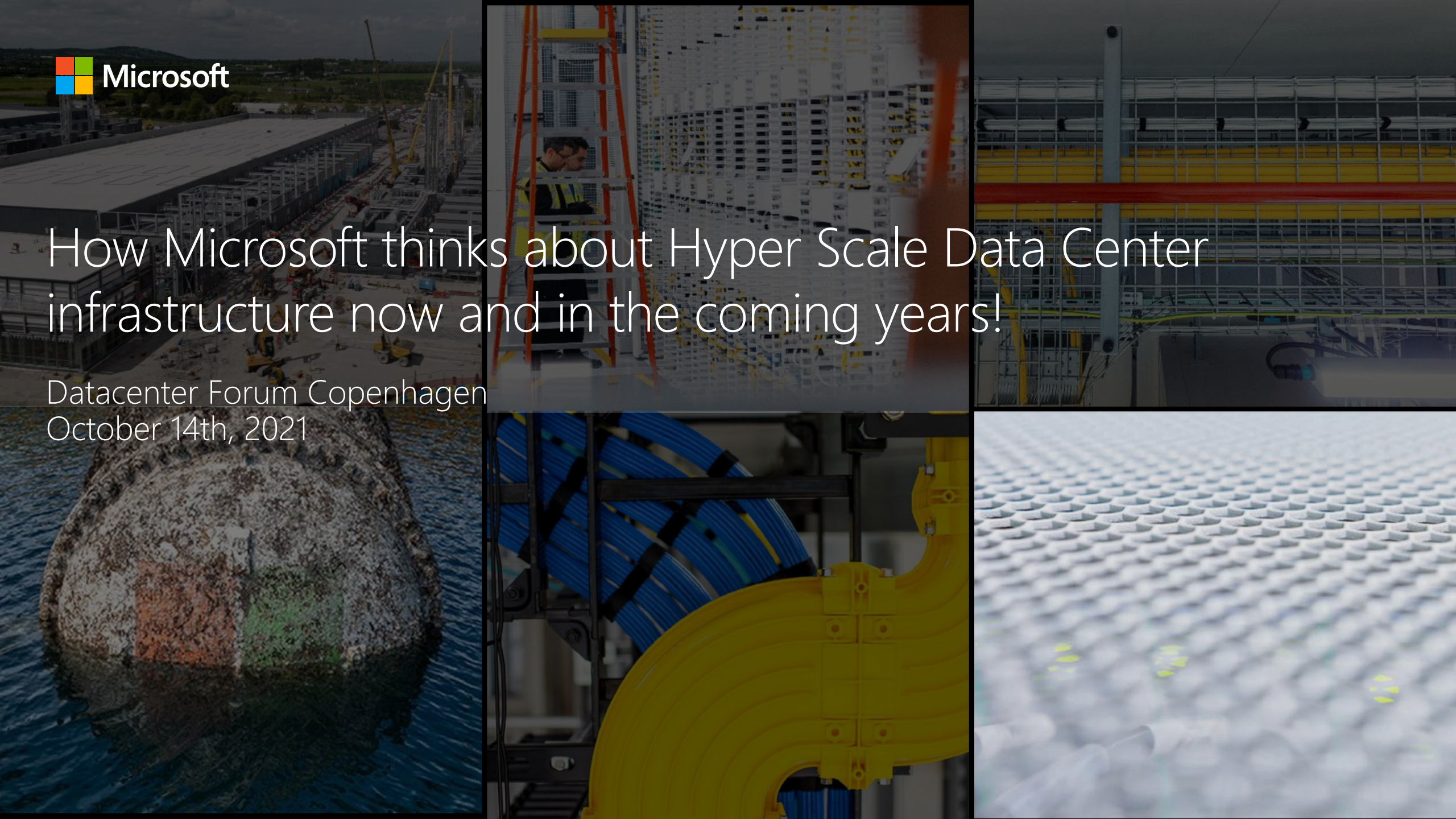
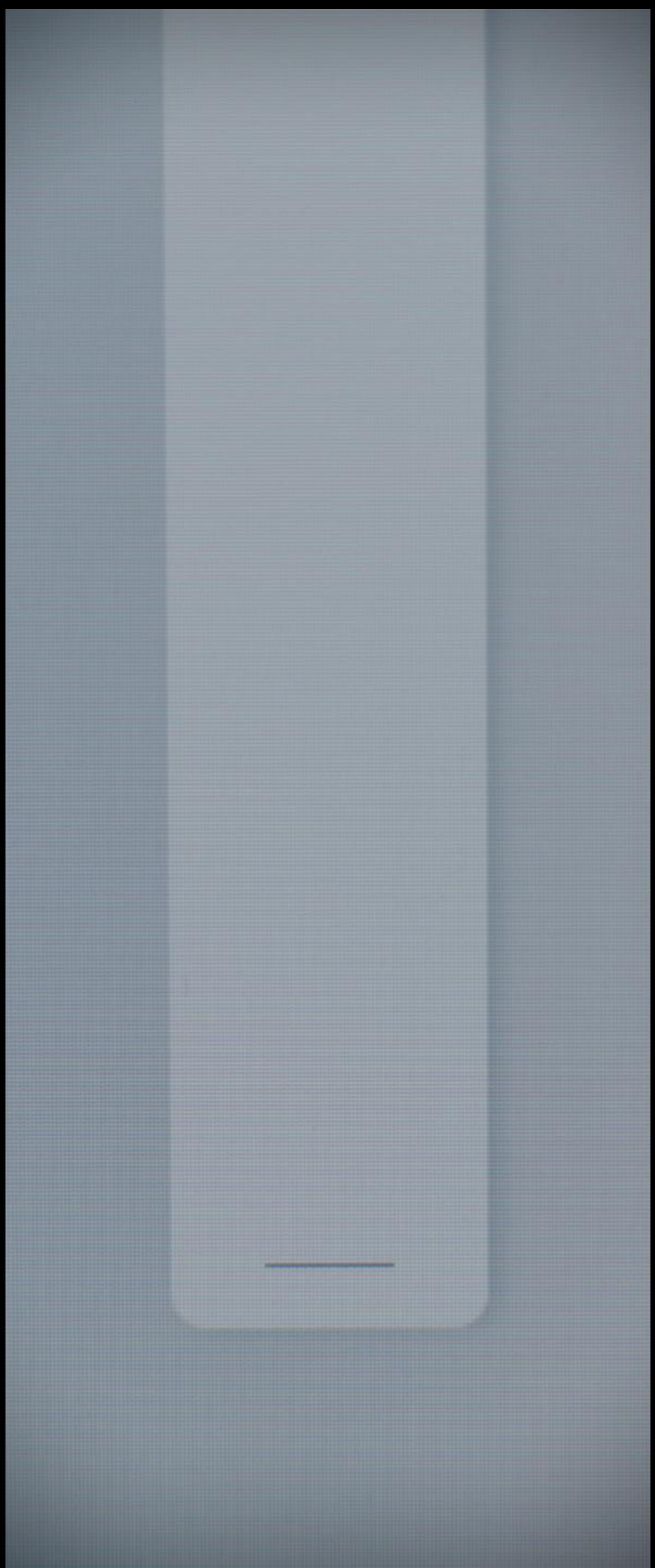


Microsoft

How Microsoft thinks about Hyper Scale Data Center infrastructure now and in the coming years!

Datacenter Forum Copenhagen
October 14th, 2021



Microsoft

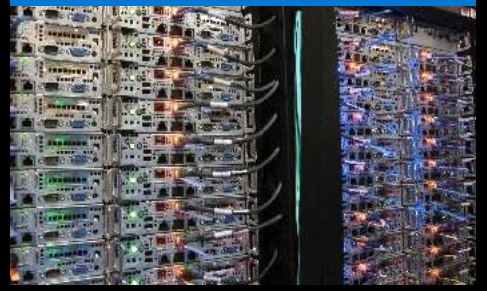
How Microsoft thinks about Hyper Scale Data Center infrastructure now and in the coming years!

Datacenter Forum Copenhagen
October 14th, 2021

Ole Kjeldsen
Director of Technology & Security
Microsoft Denmark & Iceland

Datacenter generations

GENERATION 1



GENERATION 2

GENERATION 3

GENERATION 4

GENERATION 5

GENERATION 6

GENERATION 7

GENERATION 8

GENERATION vNEXT

Datacenter generations

GENERATION 1
1989-2005
Colocation
2.0+ PUE

GENERATION 2
2007
Density
1.5 – 1.8 PUE

GENERATION 3
2009
Containment
1.4 – 1.6 PUE

GENERATION 4
2012
Modular
1.1 – 1.3 PUE

GENERATION 5
2015
Hyper-scale
1.17 – 1.25 PUE

GENERATION 6
2017
Scalable form factor
1.17 – 1.19 PUE

GENERATION 7
2018
Ballard
1.15 – 1.18 design PUE

GENERATION 8
2020
Rapid-deploy datacenter
1.11 – 1.18 design PUE

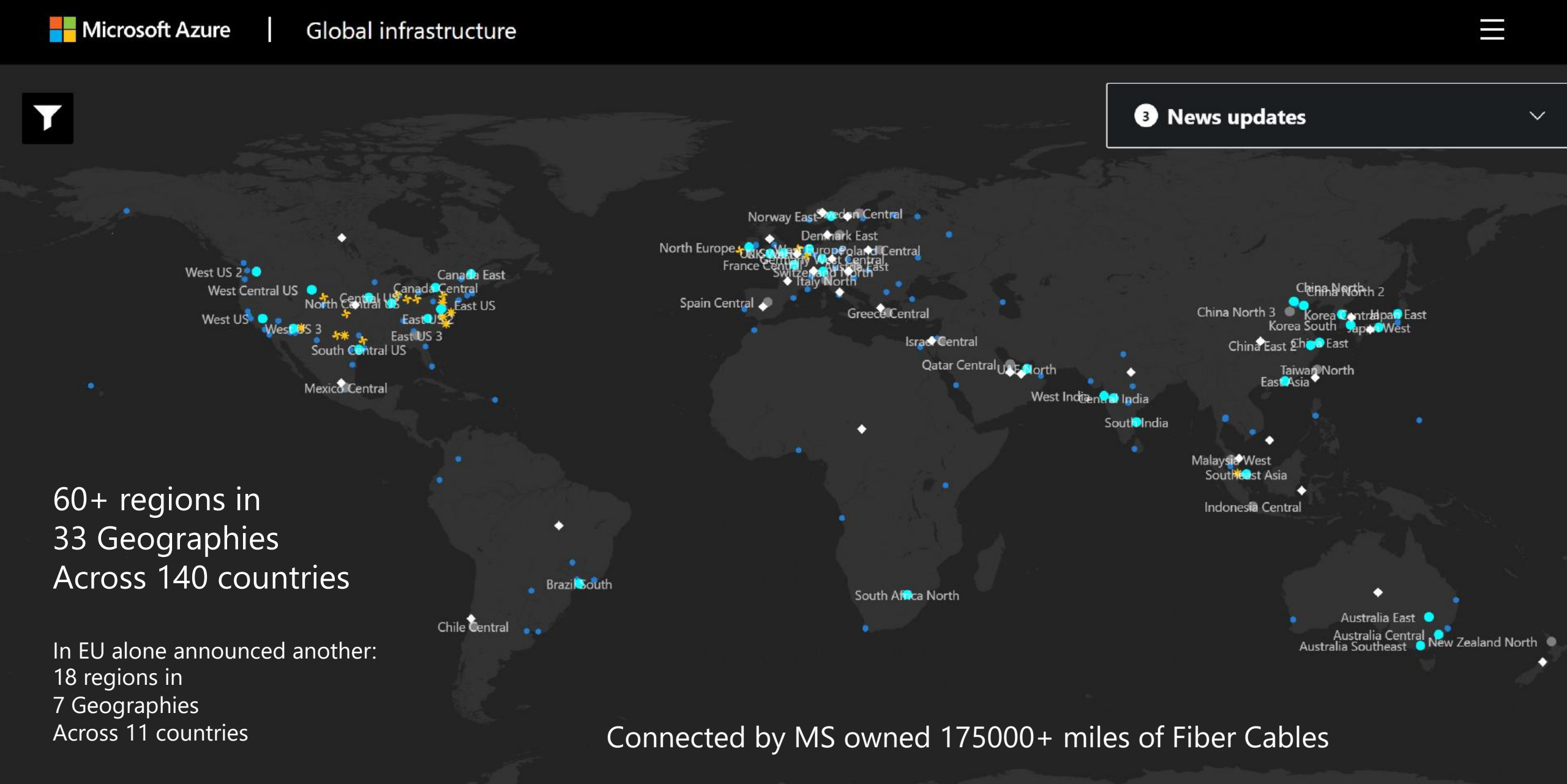
GENERATION vNEXT

FUTURE

Project Natick

- ✓ Rapid deployment
- ✓ Close to population centers
- ✓ High energy density (40 kW/rack)
- ✓ 5 MW platforms
- ✓ Resistant to hurricanes, solar storms, earthquakes
- ✓ 1.07 or less PUE

https://infrastructuremap.microsoft.com/explore



60+ regions in
33 Geographies
Across 140 countries

In EU alone announced another:
18 regions in
7 Geographies
Across 11 countries

Connected by MS owned 175000+ miles of Fiber Cables


2590

Denmark East – announced Microsoft Datacenter Region December 2020

The Danish Datacenter Region, Denmark East, consists of three separate datacenters placed on Zealand.

Denmark East will be powered by 100 percent new renewable energy.

The datacenter region will provide Danish customers of all sizes faster access to the Microsoft Cloud and world-class security.

Denmark East will provide the ability to store data at rest in Denmark, enabling customers with a need for data residency to use the Microsoft Cloud.

Denmark East will provide very low latency between Azure and On Premises, especially key when moving from old infrastructure, e.g. mainframe, to Azure.

Denmark East will include:

- Microsoft Azure
- Microsoft 365
- Dynamics 365
- Power Platform

Read more:
https://aka.ms/DigitalLeapDenmark

Amsterdam – West Europe Region

What is this?

Inside Cloud Servers

Microsoft is bringing hardware design and development into the open, making way for unprecedented innovation that benefits everyone.

750W
750W
750W
750W

Our Sustainability journey

2009
First carbon emission reduction goal

2012
100% carbon neutral + carbon tax

2013
First renewable energy PPA

Smart Building solution deployed

2016
Set first renewable energy target of 60% by 2020

Zero-waste campus certification

2017
Launched AI for Earth

LEED Gold certification for new datacenters

2018
Launched supplier carbon engagement in China

Advocated to establish an economy wide carbon fee in Washington State

2019
$15 carbon tax

Set goal of 70% renewable energy by 2023

2020
Set goal of being carbon negative by 2030

Set goal of 100% renewable energy by 2025

Announced building of Planetary Computer

Set goal to protect more land than we use by 2025

Microsoft will be carbon negative by 2030 and will remove all historic emissions emitted either directly or via electricity consumption by 2050

Sustainability Goals by 2030

Carbon negative	Zero Waste	Water positive	Restore more land than we use

https://www.theclimatepledge.com

Microsoft Sustainability Fund Investments

In 2012, Microsoft became one of the first companies to implement an internal sustainability fee that enables us to operate 100 percent carbon neutral and continue to **reduce emissions** across our global operations. We use this fund to **purchase clean electricity**, to drive green technology innovation, and to support proven sustainable development projects around the world through the purchase of carbon offsets. **Learn more**.

Filter investments by year.

All

Filter investments by type.

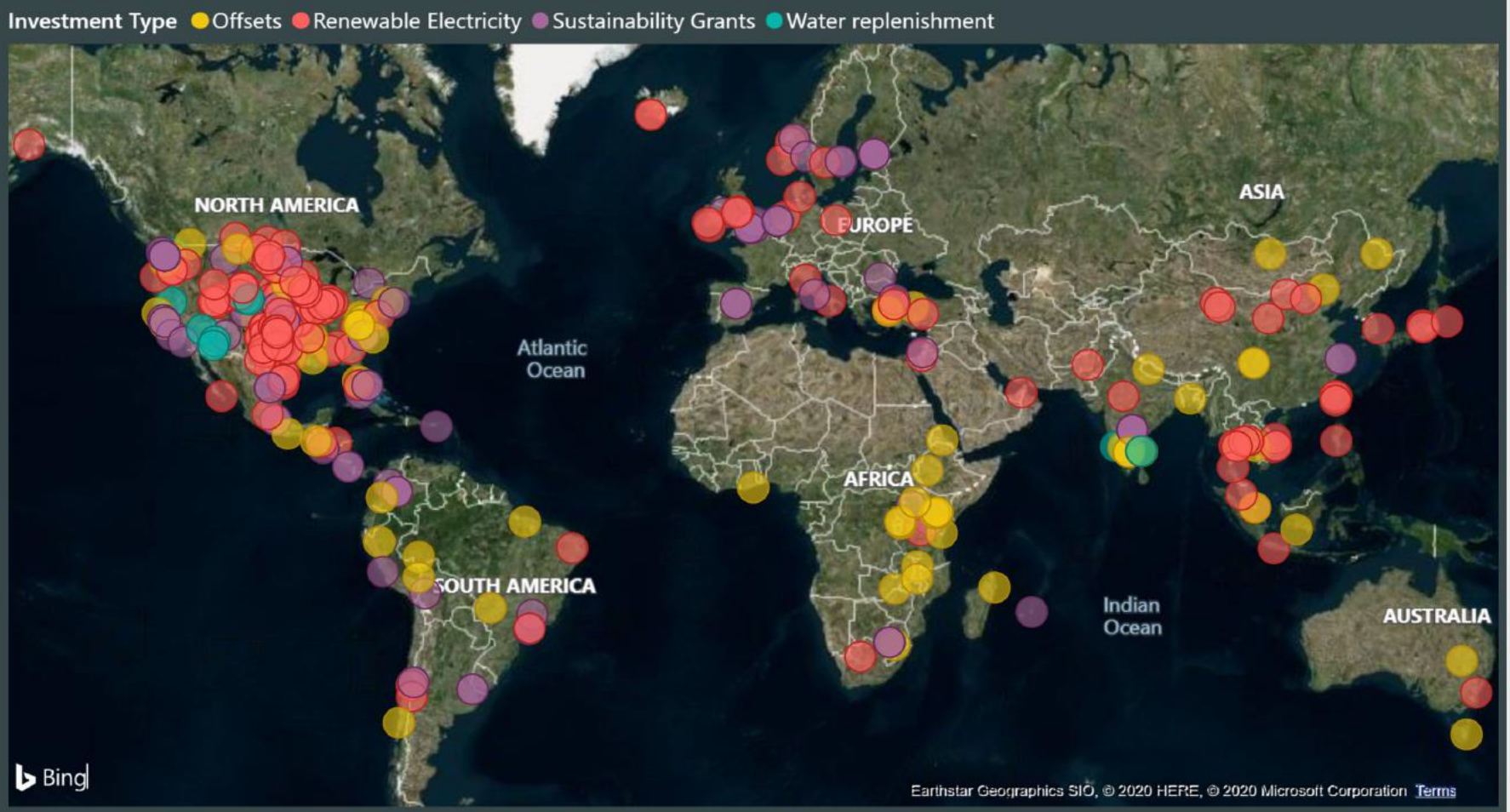
All

Filter investments by location.

All

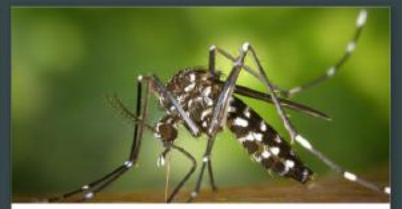
Filter investments by focus area.

All



Acre Amazonian Rainforest Conservation REDD+

Brazil • Offsets



Adapting Project Premonition for biodiversity

United States • Sustainability Grants

Agua Fria Solar Power

Honduras • Renewable Electricity

This project provides

Ainsworth Wind Energy Facility

United States • Renewable Electricity

Air conditioning control system optimization

Mexico • Sustainability Grants

This project optimized the air

Air co upgra

Mexico

This p

Investments by Type

Offsets
61

Renewable Electricity
177

Sustainability Grants
108

Water replenishment
9

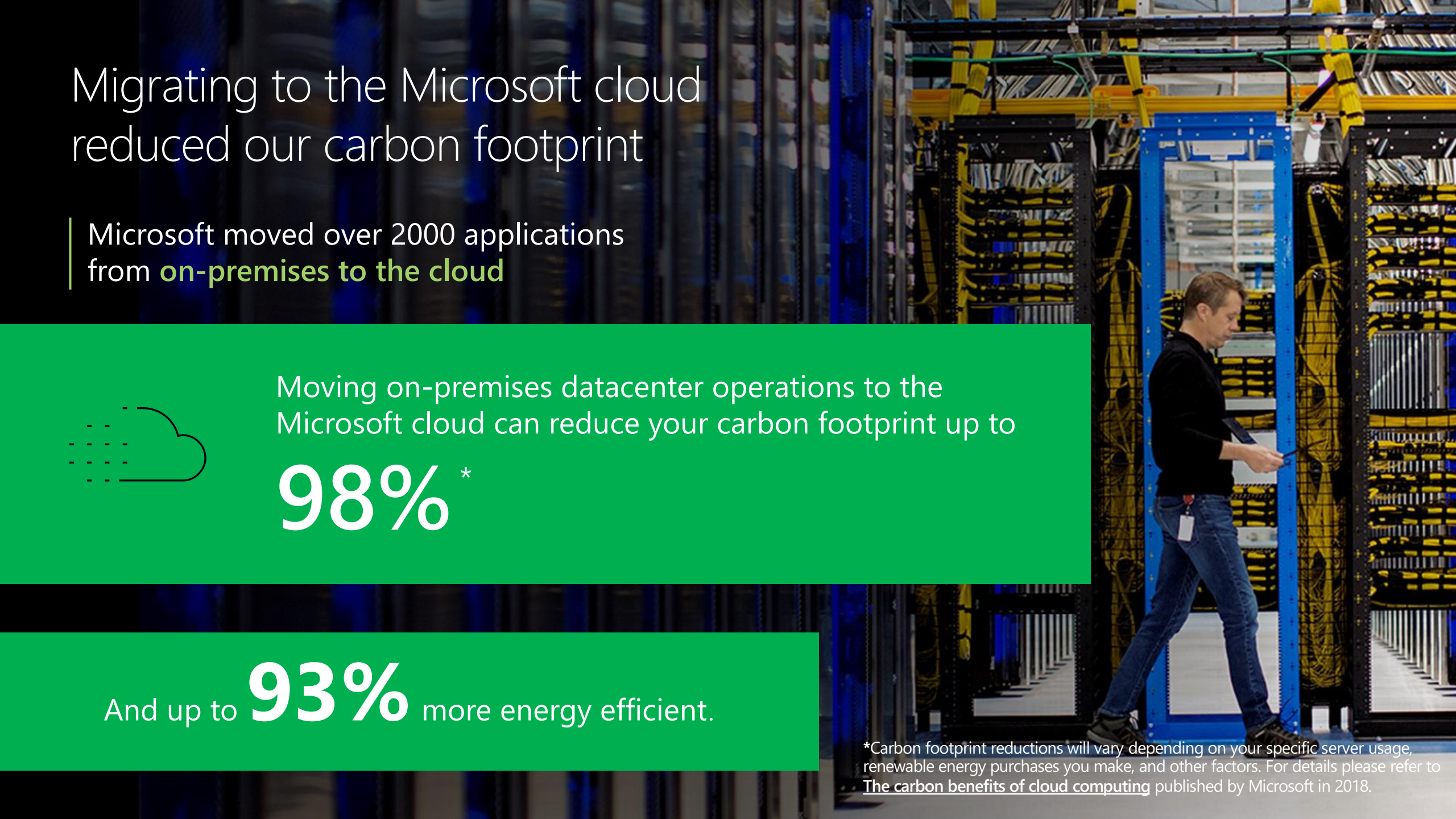
Migrating to the Microsoft cloud reduced our carbon footprint

Microsoft moved over 2000 applications from **on-premises to the cloud**

Moving on-premises datacenter operations to the Microsoft cloud can reduce your carbon footprint up to

98% *

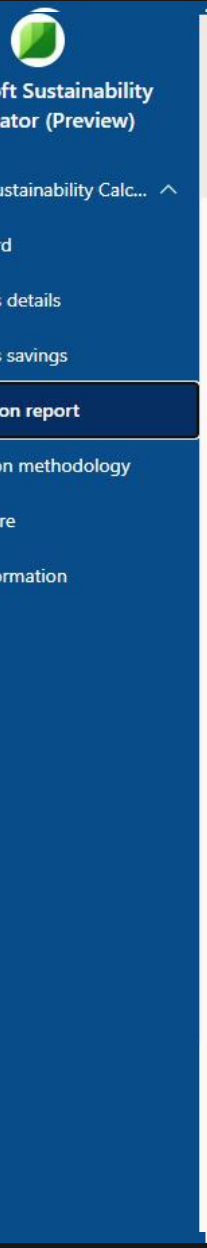
And up to **93%** more energy efficient.



*Carbon footprint reductions will vary depending on your specific server usage, renewable energy purchases you make, and other factors. For details please refer to **The carbon benefits of cloud computing** published by Microsoft in 2018.

The Sustainability Calculator

https://aka.ms/CarbonCalculator



Contoso (Demo)

Preparation report

Most recent data available: Dec 24, 2020

Enrollment ID	Subscription Name	Azure Service	Region	Year	Month
All	All	All	All	All	All

Emissions Report

Year	Quarter	Month	Azure Region	Scope	Azure Service	Carbon emissions (MTCO2e)
2017	Qtr 2	May	Central India	Scope3		0.526800000000
2017	Qtr 2	May	Central India	Scope1	Azure IoT Security	0.526800000000
2017	Qtr 2	May	Central India	Scope2	Azure IoT Security	0.526800000000
2017	Qtr 2	May	Central India	Scope3	Azure IoT Security	0.526800000000
2017	Qtr 2	May	Central India	Scope3	Azure VM Image Builder	0.526800000000
2017	Qtr 2	May	Central India	Scope3	BizTalk Services	0.526800000000
2017	Qtr 2	May	Central India	Scope3	Log Analytics	0.526800000000
2017	Qtr 2	May	Central India	Scope3	SQL Server Stretch Database	1.053600000000
2017	Qtr 3	July	Central India	Scope3		0.254860000000
2017	Qtr 3	July	Central India	Scope1	Azure IoT Security	0.428000000000
2017	Qtr 3	July	Central India	Scope2	Azure IoT Security	0.428000000000
2017	Qtr 3	July	Central India	Scope3	Azure IoT Security	0.428000000000

Usage Report

Year	Quarter	Month	Azure Region	Azure Service	Usage
2017	Qtr 2	May	Central India	Azure Firewall Manager	0.20
2017	Qtr 2	May	Central India	Azure VM Image Builder	0.20
2017	Qtr 2	May	Central India	BizTalk Services	0.20

*This Preparation report is based on preliminary data. The findings, interpretations, and conclusions presented in the report are for informational purposes only. This report and is not intended and should not be used for legal compliance, marketing, or reporting purposes.

Our waste commitments

By 2030, Microsoft will be zero waste across our direct waste footprint.

Investing in the future of circularity

We will partner with companies around the world to drive circular economy innovation and adoption of technologies to reduce waste and reuse materials and products.

Transforming waste accounting

We will improve waste data collection to ensure auditability and reporting.

Making fully recyclable Surface devices

We will manufacture Surface devices that are 100 percent recyclable in Organization for Economic Cooperation and Development (OECD) countries by 2030.

Eliminating single-use plastics

By 2025, we will eliminate single-use plastics in all Microsoft primary product packaging and all IT asset packaging in our datacenters.

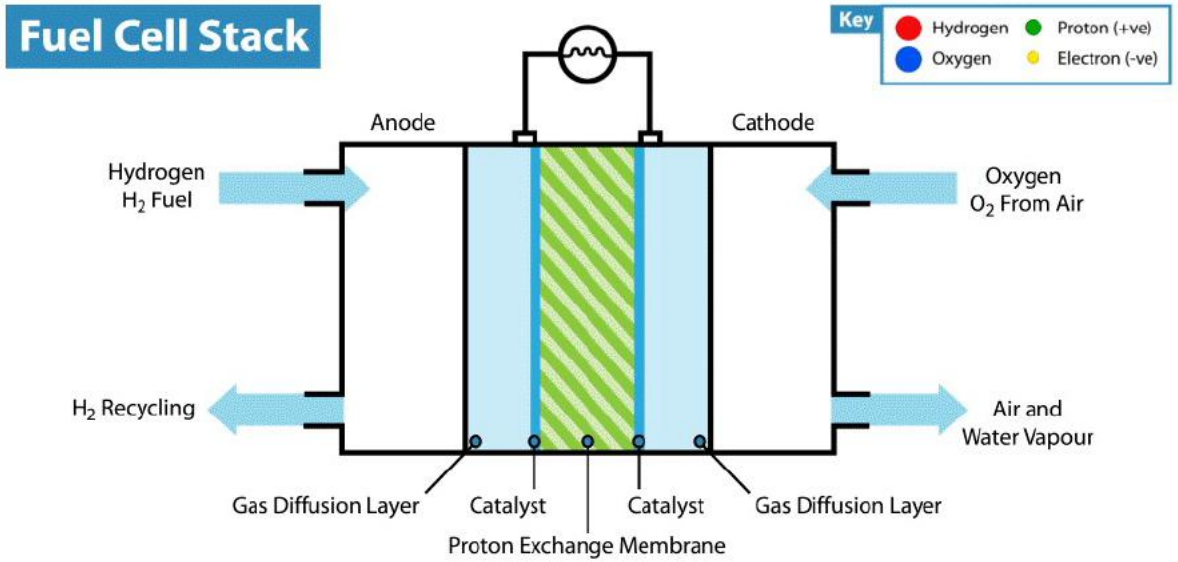
Driving to zero waste in operations

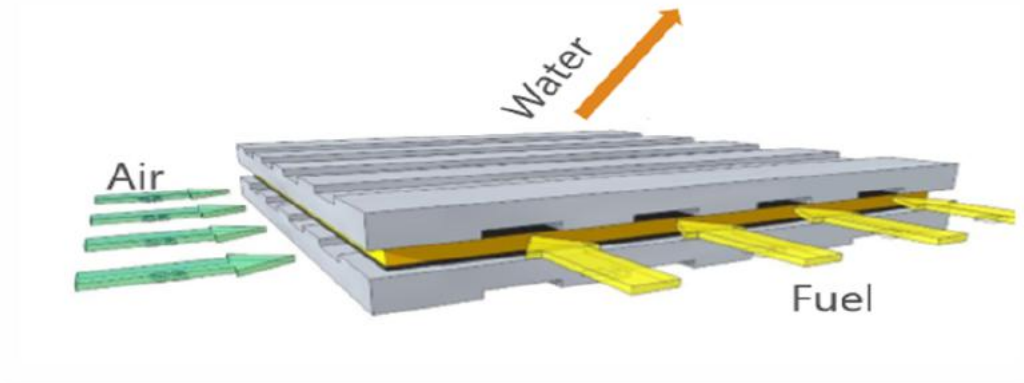
We will reduce as much waste as we create across our direct operations, products, and packaging.

Increasing reuse of servers and components through Circular Centers

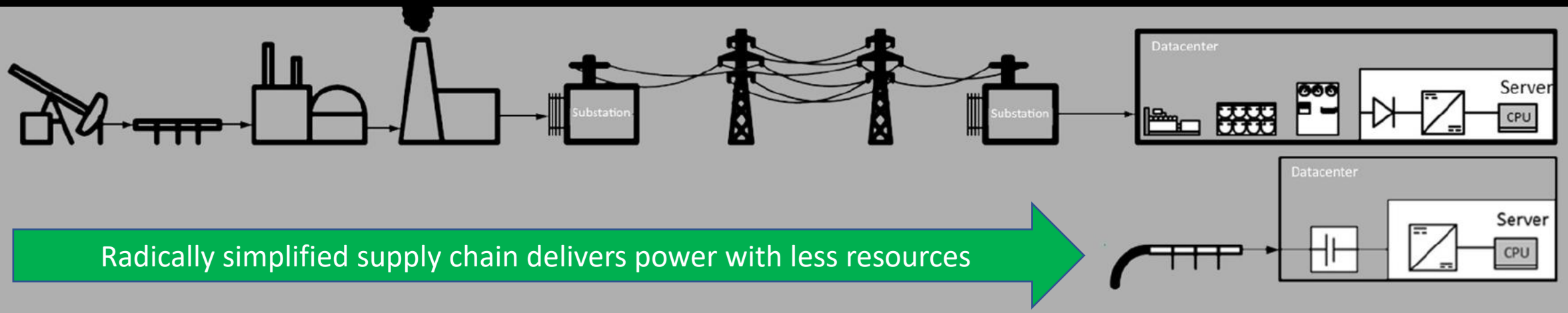
By 2025, 90 percent of servers and components within our regional datacenter network will be reused.

Redesigning Datacenters for an Advanced Energy Future

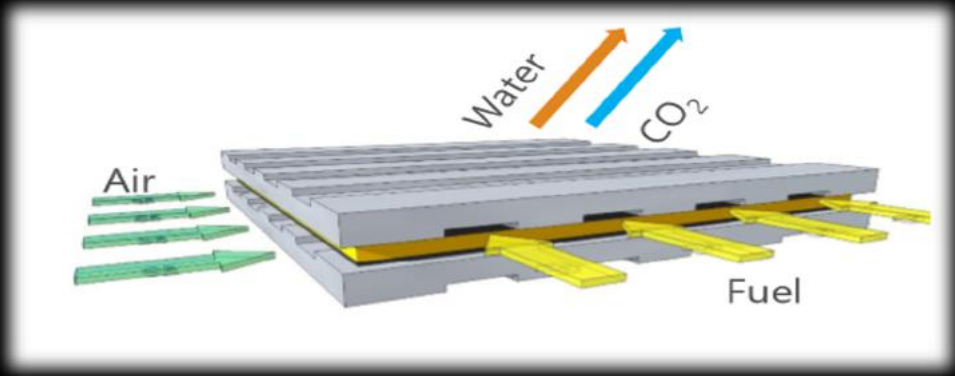




Redesigning Datacenters for an Advanced Energy Future



With this simplification comes a reduction in cost. Eliminating electrical distribution, power conditioning, and backup infrastructure makes a datacenter easier and less expensive to build, operate and manage. And more sustainable.



1.5 YEARS IN

Project Natick

3 test groups + control

- Nitrogen + Normal temp
- Nitrogen + Cold
- Nitrogen + Constant temp

During test period:

1/8 failure rate of the 'land-based' control group

Pulled up early 2021 and results currently being studied for future broader implementation

Microsoft

Thank You

Questions?

https://aka.ms/olek

Azure Energy Sustainability

180 **megawatts** of wind power in Netherlands

315 **megawatts** of new solar power in Virginia

1.189 **Power Usage Effectiveness** (PUE) Global Average

The industry average is according to reports 1.8 PUE.

The development of new world-class datacenters in **Sweden**, intends to create some of their most advanced and sustainable to date based on their design, power from **100** percent renewable energy sources through a **24/7 solution**, and plans for **zero-waste operations** and **Circular Centers**

Project Natick v3