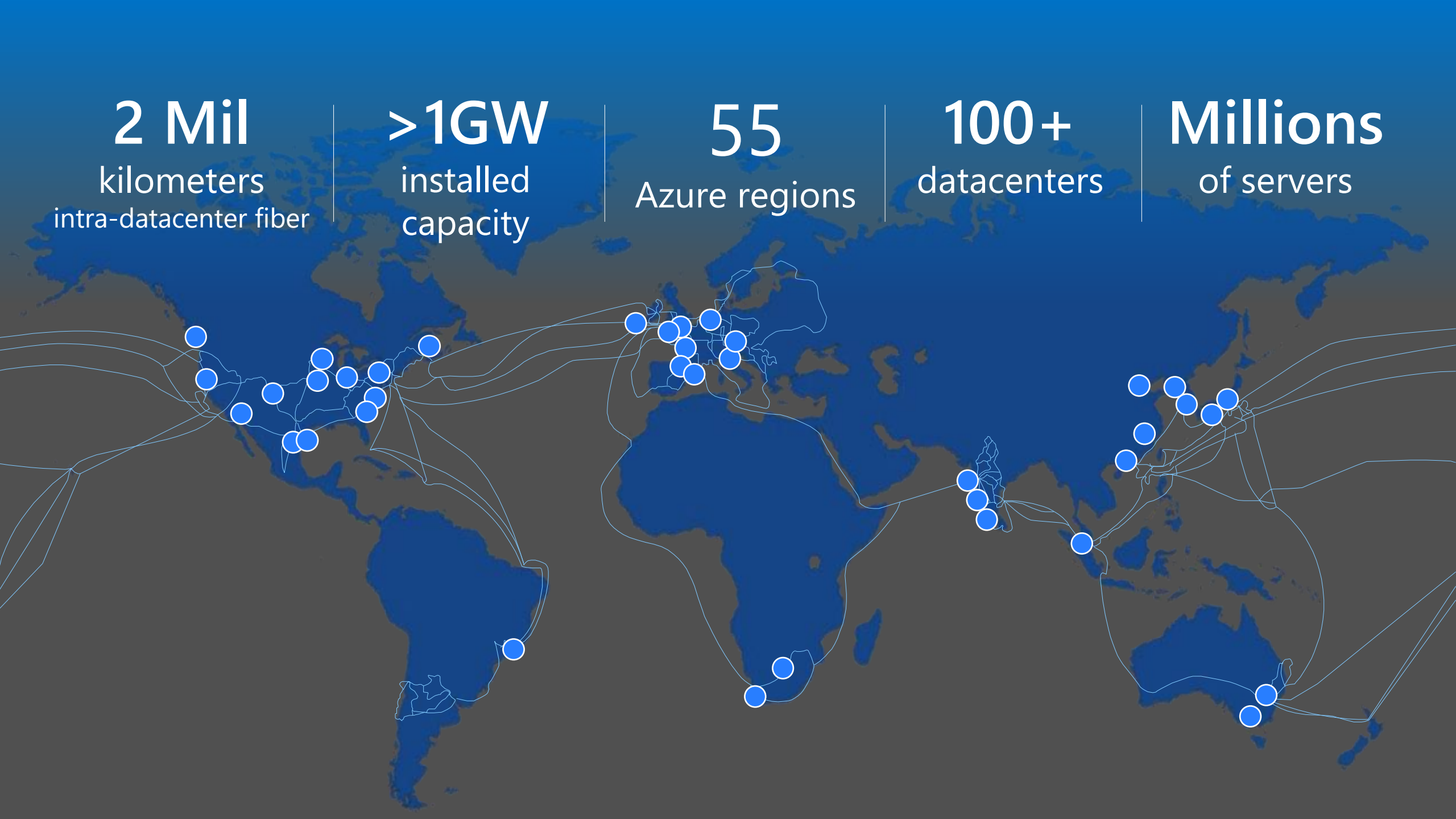
Azure regions

100+

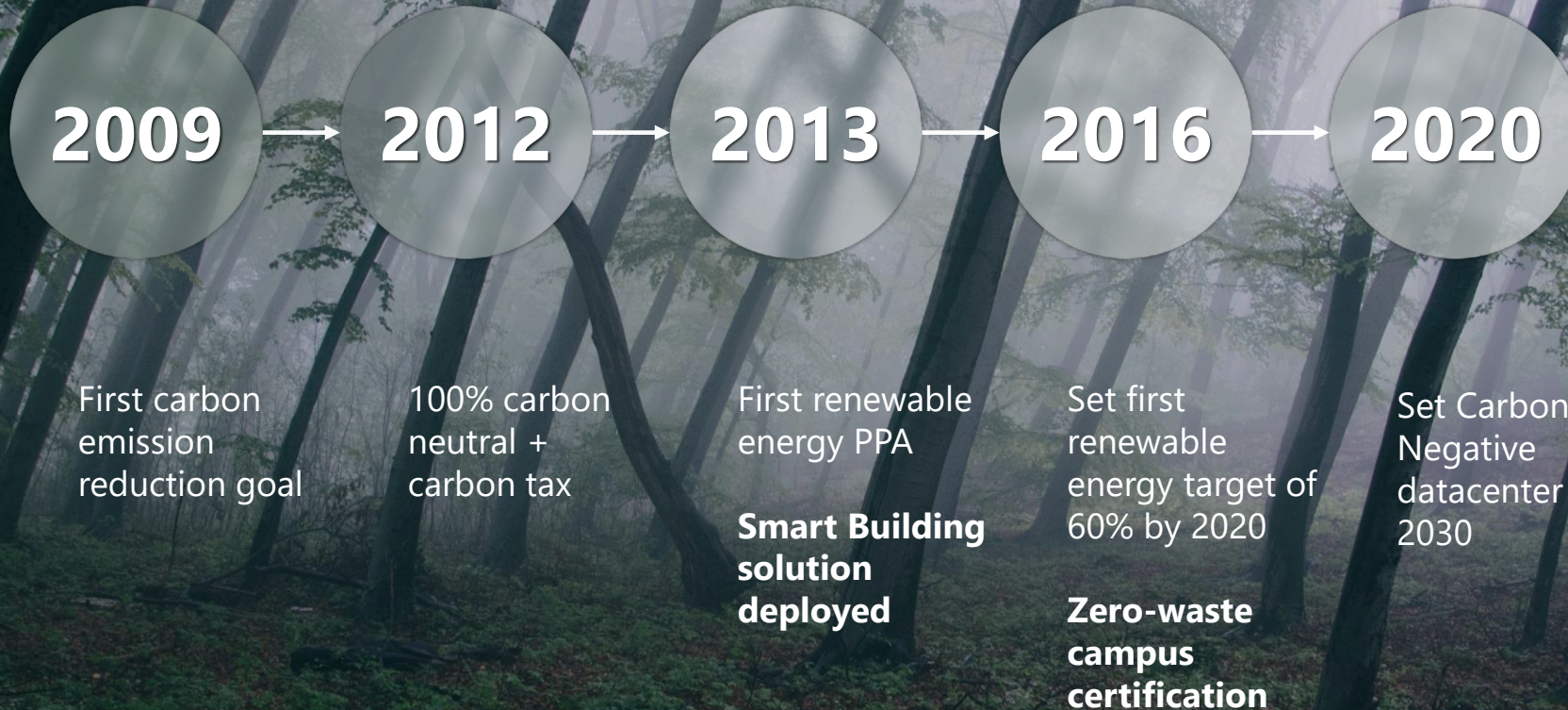
datacenters

Millions

of servers



Our journey started a decade ago



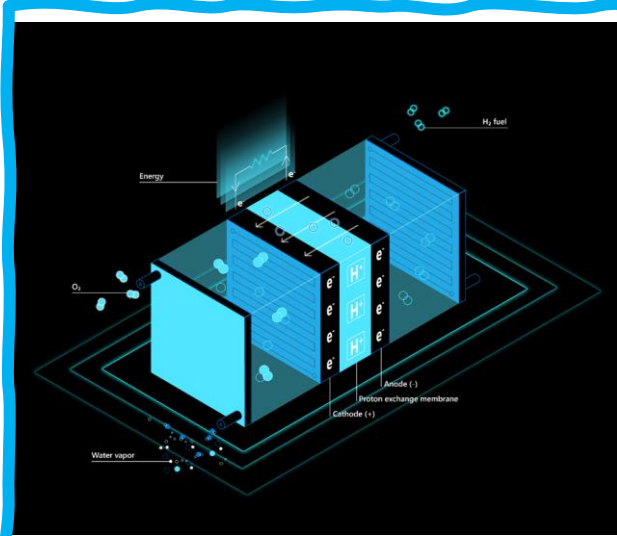


Diesel Free by 2030

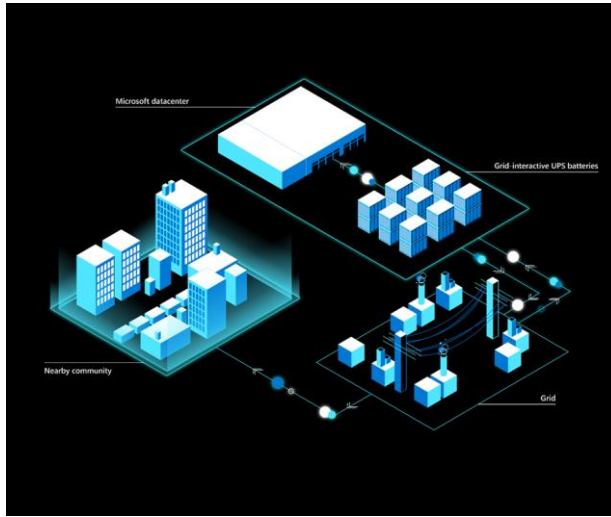
Aiming for more than just net zero

The journey to carbon negative

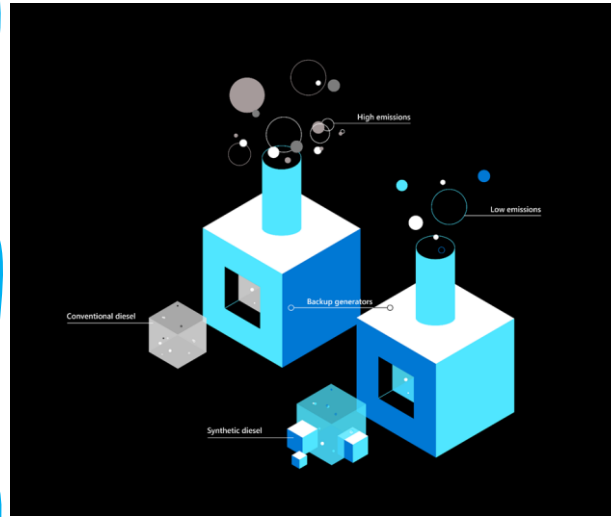
https://azure.microsoft.com/en-us/blog/aiming-for-more-than-just-net-zero/?_lrsc=ee318ef5-10ea-49b0-85d3-a58259f16cad



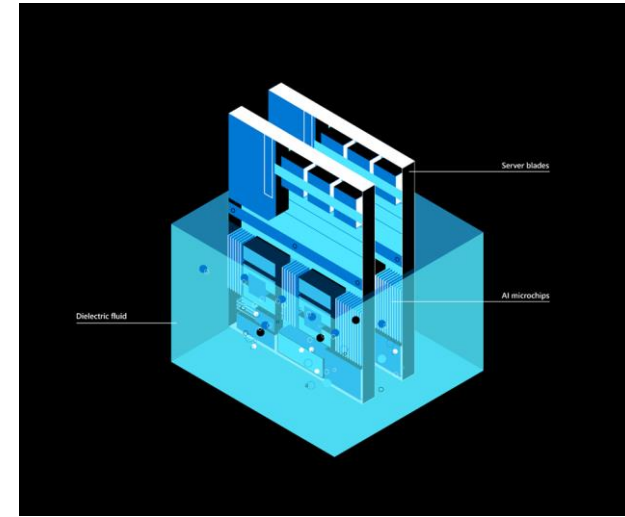
Fuel cell



Grid-interactive Datacenter



Clean power backup



Liquid cooling

Fuel Cell Research

[Business](#) | [Environment](#) | [Microsoft](#) | [Science](#) | [Technology](#)

Microsoft makes a 'crazy' bet on fuel cells to feed power-hungry data centers

Originally published September 23, 2017 at 8:00 am



Hydrogen Generator



Microsoft tests hydrogen fuel cells for backup power at datacenters

July 27, 2020 | [John Roach](#)



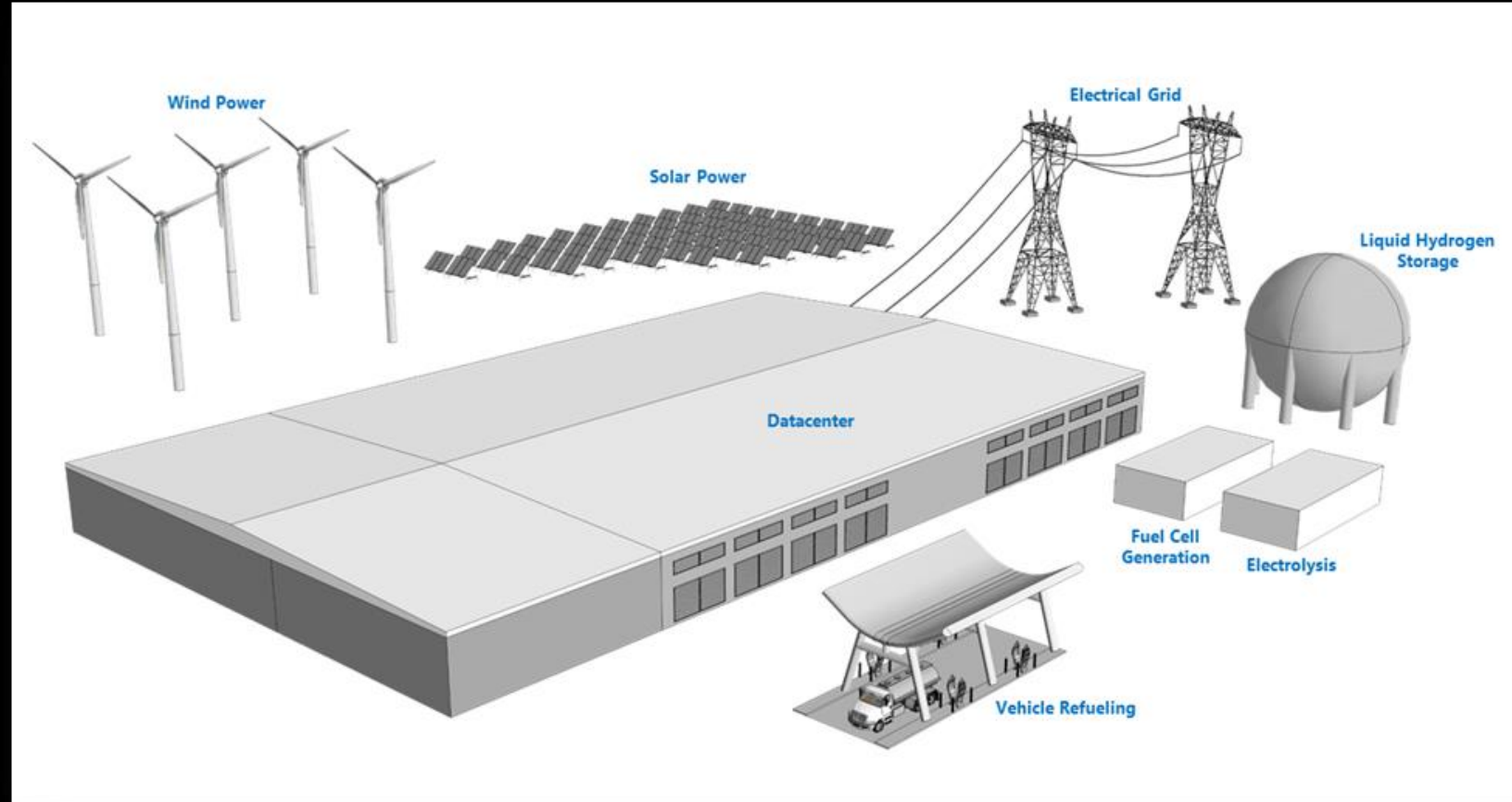
In a worldwide first that could jumpstart a long-forecast clean energy economy built around the most abundant element in the universe, hydrogen fuel cells have powered a row of datacenter servers for 48 consecutive hours, Microsoft announced Monday.

The feat is the latest milestone in the company's commitment to be [carbon negative by 2030](#). To help achieve that goal and accelerate the global transition away from fossil fuels, Microsoft is also aiming to [eliminate its dependency on diesel fuel by 2030](#).

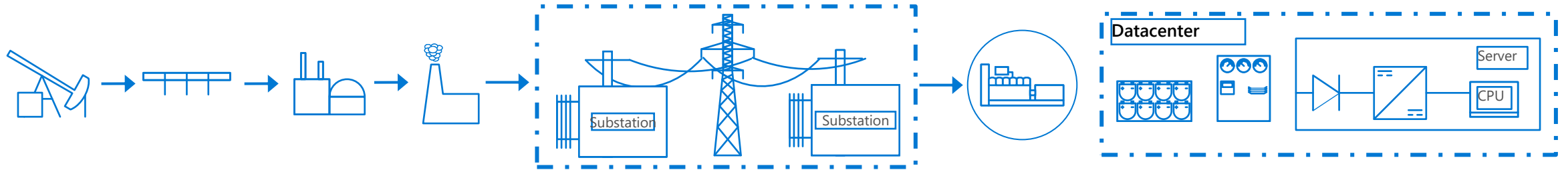
Diesel fuel accounts for less than 1% of Microsoft's overall emissions. Its use is primarily confined to Azure datacenters, where, like at most cloud providers around the world, diesel-powered generators support continuous operations in the event of power outages and other service disruptions.

<https://news.microsoft.com/innovation-stories/hydrogen-datacenters/>

Integrated Hydrogen Economy



Datacenter Opportunities



Challenges in Grid

Innovation
opportunities in
datacenter

Build a grid friendly
datacenter
to enable more
sustainable ecosystem

Battery Grid Interactive



Grid-Interactive



Grid balancing

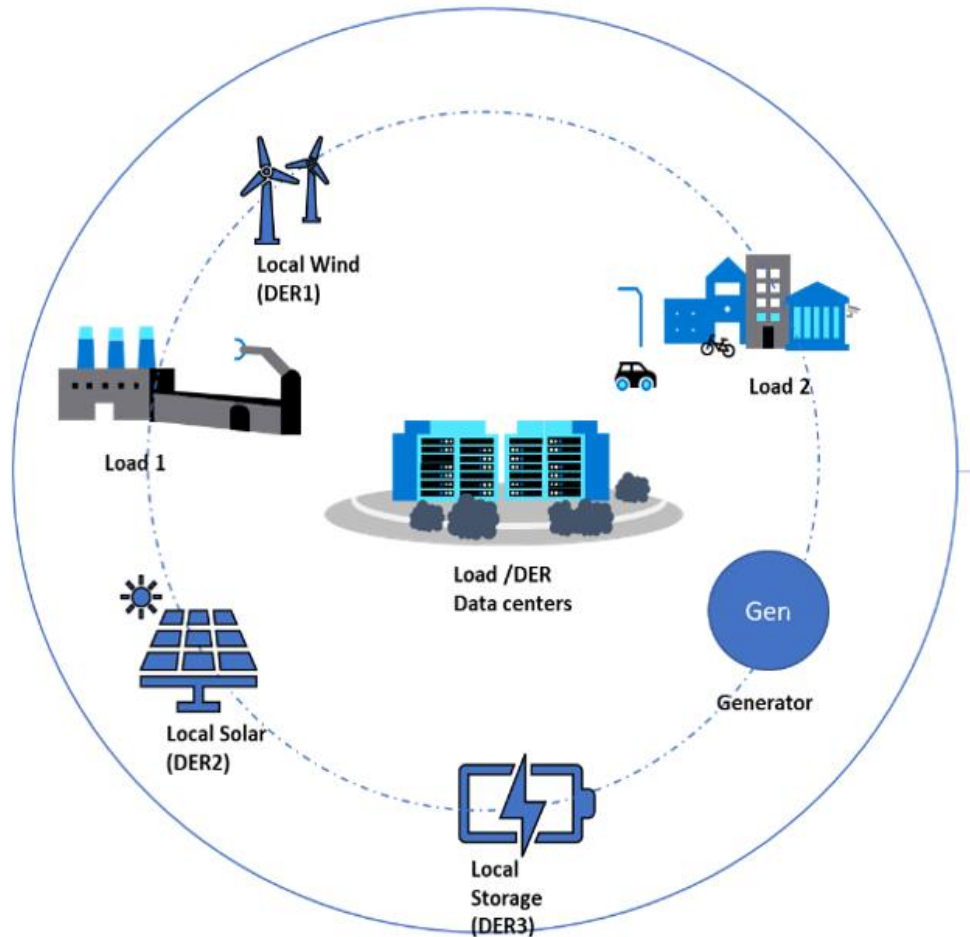


High cycle batteries

Next Generation of Energy Storage



Smart Grid and Edge Grid With Azure IOT



Grid asset maintenance

Visualize your grid's topology, gather data from grid assets, and define rules to trigger alerts. Then use these insights to predict maintenance and provide more safety oversight. Prevent failures and avoid critical downtime by monitoring the performance and condition of your equipment.



E-mobility

Remotely maintain and service electric vehicle (EV) charging points that support various charging speeds and vehicle types. Make it easier to own and operate electric vehicles by incentivizing ownership and creating new visibility into energy usage.



Energy optimization and load balancing

Balance energy supply and demand to alleviate pressure on the grid and prevent serious power outages. Avoid costly infrastructure upgrades and gain flexibility by using distributed energy resources to drive energy optimization.

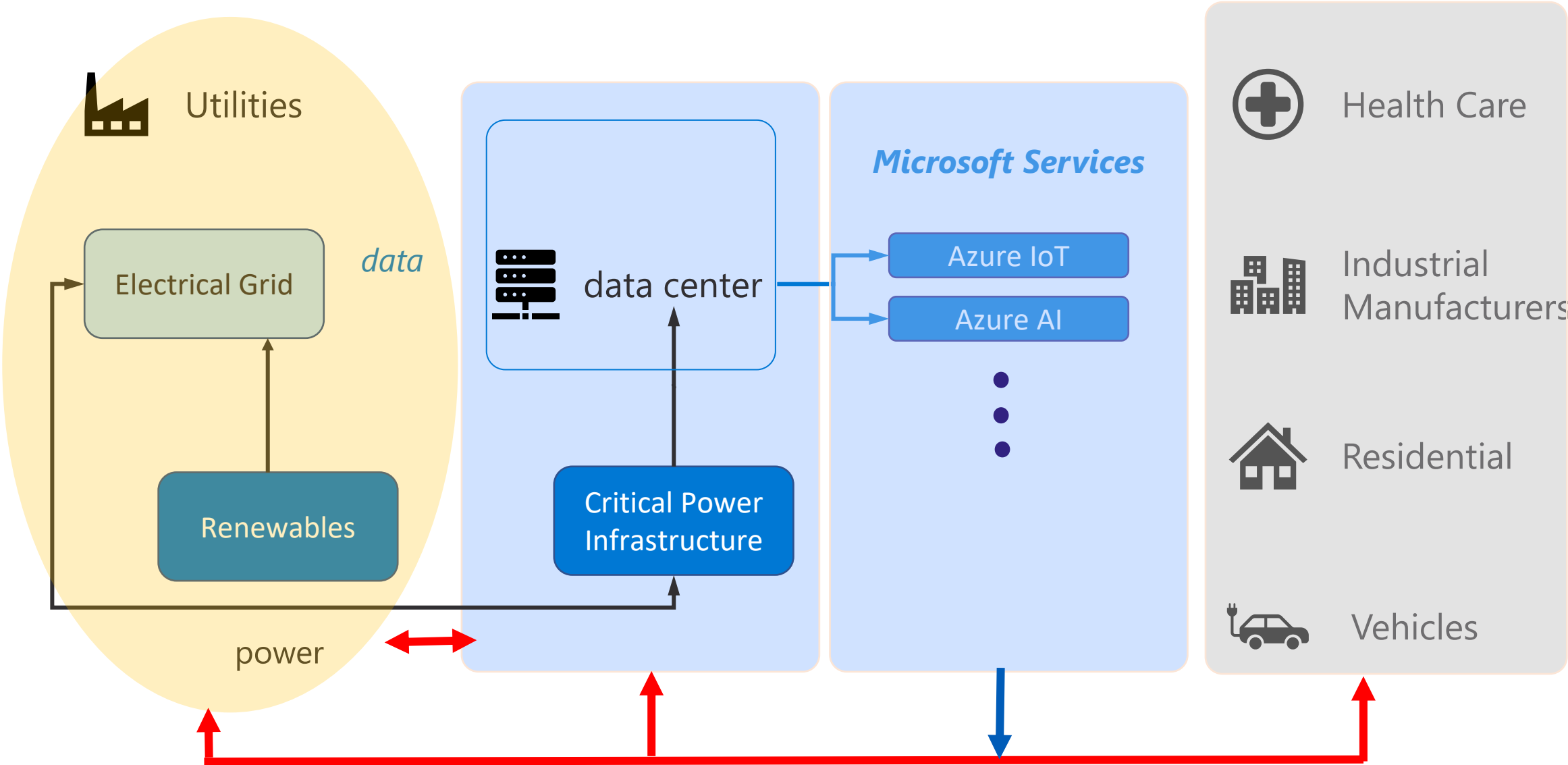


Emissions monitoring

Monitor emissions in near real-time and make your emissions data more readily available. Work towards sustainability targets and clean energy adoption by enabling greenhouse gas and carbon accounting and reporting.

<https://azure.microsoft.com/en-us/overview/iot/industry/energy/>

Limitless opportunity





Thank You!

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