



Microsoft for Energy

# P&U Industry

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Energy & Resources Industry



# Forces at Work Driving P&U Transformation



Serving the new energy consumer



Including more renewables and DERs



Developing new grid operating models



Setting ambitious sustainability goals



New regulations accelerating energy transition and digital innovation

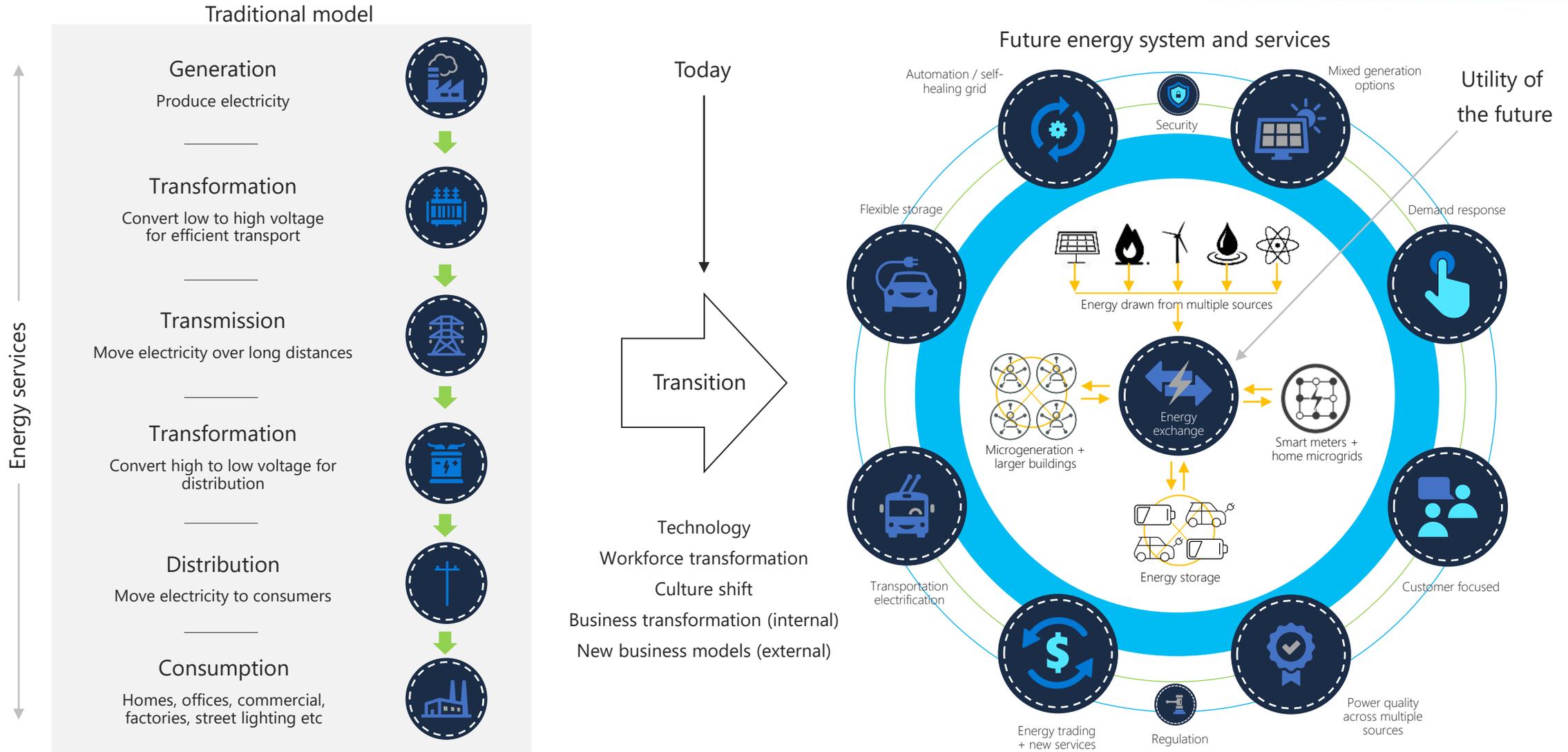


By 2035, **>50%** of electricity will be generated by renewable energy



Today, there are **51 billion tons** of carbon produced per year globally

# Evolving Energy System



# Becoming a Digital Utility



**CHANGING WHATS POSSIBLE**

## Becoming a Digital Utility

### Digitization = Operational Backbone

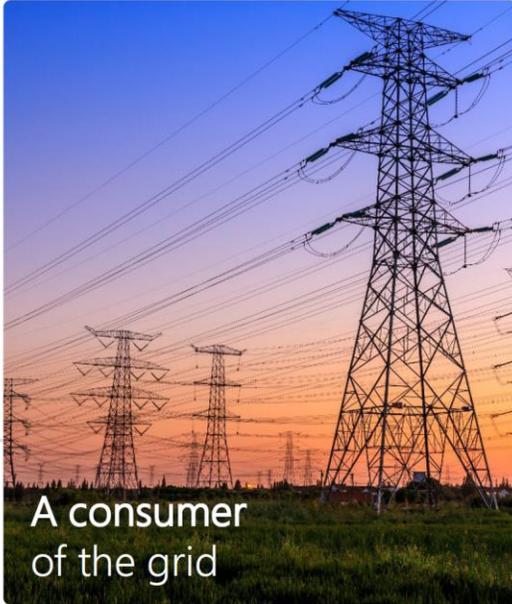
Enhances our traditional platforms and digitizes our foundational P&U operational processes

### Digitalization = Rapid Business Innovation

Delivers new line of business value propositions through new digital offerings

# Microsoft in Energy

Microsoft sees energy from three perspectives



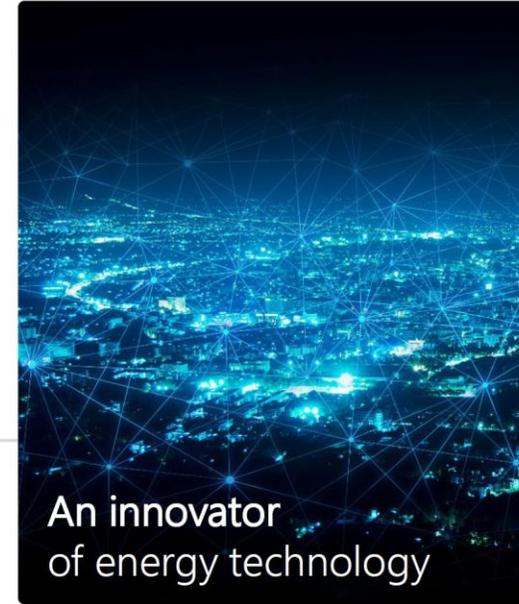
**A consumer  
of the grid**

Large customer with **stable, high-value load** and high average load factor



**A collaborator  
in clean energy**

Dedicated to procuring **100% renewable energy** and being a **backup provider**



**An innovator  
of energy technology**

Improving **grid reliability** and enabling **environmental efficiencies**

# Microsoft Azure : The World's Computer



**70+**  
Azure regions

**1M+**  
Miles of Fiber

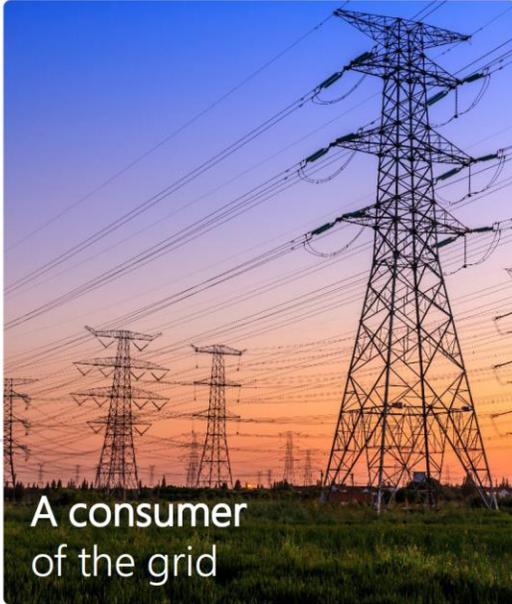
**220+**  
Datacenters

**99.9997%**  
Uptime

● Available region    ⚙️ Announced region    ○ Availability zones

# Microsoft in Energy

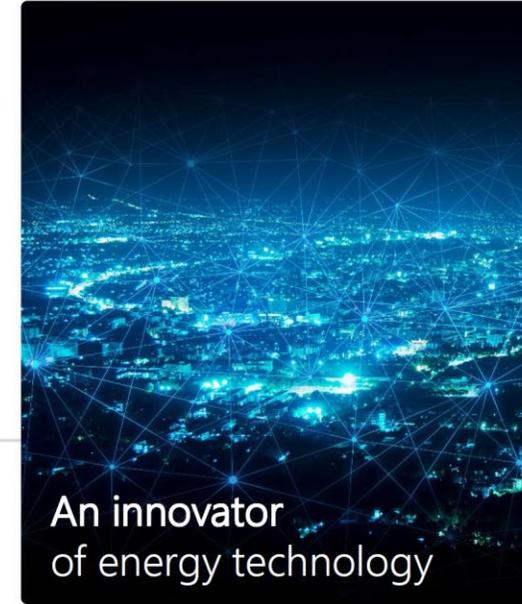
Microsoft sees energy from three perspectives



Large customer with **stable, high-value load** and high average load factor

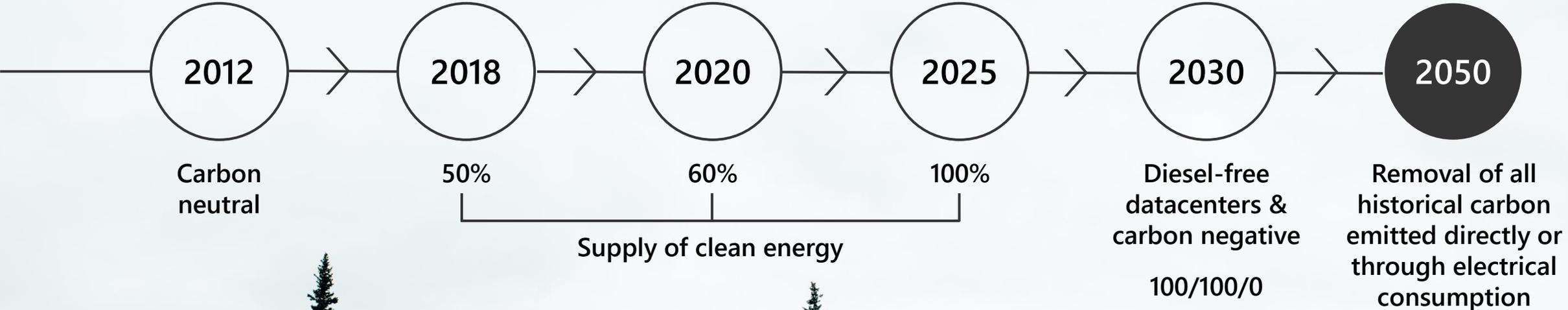


Dedicated to procuring **100% renewable energy** and being a **backup provider**



Improving **grid reliability** and enabling **environmental efficiencies**

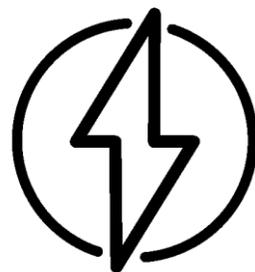
# Microsoft is Committed to Sustainability





## Supporting a decarbonized grid

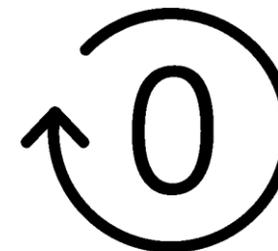
Microsoft 100/100/0 commitment by 2030



100% of electricity consumption



100% of the time



Matched by zero carbon energy purchases

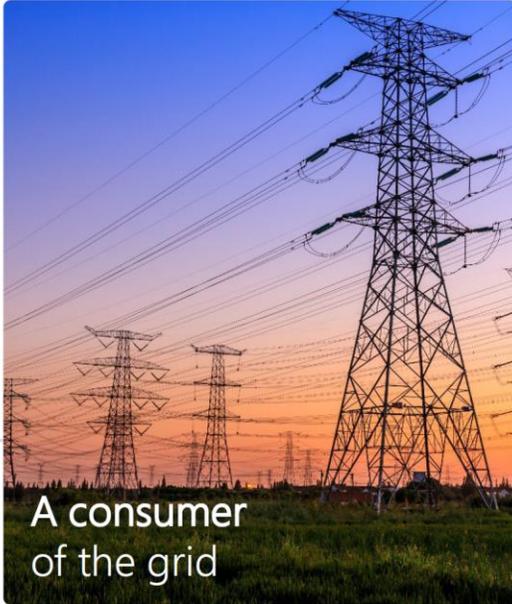
Press release

**Fortum and Microsoft announce world's largest collaboration to heat homes, services and businesses with sustainable waste heat from new data centre region**



# Microsoft in Energy

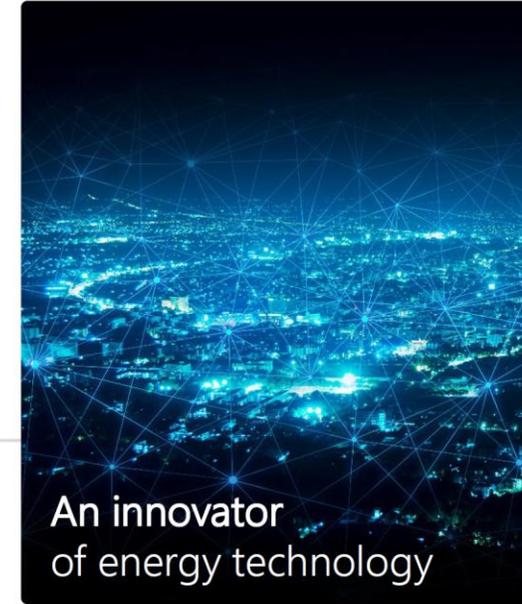
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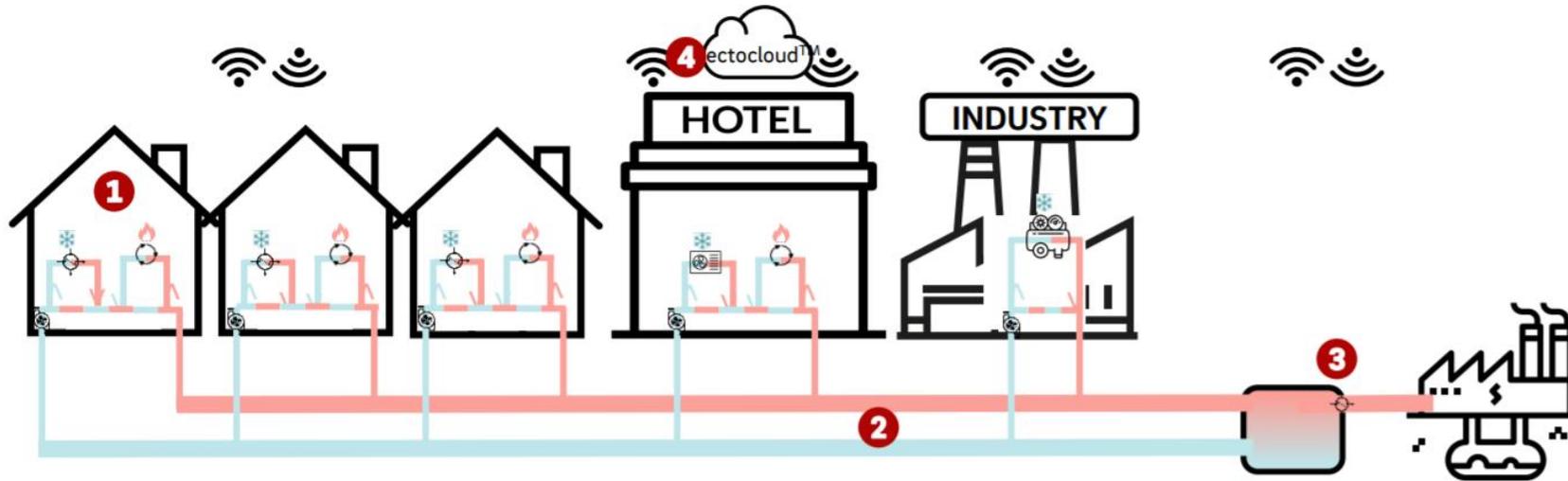


Dedicated to procuring **100% renewable energy** and being a **backup provider**



Improving **grid reliability** and enabling **environmental efficiencies**

# The ectogrid™ technology combines the best characteristics from heat pumps, energy management and grid-based infrastructure



## What are the key features of ectogrid?

- Heating and cooling with one low temperature grid
- Heating and cooling balanced against each other
- Possibility to use low temperature excess heat
- Decentral energy generation via heat pumps

## What are the building blocks?

- 1 Building integrated equipment
- 2 Distribution grid
- 3 Balancing capacity
- 4 Energy management software (ectocloud)

### Ectogrid™ effectively uses and reuses all available thermal energy

- Cities generate thermal energy flows
- With ectogrid™ we are able to connect buildings with different needs and to balance residual thermal energy flows between them
- Thus ectogrid™ makes it possible to decrease both pollution and the energy consumption in a city

ectogrid™



Infrared spectrum

Visual spectrum



ectocloud™ is based on Microsoft Azure



ectocloud™

The cloud system helps to transfer energy users to prosumers



## Australian Energy Simulation Center (AESC)

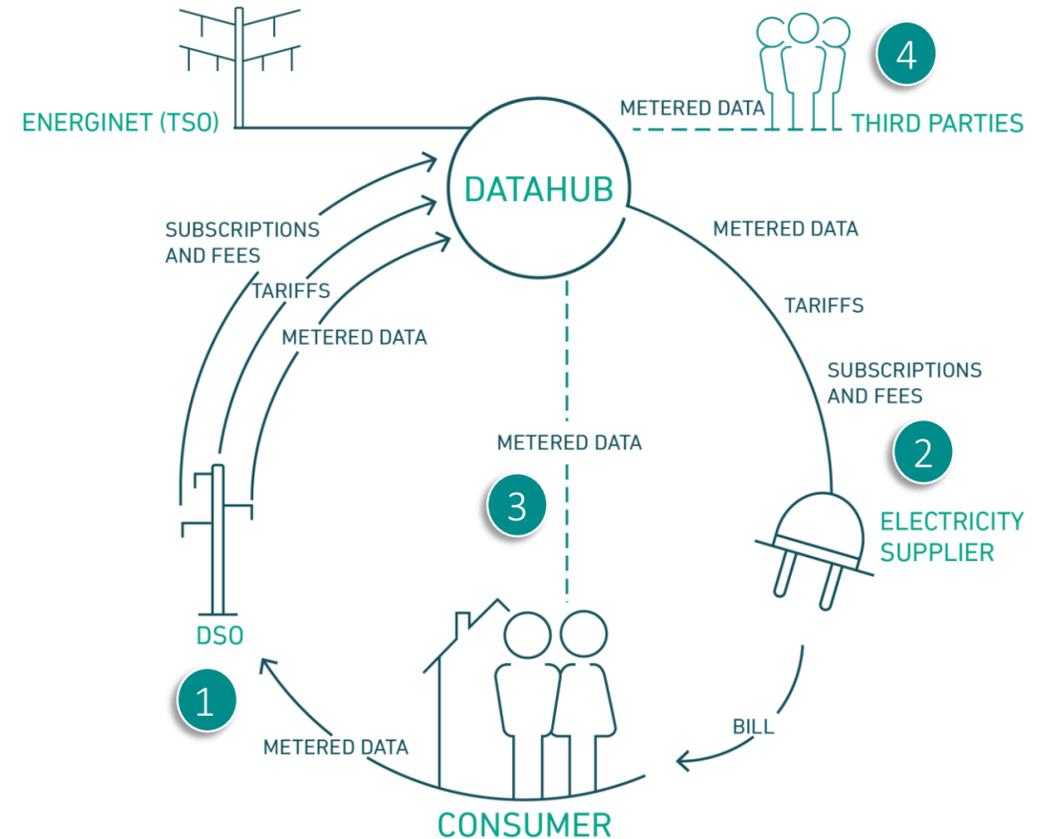
- Simulation of the entire energy supply
- Integrates data from multiple suppliers and systems of record
- Enhanced forecasting and grid reliability
- Detailed models of wind, solar and battery storage systems
- Simulated grid behaviors to better enhance decision support
- Objective is a one-minute simulation with 3 minutes of processing time
- Enhanced support for environmental mitigation



# NEW GENERATION DATAHUB TO BOOST GREEN TRANSITION

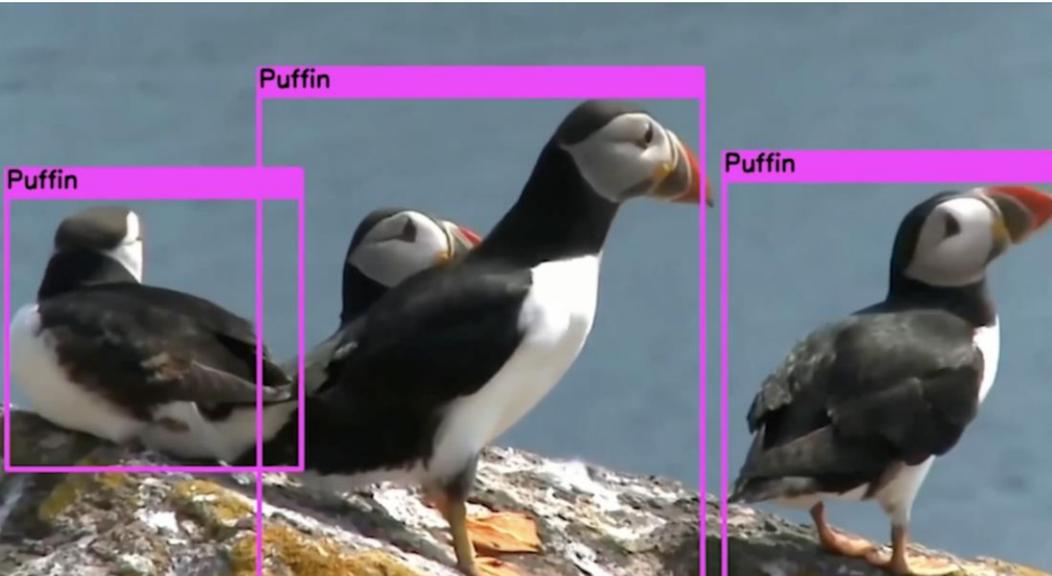
“With Energinet’s expertise in energy-markets and Microsoft’s expertise in software and architecture the upgraded DataHub system will be able to maintain the essential daily operations while at the same time facilitating the green transition by making data accessible and flexible in order to integrate new solutions”

Martin Lervad Lundø, CEO Energinet DataHub



Case study: SSE Renewables

## UK wind power provider monitors puffin colonies with AI



Offshore wind provides consistent low-carbon energy but is known to have effects on wild bird populations. SSE Renewables, a global leader in offshore wind, completed a live trial off the coast of Scotland using remote cameras connected to an AI tool in the Microsoft cloud to automatically detect and count puffins at a local colony—down to the individual bird. SSE Renewables can use this data to adapt operations to reduce negative impacts on local ecosystems, and meet regulatory requirements, as their production footprint expands.



### Eliminate manual monitoring

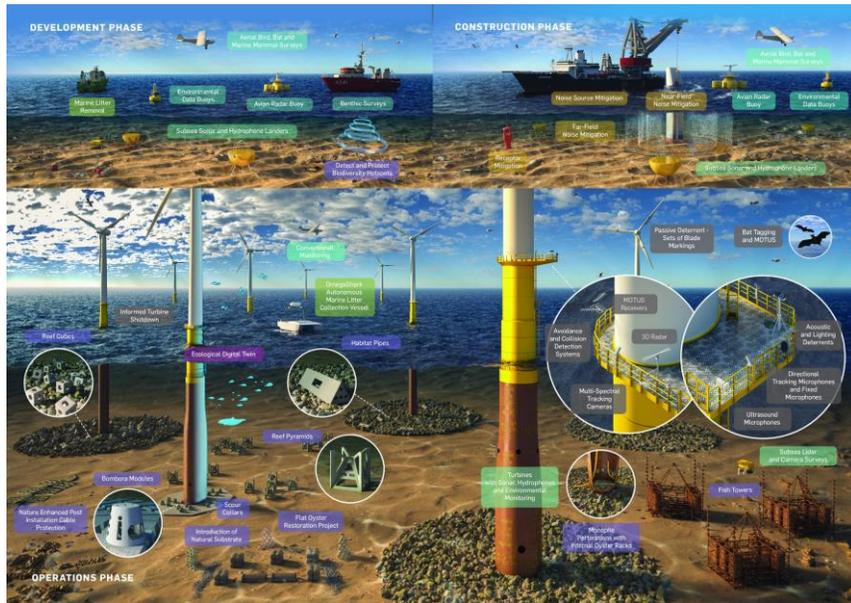
Save employee time needed to review video footage or travel to the field

### Share insights to drive decision making

Stakeholders can access real-time dashboards from anywhere

Case study: SSE Renewables

# SSE Renewables, Microsoft and Avanade create ecological digital twins that could reshape windfarms and the environment around them



Offshore wind provides consistent low-carbon energy but is known to have effects on wild bird populations. SSE Renewables is to deploy Microsoft's technology and monitor changes in the atmosphere, reefs and marine and bird life around windfarms.

It will be used to build a digital replica of sites that can be viewed on mobile devices and headsets to help SSE Renewables understand how a development is affecting an area in real-time, in addition to monitoring the ecosystem through the lifecycle of the windfarm to minimise any negative impact.



**Eliminate manual monitoring**  
Save employee time needed to review video footage or travel to the field

**Share insights to drive decision making**  
Stakeholders can access real-time dashboards from anywhere

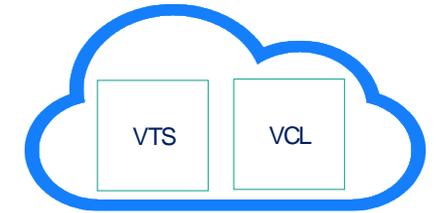
# Microsoft, Planet and The Nature Conservancy launch the Global Renewables Watch

- Using AI and satellite imagery, the Global Renewables Watch maps renewable energy installations from space
- Microsoft is providing the AI and platform technology, Planet is contributing the underlying satellite imagery, and The Nature Conservancy is overlaying the subject-matter expertise to analyze the output
- Mapping of solar and wind energy installations in Germany and India, as well as solar installations in Brazil and Egypt completed
- The first full global inventory is expected to be completed by early 2023

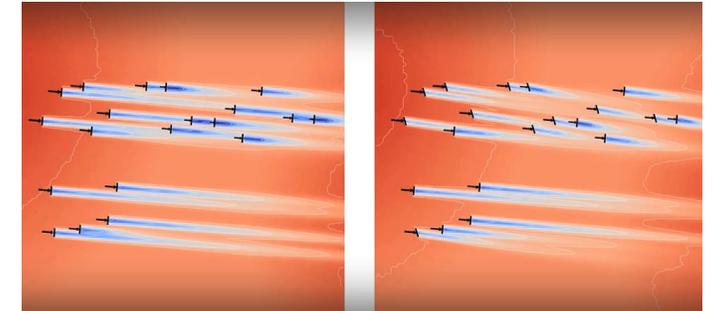


Case study: Vestas

# Moving the Climate Library to the cloud



Cloudburst: Modernizing the Foundation - Turbine Simulation, Climate Library, etc



## Vestas Grand Challenge:

Wake steering optimization, developing an intelligent wind farm flow controller to increase energy yield of a wind farm up to 100 turbines

## Modernizing the foundation:

Early results include the ability to build regional weather maps 500x faster, and build 20-year point weather histories (context for sighting & plant design) 30x faster

# Microsoft for Energy Industry Priorities

## Operate for the future

Increase operational resiliency while generating value for stakeholders

## Transform your workforce

Attract, train, and retain employees for your next-generation workforce

## Transition to clean

Achieve net-zero commitments through emissions reductions and decarbonization

## Reimagine energy

Capitalize and expand your market positioning, growth opportunities, and new business models



Global SIs



Modern work



Business applications



Infrastructure



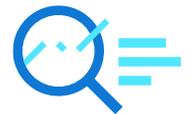
Digital and app innovation



Data & AI



Security



Global ISVs

# Microsoft mission

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

