AWS re:Invent

NOV. 29 – DEC. 3, 2021 | LAS VEGAS, NV

IOT206

Scaling sustainability solutions with IoT

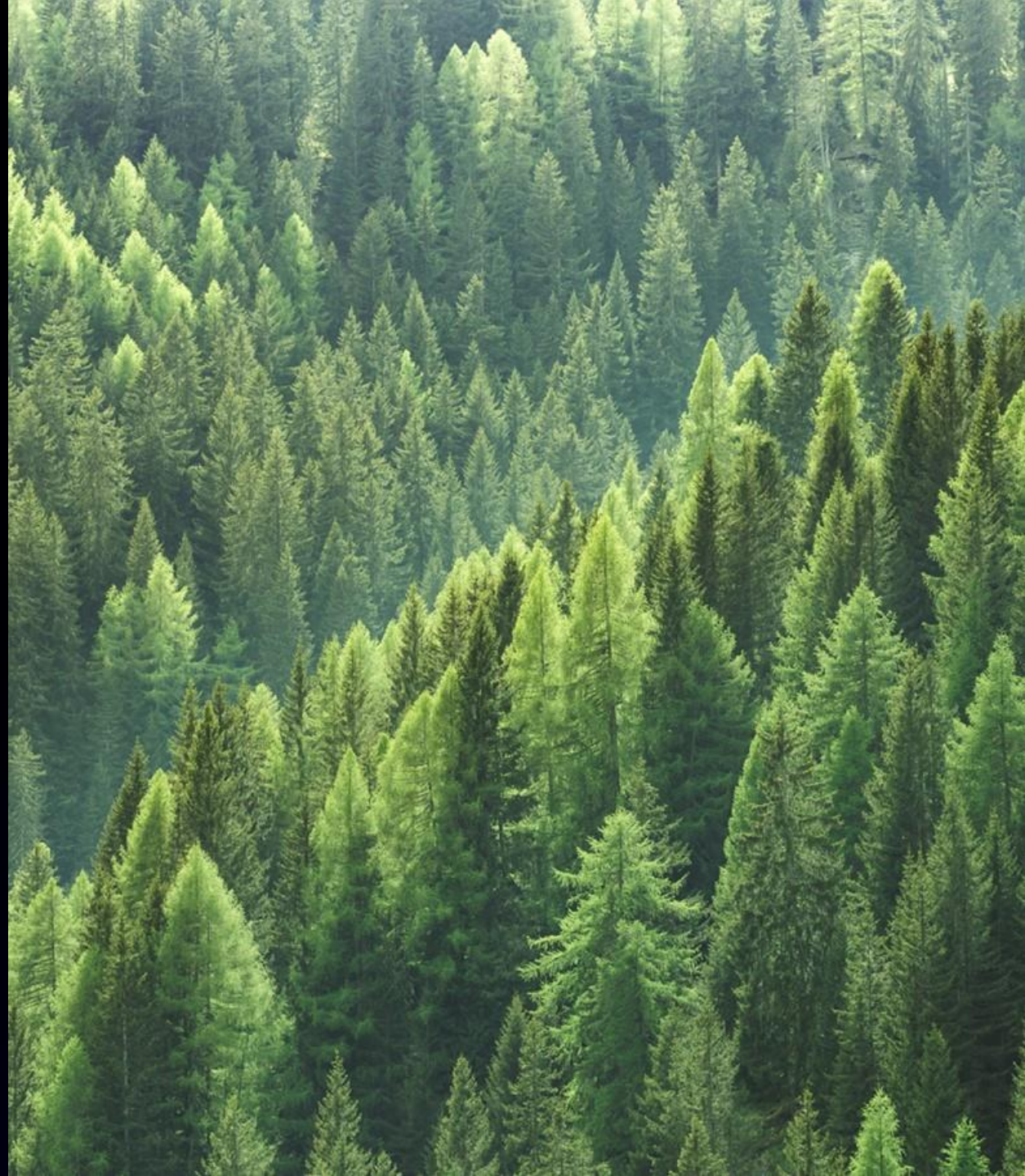
Mark Relph (he/him)
Director, IoT Business Development & Sales
Amazon Web Services

Sandy Coleman
Executive Vice President of Research & Development
Siemens

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We can act and make a difference

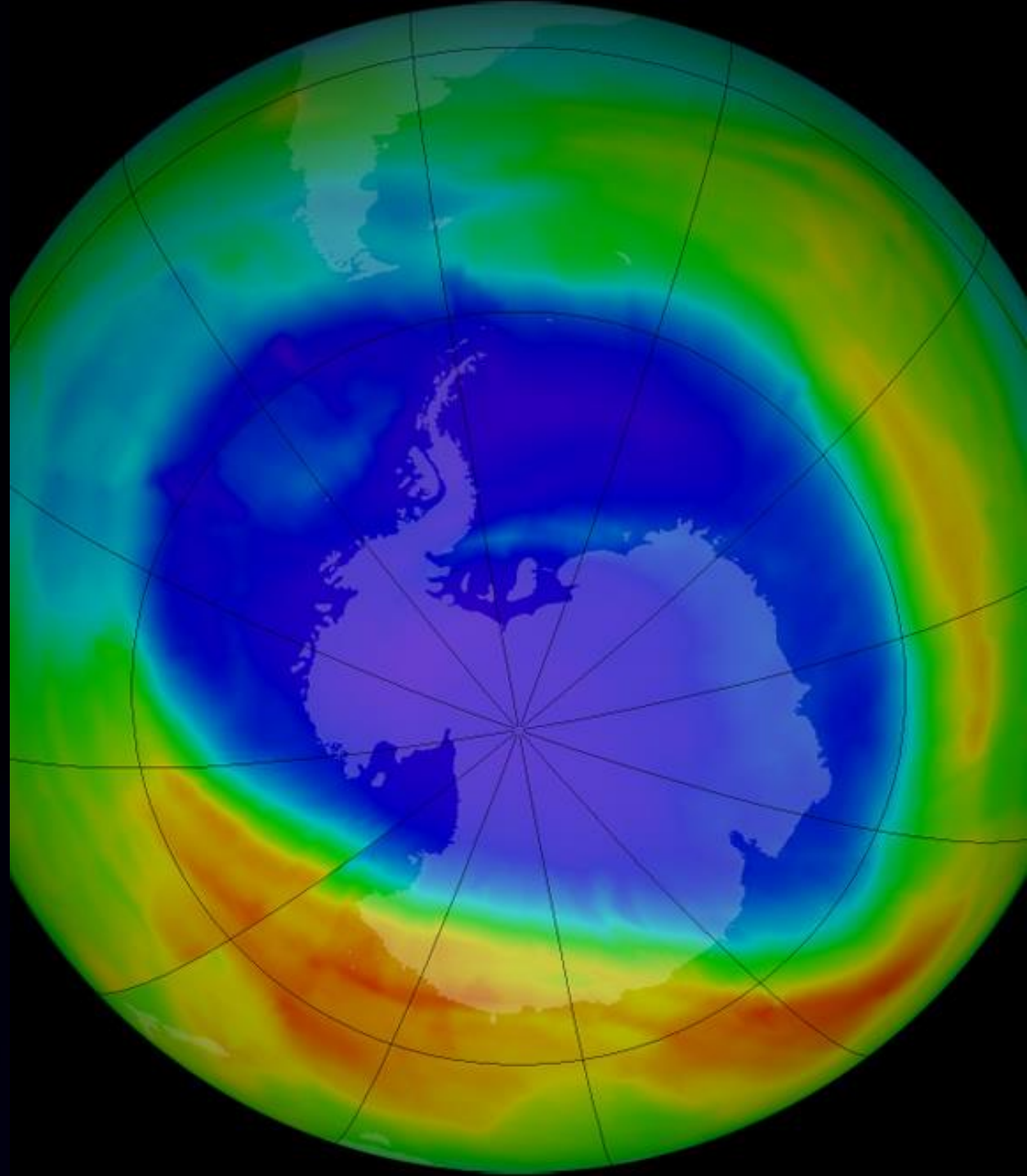
A lesson from history...



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Ozone: Action works

- Evolved from Carbon tetrachloride, used in fire control
- In the 1920s, evolved into CFCs widely used for refrigeration and aerosol cans
- Quickly determined the impact on the Earth's ozone layer
- 1985 – Vienna Convention for the Protection of the Ozone Layer
- 1987 – Montreal Protocol
- 2019 – Smallest amount of ozone depletion detected



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Sustainability and climate action



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UN Sustainable Development Goals & COP26





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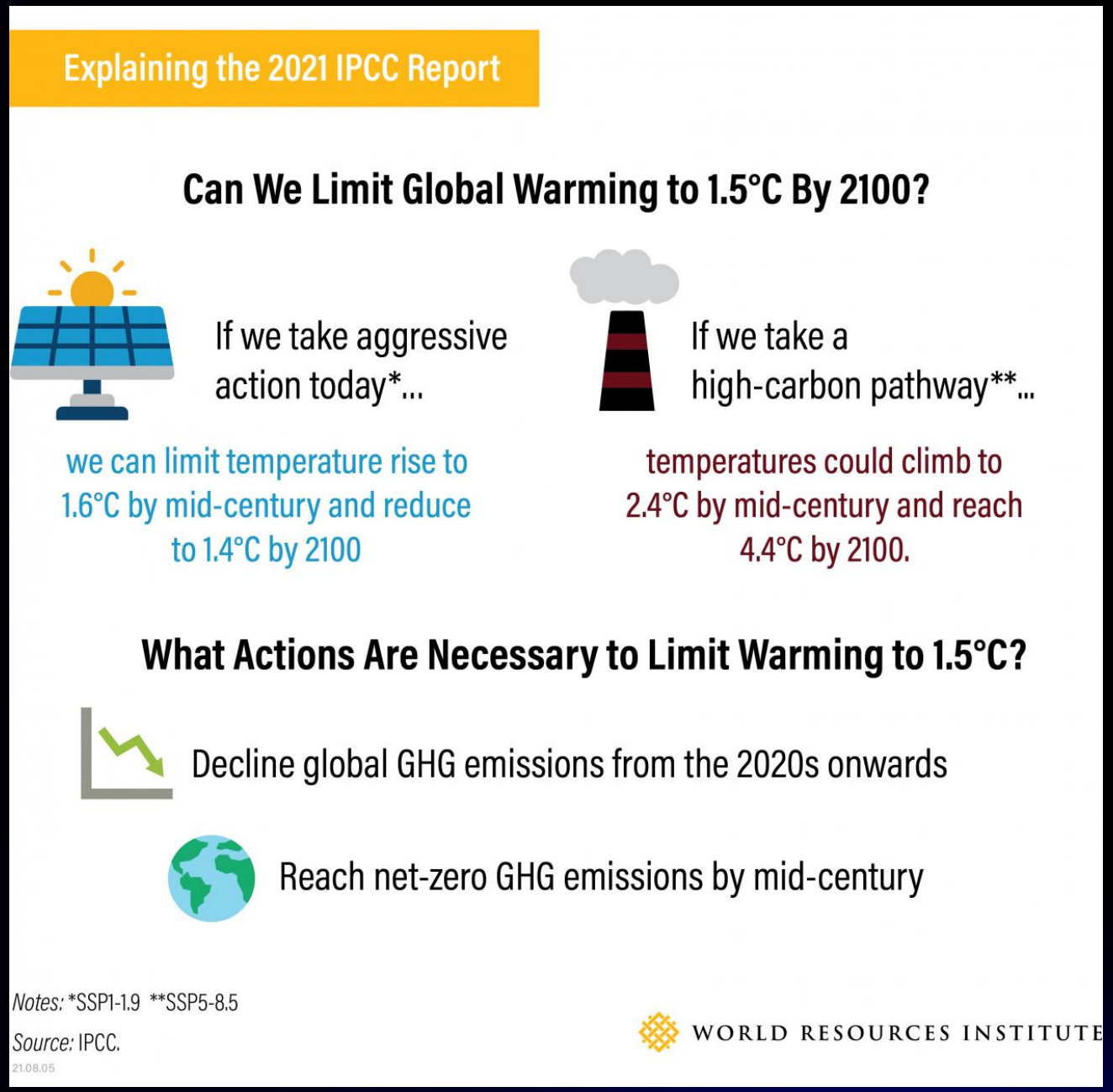
Limiting global warming to 1.5 degrees C by the end of the century is still within reach but requires transformational change



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2021 IPCC Report

The Intergovernmental Panel on Climate Change (IPCC) is the United Nations body for assessing the science related to climate change



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Further and faster, together



Commitment to a sustainable future

On September 19, 2019, Amazon and Global Optimism announced The Climate Pledge, a commitment to meet the Paris Agreement 10 years early

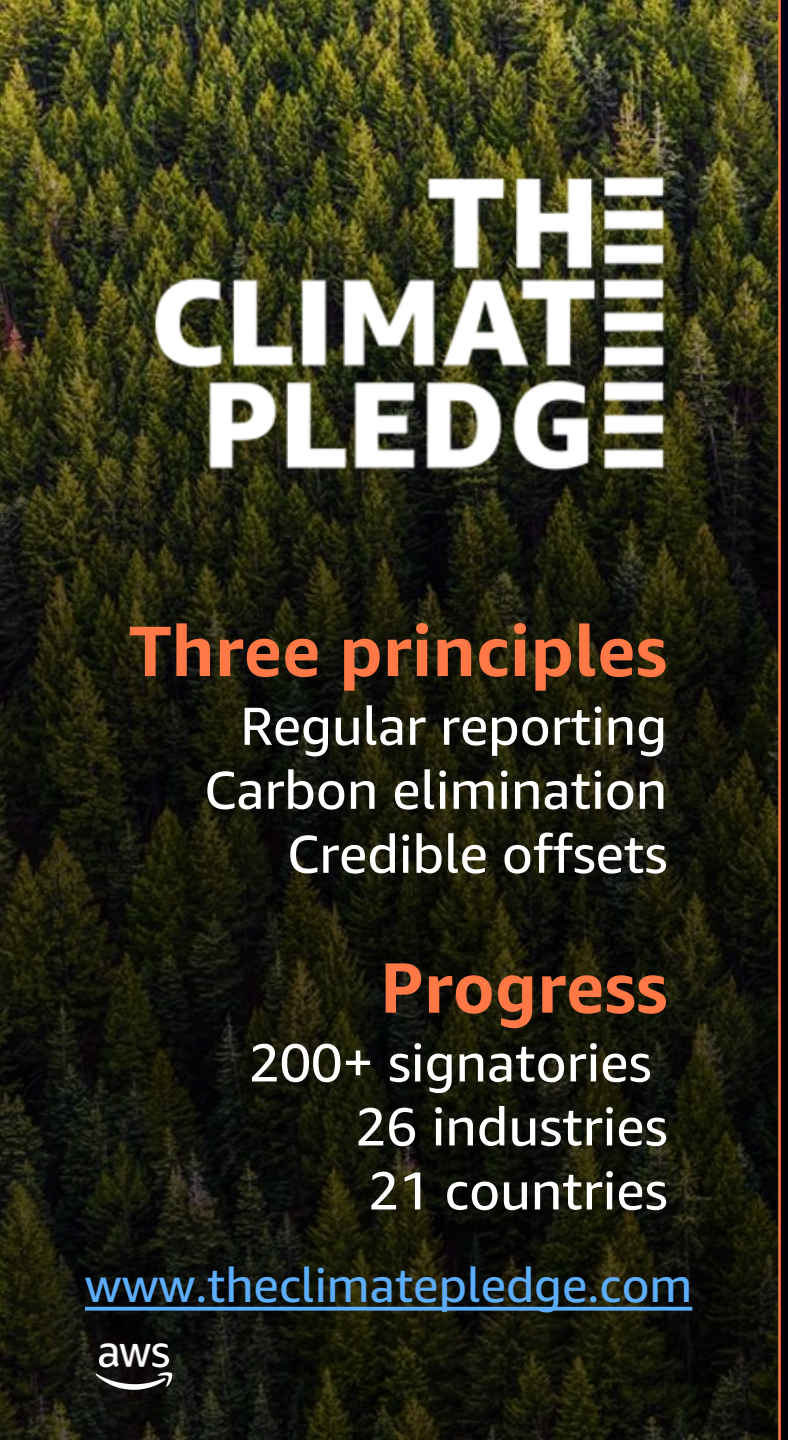
Net-zero carbon by 2040

Path to 100% renewable energy by 2025

$2 billion Climate Pledge Fund

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THE CLIMATE PLEDGE

Three principles

Regular reporting
Carbon elimination
Credible offsets

Progress

200+ signatories
26 industries
21 countries

www.theclimatepledge.com

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Alaska AIRLINES
BNB BNBuilders
Coca-Cola
COLGATE-PALMOLIVE
EST. 1873 Heineken®
IBM
IRON MOUNTAIN®
LifeStraw
Lime
posti
RUSSELL GROUP
Telefónica
Unilever
VISA

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Harnessing the power of IoT for sustainability



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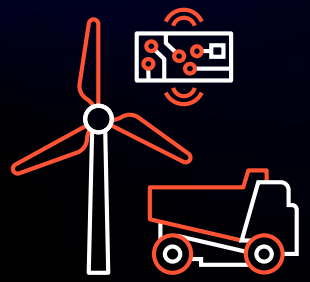
IoT adoption is rapidly accelerating

	TODAY		IN 2025
IOT DEVICES INSTALLED [1]	36B	›	75B
IOT DEVICE DATA GENERATED [2]	4.4zB	›	79zB
IOT AS A KEY COMPONENT OF DIGITAL BUSINESS STRATEGY [3] (according to enterprise executives)		››››››	60%

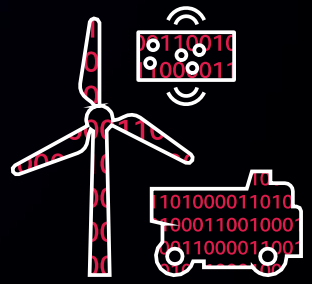
[1] Statista | [2, 3] IDC

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IoT: Key to sustainability projects



AT THE EDGE & PHYSICAL SYSTEMS



DATA & INSIGHTS



BUSINESS OUTCOMES



AWS IoT Greengrass



FreeRTOS



AWS IoT Core



AWS IoT SiteWise



Amazon Monitron



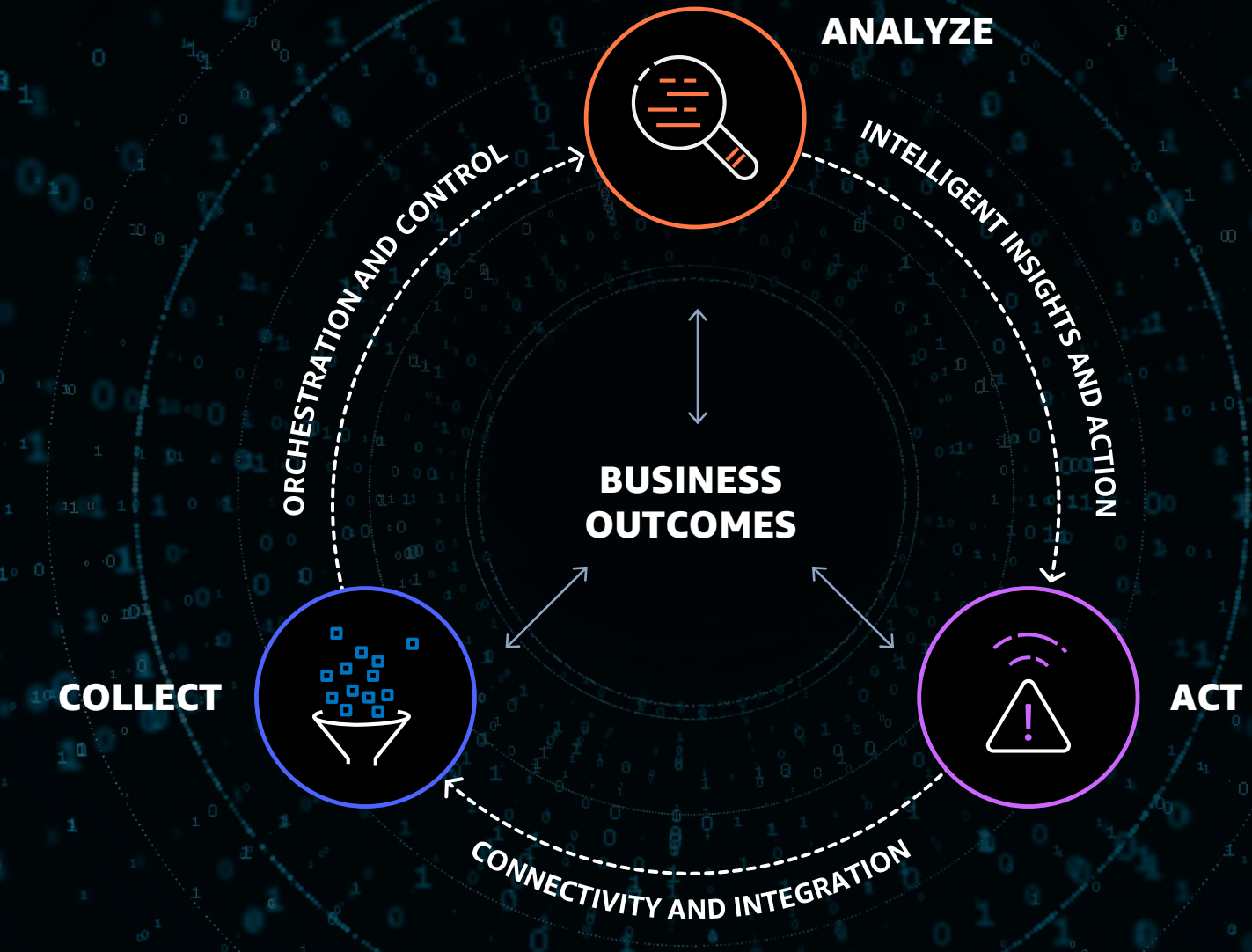
Amazon Lookout for Equipment



Amazon SageMaker

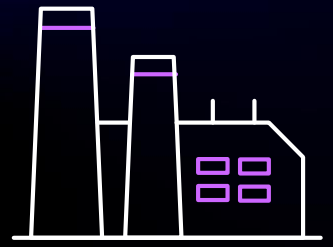
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IoT powers insight and action

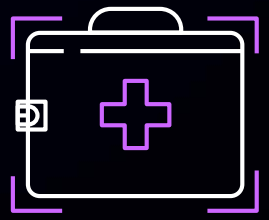


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What customers are building with AWS IoT



Improve the performance and productivity of industrial processes



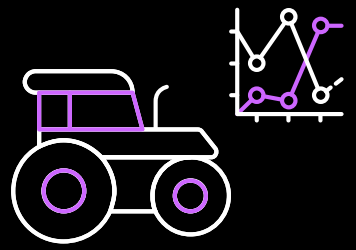
Remotely monitor patient health & wellness applications



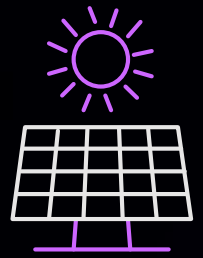
Efficient warehouse operations



Build smarter products & user experiences in homes, buildings, and cities



Grow healthier crops with greater efficiencies



Manage energy resources more efficiently



Transform transportation with connected and autonomous vehicles



Enhance safety in the home, the office, and on the factory floor

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Smart agriculture: CropX



Soil sensors enable sustainability

- Combines above-ground datasets with in-soil data measured by sensors that transmit the data to the AWS-based platform
- Integrated with imaging, weather, topography, and soil data and analyzed by AI-based algorithms to provide analytical insights via the CropX web or mobile app
- Demonstrated more than 40% water savings across different crop types, with a 10% yield increase

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Beewise deployed a wide, interconnected network of distributed devices and sensors using AWS IoT Core and AWS IoT Device Management

Beewise was able to achieve a dramatic increase in plant pollination and honey production

Beewise lowered the average bee mortality rate from ~40% (in today's beehives) to less than 10% in Beewise's robotic AI-controlled beehives

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"With AWS investments, we have been able to shift our development resources to focus on building an innovative peer-to-peer microgrid that is bringing affordable solar electricity to communities in Bangladesh and beyond."

Hannes Kirchhoff
SOLshare CTO

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Securely and efficiently allow people to trade excess solar energy from in-home solar systems

SOLshare uses FreeRTOS on constrained MCU devices to securely implement microgrid logic connecting to AWS IoT Greengrass

Providing state-of-the-art technology from FreeRTOS on devices to services in the cloud

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Coca-Cola İçecek

CHALLENGE

Coca-Cola İçecek (CCI) is the sixth-largest bottler of Coca-Cola products by sales volume. CCI's production facilities previously relied mainly on analog processes for asset measuring and monitoring. Routine process tracking and asset maintenance required operators to search for issues by hand and manually keep track of how much energy, water, and other materials production lines used.

SOLUTION

To improve its operations, CCI decided to digitize its shop floor and manufacturing processes to implement a complete digital twin solution that would scale to all 26 bottling plants.

In 2 months, CCI built a robust digital advanced analytics solution for its production line sanitation process using AWS IoT SiteWise and AWS IoT Greengrass.

IMPACT

- Improved process efficiency and environmental sustainability
- Saved 20% on energy annually
- Saved 9% on water annually
- Optimized clean-in-place process time and cost performance



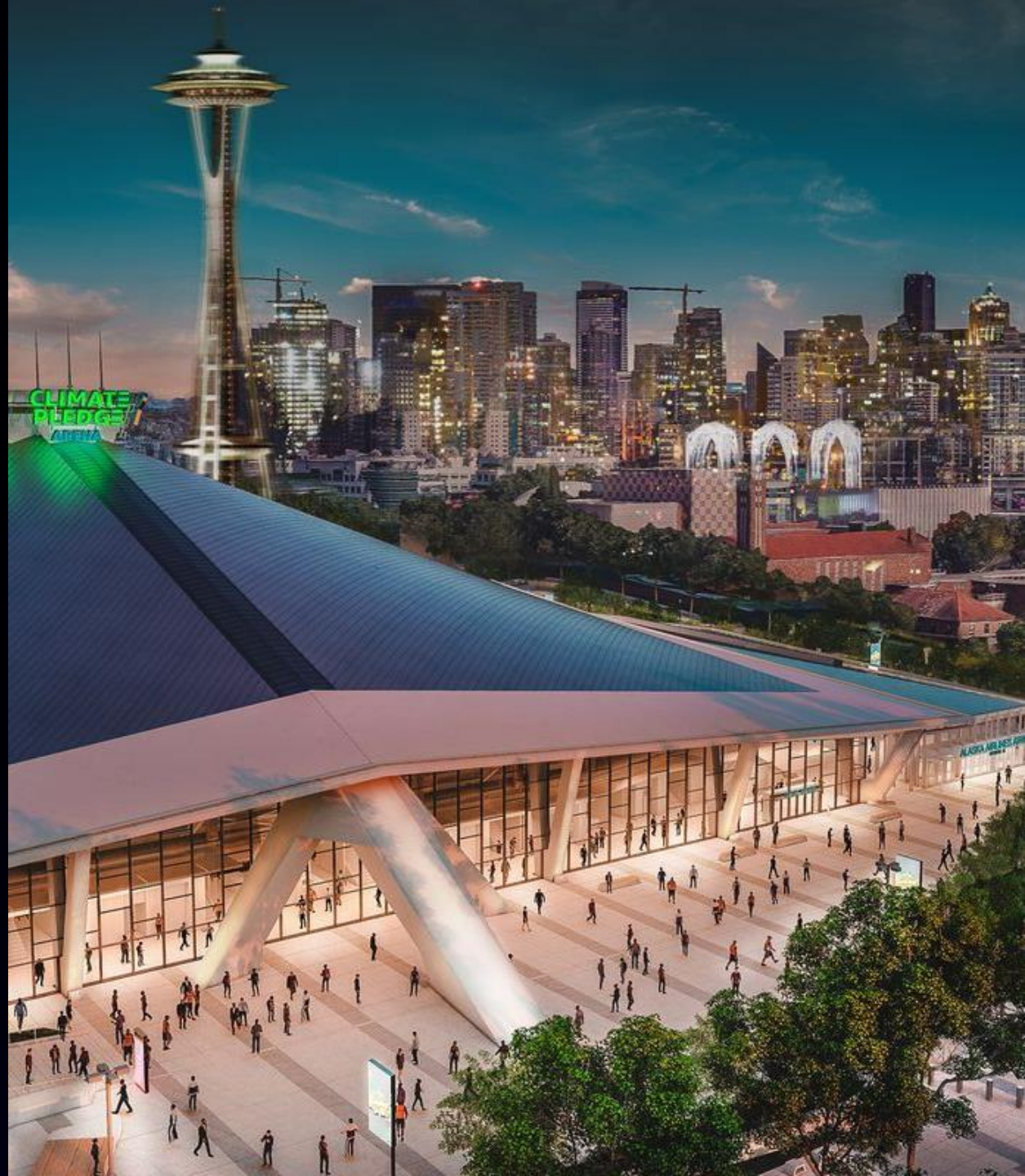
"If we can locate failures and other maintenance issues before they happen, we can keep the plant up and running at all times and improve our utilization."

Suheyla Er Aksoy, Asset Optimization Digital Technology Leader, Coca-Cola İçecek

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Climate Pledge Arena

- Goal: to be the most progressive, responsible, and sustainable arena in the world
- Create the first International Living Future Institute certified zero carbon arena in the world
- Electric kitchens vs. gas
- Rainwater reclamation
- Zero single-use plastic



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IoT and smart buildings

Sandy Coleman

Executive Vice President of
Research & Development

Siemens

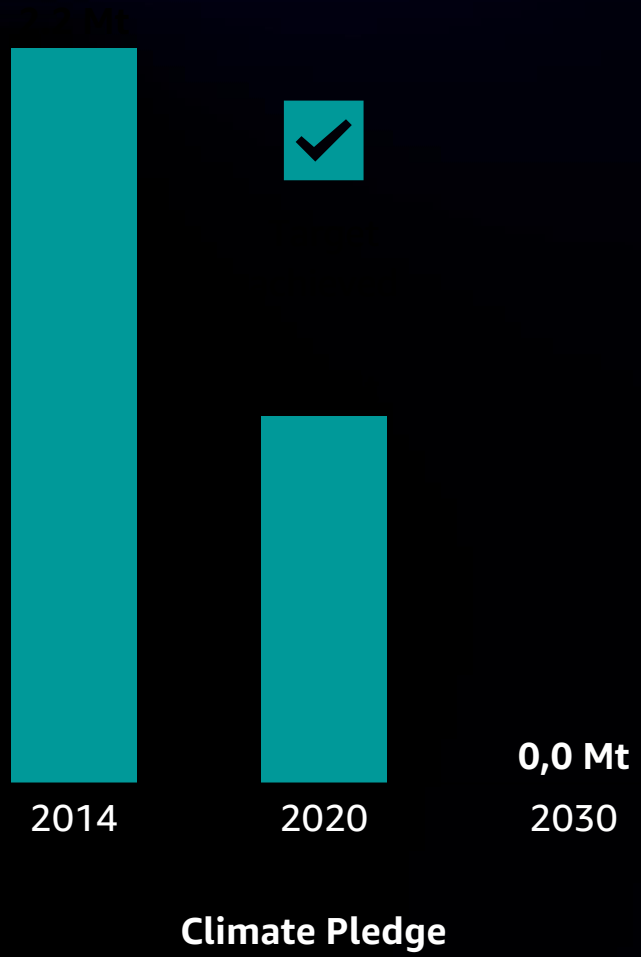


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REACHING NET ZERO OPERATIONS

SIEMENS

Achieving our own sustainability goals



1 **We reduced our CO_2 emissions by >50%** via energy-efficient buildings and factories, green electricity, decentralized energy systems, new mobility concepts, and eCars – reduction of SF6 gas



2 **Our investments in energy efficiency projects led to 15% reduced energy costs**



3 **For example, >70% of the electricity consumption of our sites globally is covered by renewables**





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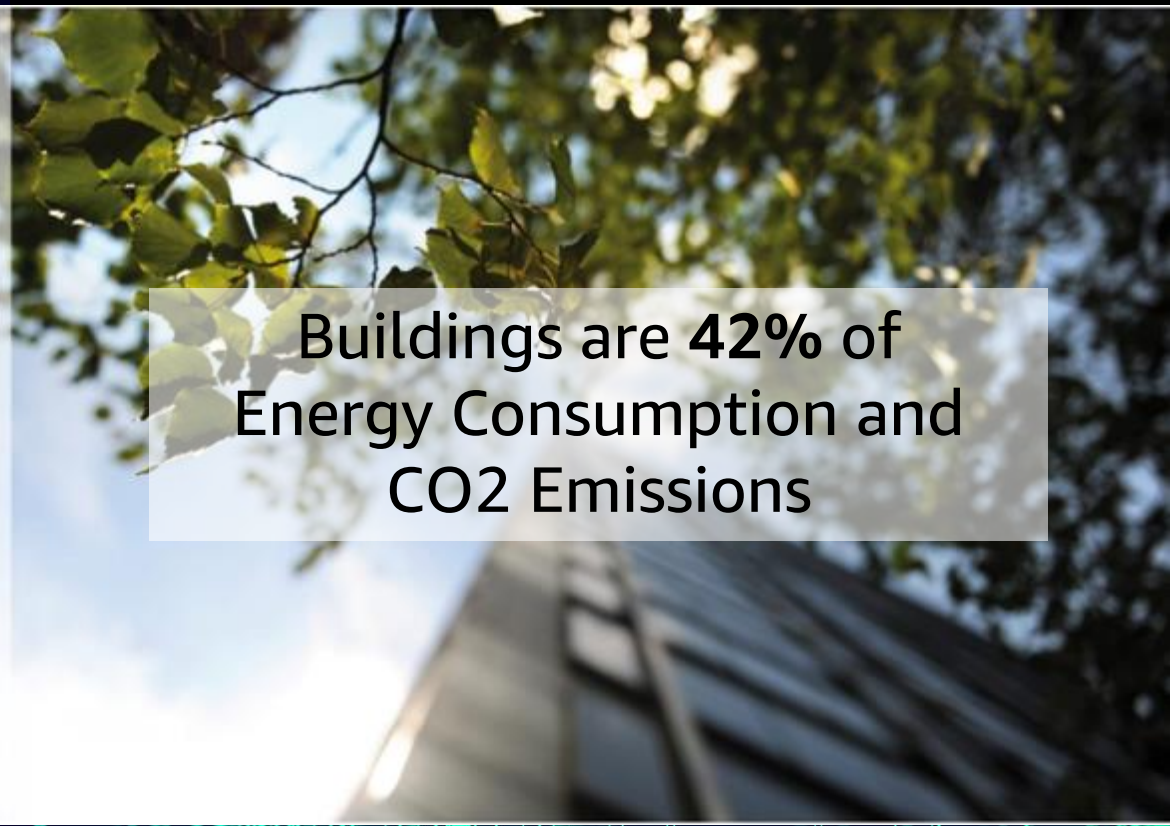
of its customers' building portfolio

7,421
buildings optimized

10.5 million
tons less CO_2 emitted each year

>35,000
buildings serviced

€ 2 billion
energy costs saved



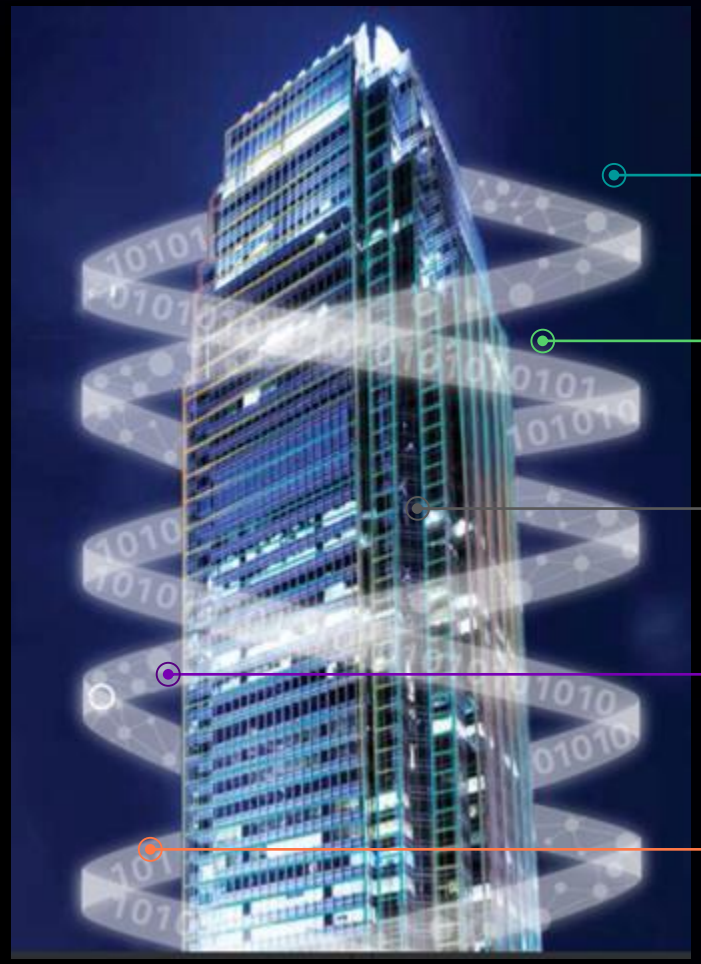
SIEMENS optimizes the efficiency

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ENERGY AND USE EFFICIENCIES

SIEMENS

Smart buildings: Key to sustainability objectives



Lighting control	Efficiency and safety
Temperature control	Democratization and choice
Utilization management	Regenerative spaces
Energy prosumer	Efficient local, on-site production
Intelligent platform	Amazon Web Services

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ADDRESSING MULTIPLE ORGANIZATION LAYERS

SIEMENS

Each persona has a unique challenge



CXO – Business	Reduce capital and operating expenses
Sustainability Manager	Enhance space and asset efficiency & increasing sustainability
Energy Manager	Increase staff productivity
Operators	Optimize safety and security
	Drive revenue growth

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WHERE TO BEGIN?

SIEMENS

Many questions are unanswered

How **advanced am I** in my **sustainability journey** today?

How do I reach net-**zero emissions**?

How can **technology & digitalization** help?

What **financing** opportunities do I have?

How do I **build on what I already have** (e.g., existing energy efficiency technology)?

How do I reduce my **resource consumption** (e.g., primary materials, water)?

How do I fulfill my **investor's requirements** for nonfinancial disclosure?

Which new **regulations** are upcoming and how do I cope with these? (e.g., EU Green Deal, Human Rights Due Diligence Law)

With whom to **partner**?



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FUTURE-PROOFING SPACES

SIEMENS

It began with lighting for IOT



Bluetooth

Motion

Light (multi-channel)

Temperature

Power

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Lighting control energy savings

Darkened by COVID-19, Salesforce and Enlighted light up the night with love and hope

TECHNOLOGY

- Sensor-based occupancy control
- Dimming
- Task tuning
- Utility-grade power meter provides real-time measurement & verification of energy savings

60–90+%

Customer energy savings

Smart lighting control results in savings and safe lighting systems



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COMFY | ENLIGHTED – BRINGING PEOPLE, DATA, AND SOLUTIONS TOGETHER

SIEMENS

Next level down

Core



- Authorization & Authentication
- Tenant Management
- User Management
- Event Notifications

Edge and Data Ingestion



- Bootstrap
- Site Connectivity
- Device Mgmt

Contextual Data



- Facilities
- Maps
- Inventory of Objects

Flexible Spaces



- Desk booking
- Neighborhoods
- Co-Workers

Lighting as a Service



- Manage
- Configure

Data Solutions



- People Counting
- Occupancy Services

Application Framework



- Web Framework
- Mobile App Framework
- Components

Location Services



- Rules Engine & Events
- Location Data Zonal Data
- Tags
- Proximity Analysis

IOT Infrastructure and Devices



Shades



Lighting



Enlighted sensors



HVAC



People counting

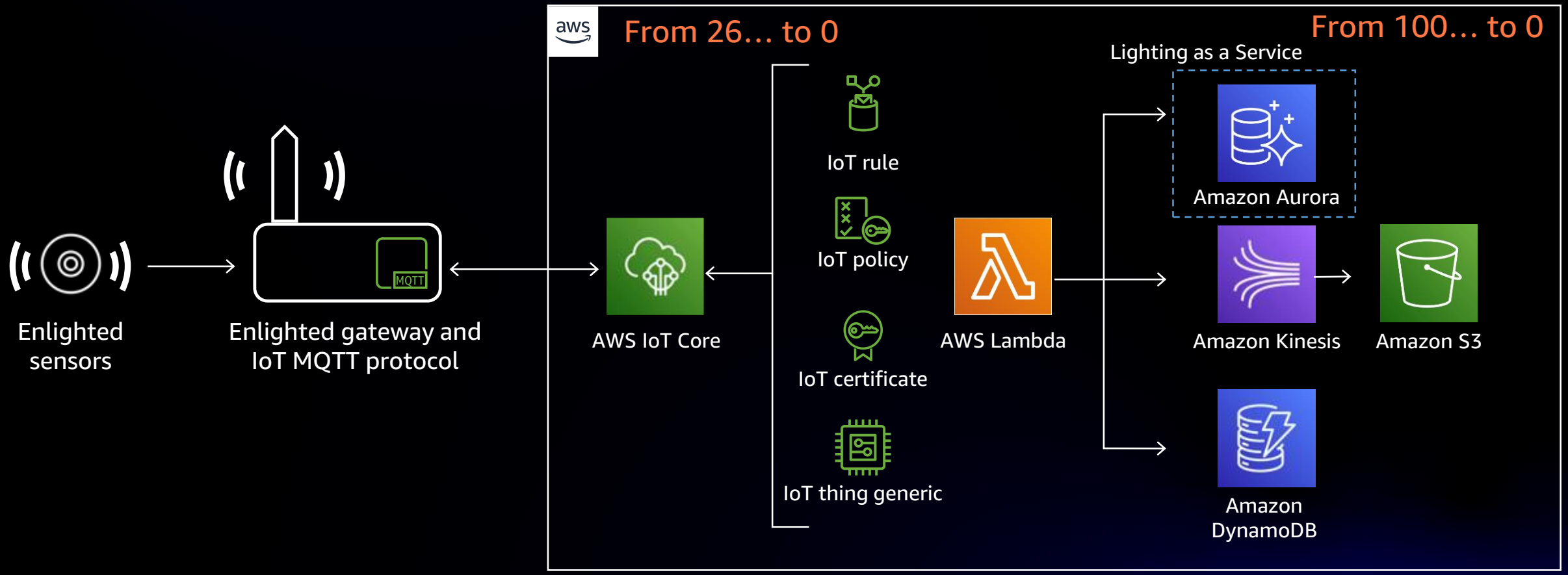
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IoT and data: Reimagine the future of hybrid work and contribute to sustainability

SIEMENS

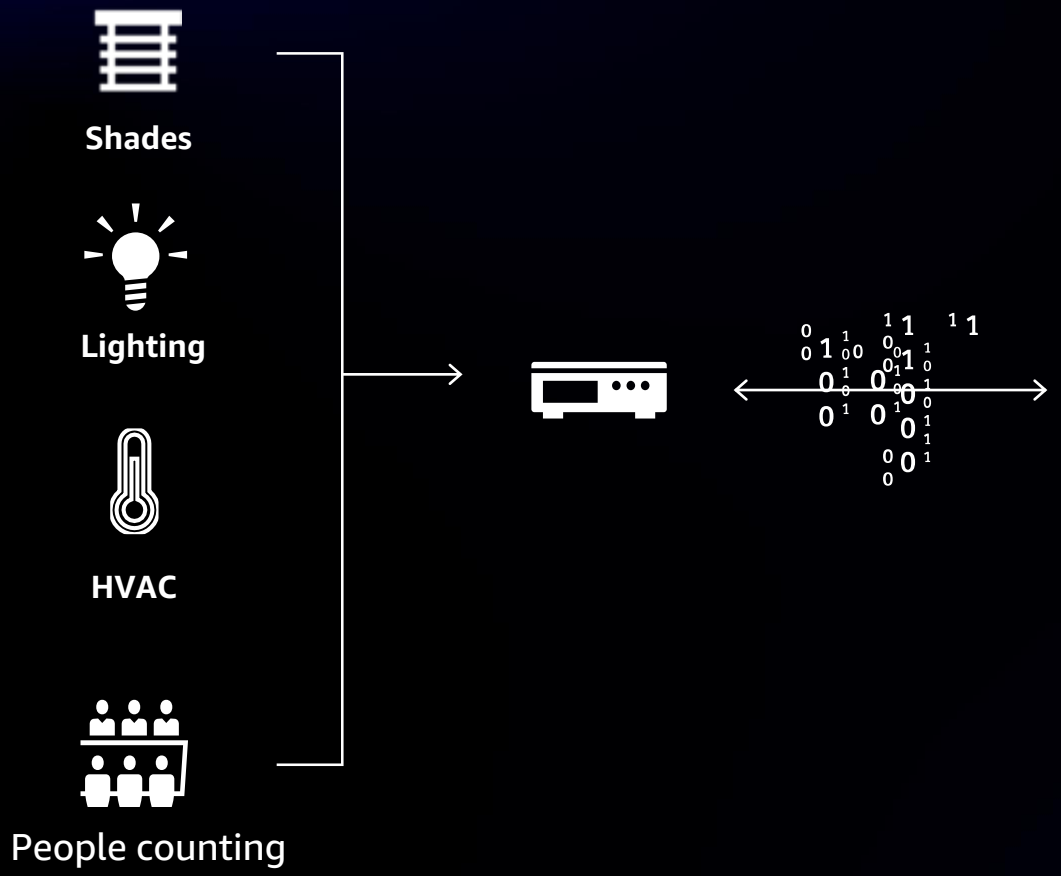
Securely connect millions of square feet to AWS to unlock the power of data



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Workplace experience solution





Delivers both amazing workplace experiences and improved operational results

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Space utilization management

30 European offices – 7,000 employees – 15 countries - 63,000 m2 space

Data	Insights	PORTFOLIO MANAGER **Analysis and decisions**

• Occupancy data
• Workspace booking data
• Badge swipes
• Amenity usage
• Health checks
• Heating/lighting
• IP usage
• Elevator usage
	• Portfolio view, building view, floor view
	• New data insights available as APIs; examples include:
	  • Day-of-the-week forecasts
	  • Highly used space
	  • Booking duration trend
	  • Team vs. individual bookings by space
	  • Utilize machine learning for forecasting analytics
		• Release space
		• Acquire more space
		• Satellite offices needed

SIEMENS

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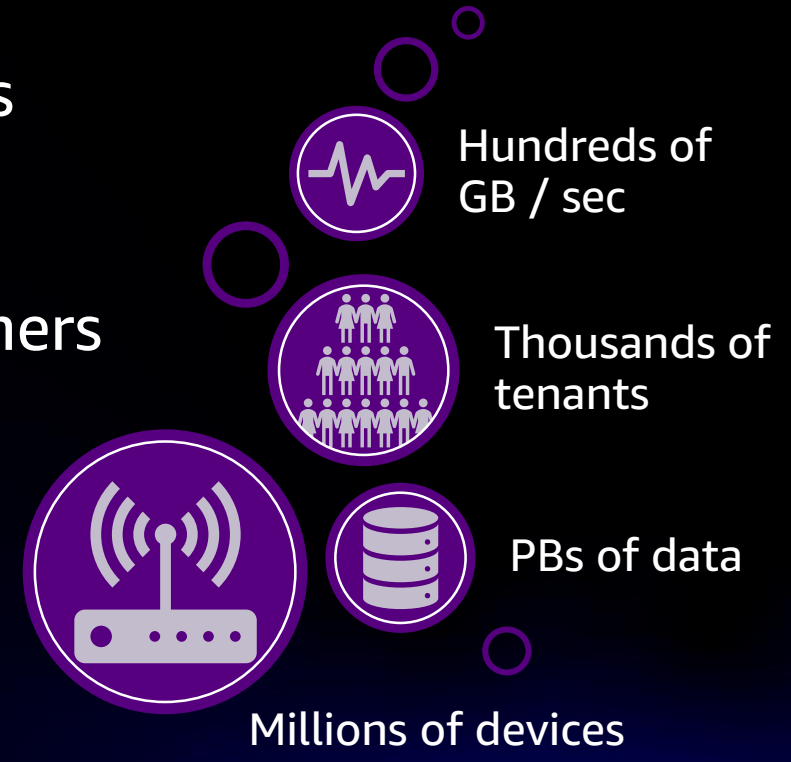
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How does AWS support Siemens' mission?

SIEMENS

Siemens – Securely connect millions of square feet to unlock the power of data, which enables the future of hybrid work and sustainability

- Focus on our business and competitive differentiators
- Long-term security
- Maximum flexibility to serve global enterprise customers
- Cost-effectiveness
- Leverage resources and programs for best practices
- Scalability and automation



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University of Birmingham

ONE OF THE SMARTEST UNIVERSITY CAMPUSES IN THE WORLD

Siemens sponsoring PhD students and co-designing research projects to address important challenges in data, technology, urban systems, and the net-zero goal

- Digital sensor and analytics technologies (23,000 Enlighted sensors across the campus)
- Artificial intelligence
- Decentralized energy generation and storage, renewable energy
- Creating a living lab where research and learning benefits from access to new data

Meet commitments to zero CO2 emissions by 2030



Sustainable buildings

Smart lighting control
Software-controlled lighting that creates maximum efficiencies

Smart temperature control
Democratized heating/cooling control via employee app



Reduced space utilization
Managed hybrid spaces mean an overall reduction of real estate used

Energy prosumer
Sustainable offices create their own renewable energy and smartly utilize it to cover their own consumption

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> Sustainability is again rising up the real estate agenda, as investors, occupiers, and landlords respond to tightening building regulations and CEO-led carbon targets.

Source: Verdantix, “Strategic Focus: Defining The Business Value Of Sustainable Real Estate,” April 2021

Other sustainability sessions at re:Invent

AMZ202 – Driving sustainable operations at Amazon and Climate Pledge Arena

AIM207 – AI/ML for sustainability innovation: Insight at the edge

ARC206 – Sustainability in AWS global infrastructure

ARC325 – Architecting for sustainability

STP213 – How startups are building solutions for a sustainable future

STP222 – How Sofar Ocean is building ocean intelligence at scale

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Learn more in our AWS IoT sessions

ID	SESSION TITLE	TYPE
IOT201	Predicting equipment health with IoT in power and utilities	Breakout
IOT202	Migrate and innovate faster with AWS IoT for connected products	Breakout
IOT204	Building connected auto solutions with AWS IoT	Breakout
IOT205	Industrial digital transformation using AWS IoT SiteWise	Breakout
IOT206	Scaling sustainability solutions with IoT	Breakout
IOT304	Increase factory efficiency via real-time decision support management	Chalk Talk
IOT311	AWS IoT device connectivity and provisioning	Chalk Talk
IOT313	Enhancing telecommunications CPE data collection & analytics with AWS	Breakout
IOT317	Building digital twins using AWS services	Chalk Talk

AWS powers edge-to-cloud solutions

Leadership session with Bill Vass, VP Technology

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Thank you!

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