# Moving towards zero carbon energy for data centers

100% renewable electricity
100% of the time
matched by ‘zero-carbon’ purchases

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


2025:
100% renewable energy

## Sustainability Goals by 2030

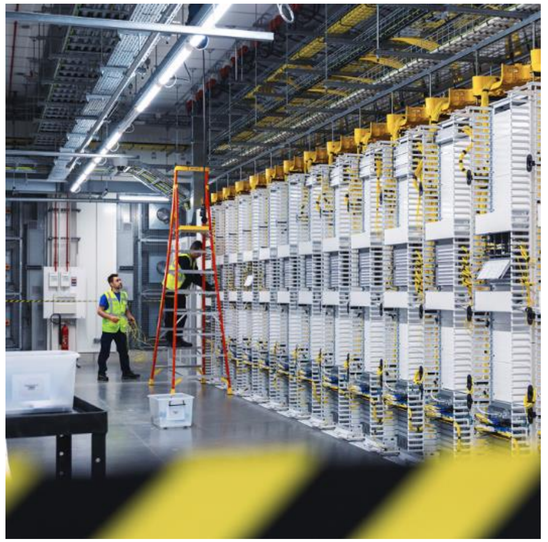
| Carbon negative | Zero Waste | Water positive | Restore more land than we use |
|---|---|---|---|

# Microsoft data centers are key to our sustainability goals

Microsoft has purchased **270 MW of renewable energy in the Netherlands** to support our facilities: 180 MW from the Vattenfall Wieringermeer wind farm and 90 MW from the Borssele 3/4 Eneco wind farm.

Microsoft's data centers in Middenmeer had a **12-month average PUE of 1.14 through July 2021**. Lower PUE (Power Usage Effectiveness) indicates more energy efficient data centers, These data centers are 2X as energy efficient as average customer data centers

Microsoft uses air cooling in our Datacenters in the Netherlands. This method uses **outside air instead of water** for cooling at temperatures below 25 degrees Celsius, reducing water use to less than five percent of the year.



In 2020, we successfully opened our first **Microsoft Circular Center** in our North Holland data centers, which is designed to extend the lifecycle of servers through reuse and thereby support a circular economy for our Cloud.

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

Microsoft

# Microsoft’s 100/100/0 vision and commitment for a decarbonized grid

Stanford study: When 100% renewable energy doesn't mean zero carbon,  Vincent Xia, Precourt Institute for Energy, Stanford Earth Matters, Climate Change, May 23, 2019

*“By 2025, the use of yearly averages in California could overstate the greenhouse gas reductions associated with solar power by more than 50% when compared to hourly averages.”*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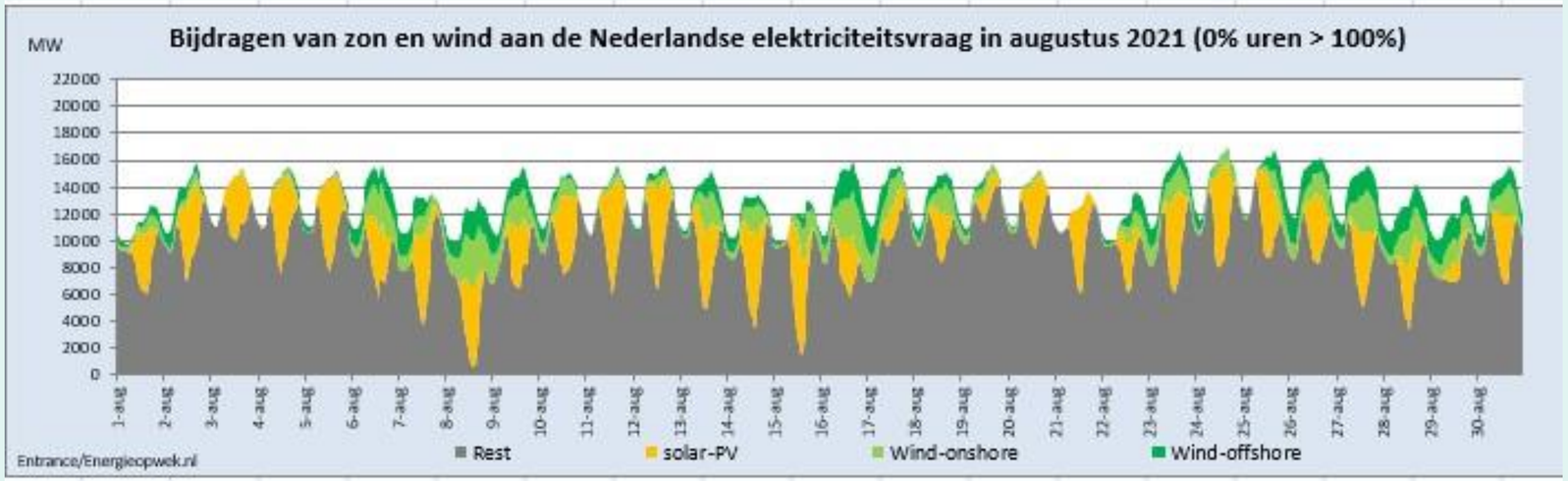
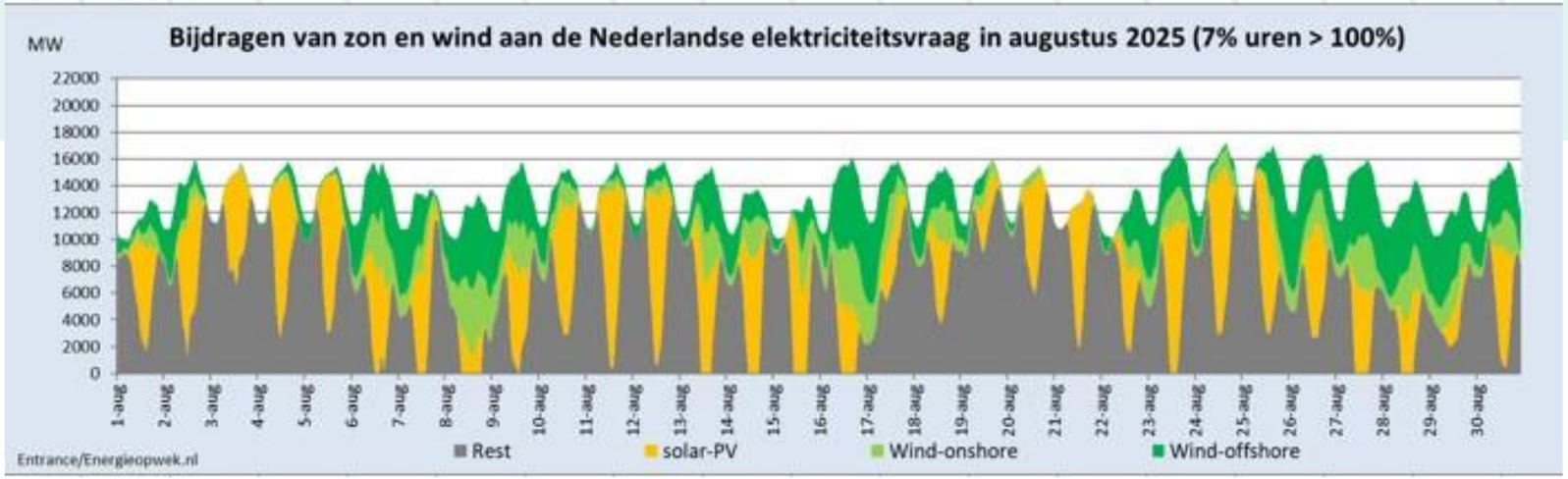
# Demand for CO2-free Flex

## Even with bad aug-mnth‘21 we go to surpluses in 2025




## How to anticipate?

1) **Optimal production mix**
   e.g. contract 25% solar and 75% wind, improves matching score from ca 60% to 70%

2) **Demand steering**
   if possible and where economical

3) **Battery storage**

4) **CO2 free Flex** (e.g. H2)

Eneco

# Multi-party hourly matching project for Microsoft's data center in Amsterdam


Eneco

EnergyTag

certiQ

FLEXIDAO

Microsoft

Currently Microsoft has signed a PPA contract with Eneco for renewable energy from an offshore wind farm. Microsoft has committed to a **100/100/0 goal** in order to truly eliminate emissions from the electricity they buy for its datacenters.

With CertiQ and FlexiDao parties are testing with tracking energy on an hourly basis using the Granular Certificate standard from EnergyTag.

Microsoft

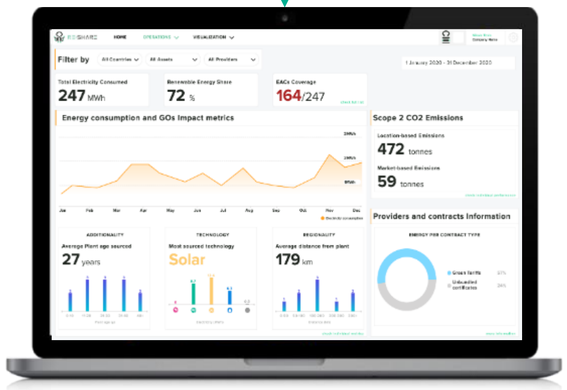
# A digital “control room” of all renewable energy certificates, contracts and emissions

FlexiDAO software tracks the origin of green energy and its CO2 every hour (24/7) with blockchain

**ENERGY CERTIFICATES**

**CONSUMPTION & EMISSIONS**

**PRODUCTION DATA**




**CREDIBLE REPORTING**

**DECISION MAKING**

**SAVINGS ON ADMIN TIME**

# Microsoft has taken the lead with pilots in Sweden and in The Netherlands

But we're not alone

Microsoft

Business

**Achieve 100% Renewable Energy with Microsoft Sweden 24/7 Monitoring | Azure Blogs and Updates**

Google

CARBON-FREE ENERGY

Operating on 24/7 Carbon-Free Energy by 2030.

TOTAL

Ørsted

ENGIE

Statkraft

IRON MOUNTAIN®

**Iron Mountain Adds Hourly Renewable Energy Tracking for its Data Centers**

BY RICH MILLER - APRIL 14, 2021 — LEAVE A COMMENT

**Biden pledges to buy 24/7 carbon-free electricity pushed by Clean Air Task Force, Google and others**

VATTENFALL

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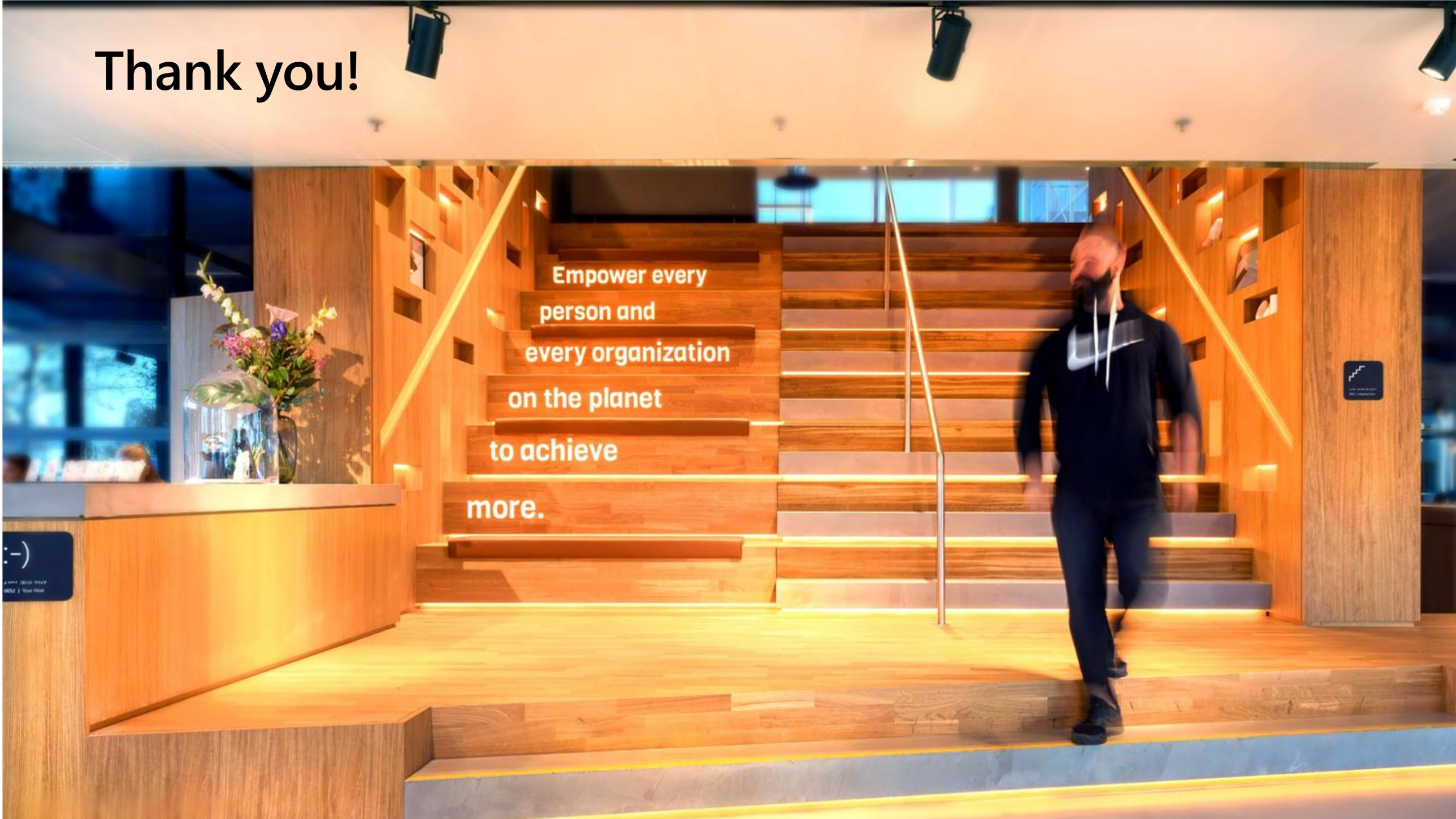
# Thank you!


Empower every
person and
every organization
on the planet
to achieve
more.