

The background features a vibrant, abstract design. On the left, there are horizontal, wavy bands of color in shades of red, orange, yellow, and green. On the right, a bright white light source emits a series of colorful rays in shades of blue, cyan, and yellow, creating a sunburst effect.

cisco *Live!*

Let's go



The bridge to possible

Your Kick-Start for the Sustainability Journey

Neale Rowe, Distinguished Engineer
@nealerowe
BRKGRN-1751

CISCO *Live!*

#CiscoLiveAPJC

Cisco Webex App

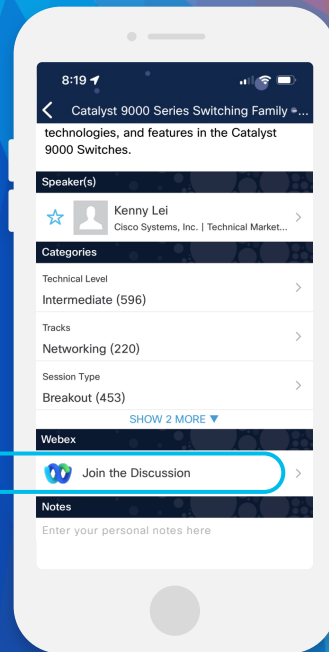
Questions?

Use Cisco Webex App to chat with the speaker after the session

How

- 1 Find this session in the Cisco Live Mobile App
- 2 Click “Join the Discussion”
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- 4 Enter messages/questions in the Webex space

Webex spaces will be moderated by the speaker until December 22, 2023.



<https://ciscolive.ciscoevents.com/ciscolivebot/#BRKGRN-1751>

Abstract

Sustainability is critical for strategic and operational decisions, supporting long-term stakeholder value. Driven by the heightening urgency over climate action, there is a noticeable emphasis on the environmental dimension as a strategic priority.

For the technologist or leader who needs to make a sustainable impact, join this session to deep dive into concrete solutions and technical use cases to understand how circular design principles, energy-efficient solutions, and digitalization can help with your Sustainability Goals.

In a rapidly evolving discussion where research is ongoing, with a dizzying array of objectives and trade-offs to consider, we aim to provide you with high-level concepts but also practical technical examples and certainly food for thought.

What this Session ...

...is About?

- Starts with introduction to sustainability-101
- Present practical examples and introduction to help kick-start your Business sustainability goals

...is NOT About?

- Convincing you that Sustainability is important
- Everything, not enough time

Agenda

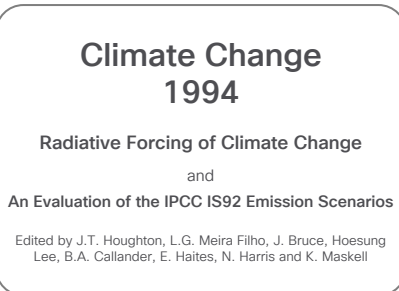
- Introduction to Sustainability
- Sustainable ...
 - IT Frameworks
 - Data Centers
 - Buildings and Hybrid Work
 - Telemetry & Reporting

Sustainability: Personal Reflection

Data is essential to making informed decisions



1994 joined Cisco



Cambridge University Report¹

Trip to Cisco Live
Roundtrip (Economy)

CO₂e Amount ²

Sydney to Melbourne

0.350 t

Source:

- https://archive.ipcc.ch/pdf/special-reports/cc1994/climate_change_1994.pdf
- https://co2.myclimate.org/en/flight_calculators/new
- <https://www.greenvehicleguide.gov.au/Vehicle/Search>
- <https://www.energy.gov.au/households/transport>
- <https://app.electricitymaps.com/>
- <https://app.electricitymaps.com/map>

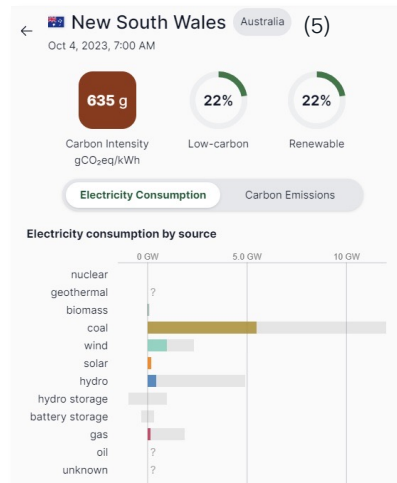
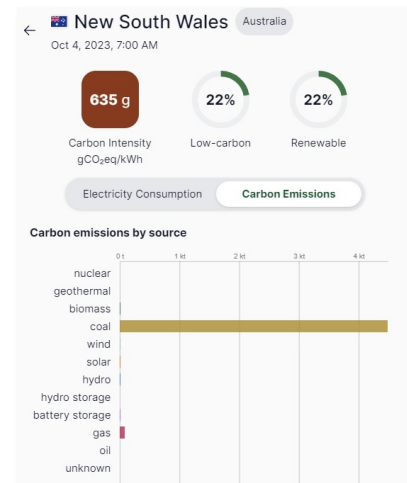
My Car (running)
- 15,000km per year,
CO₂e 2.22 tonnes³

VS

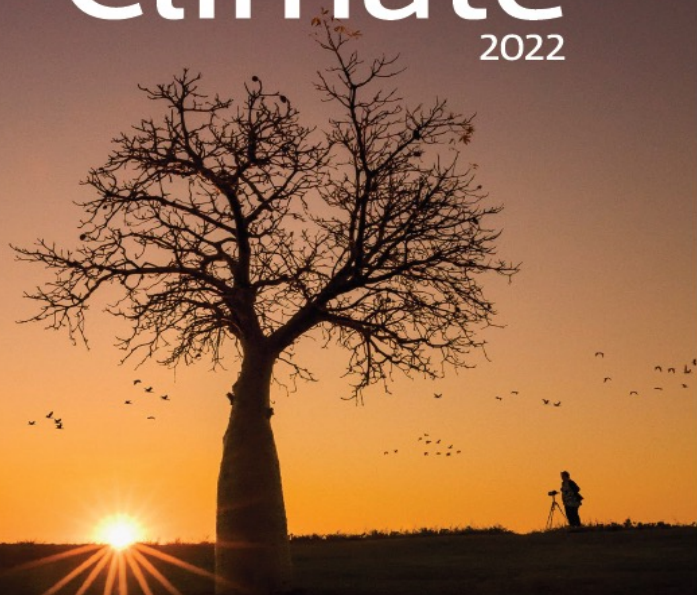
EV Car ? (running)
- 15,000 km per year,
Zero CO₂e⁴

*** EV assumption based on having installation Solar panels and Home Battery.*

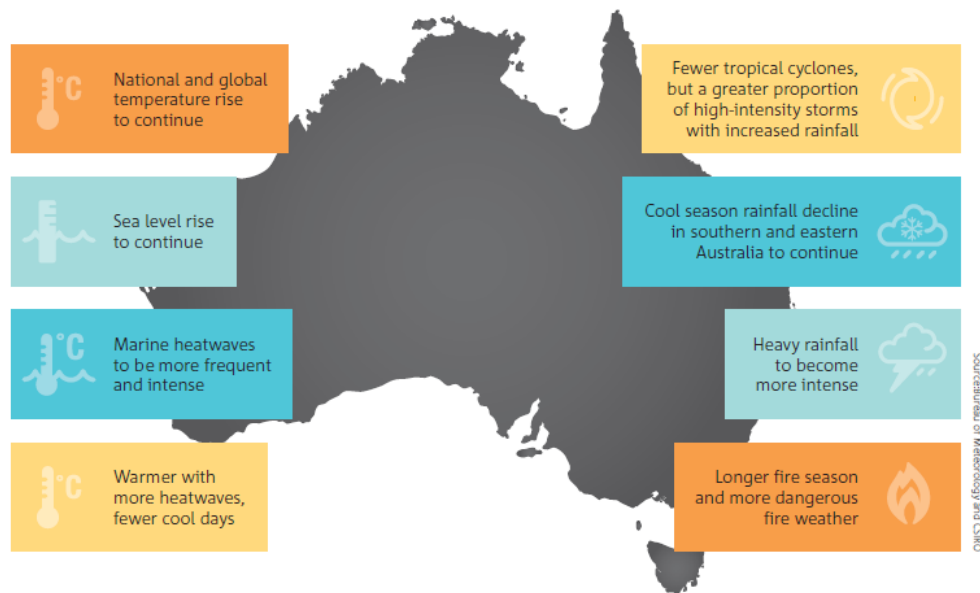
Other factors to be considered, raw material acquisition for car, panels, battery, production stage, afterlife ! Consideration to the Circular Economy.



State of the Climate 2022



CISCO *Live!*



Source: Bureau of Meteorology and CSIRO



SCAN TO LEARN MORE

Source :

<https://www.csiro.au/en/research/environmental-impacts/climate-change/state-of-the-climate>

Smart Zero

Using advanced networks to accelerate progress towards Net Zero



Helping get you *Started*

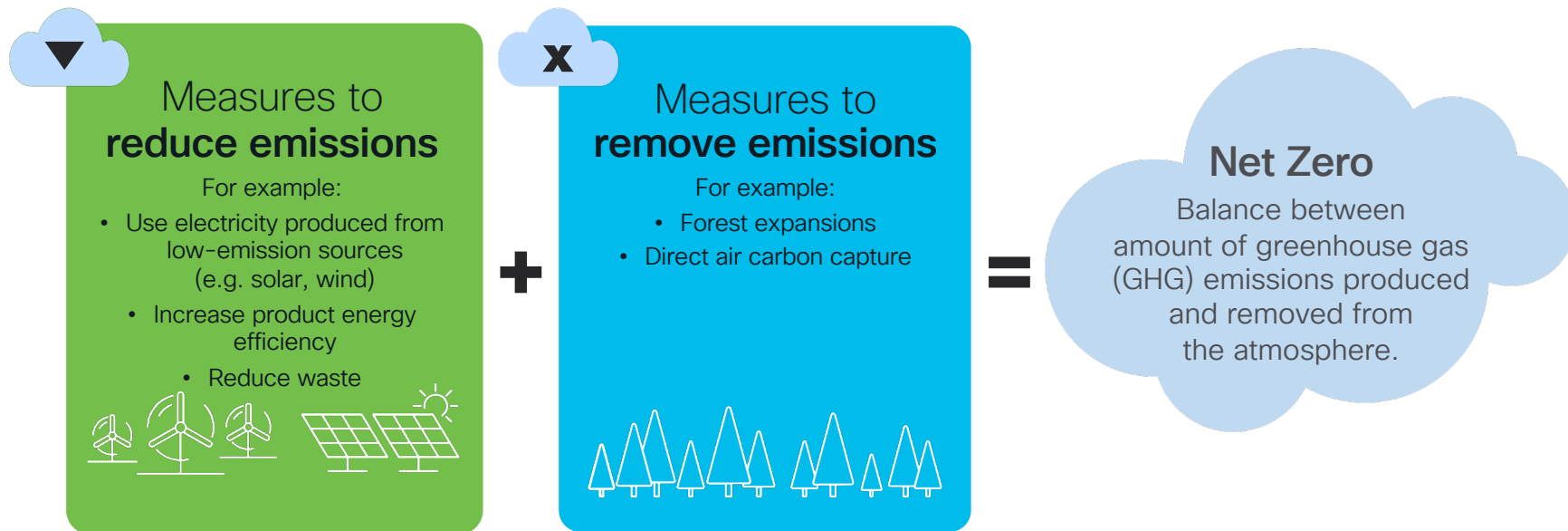
SmartZero

Net Zero Requires an Advanced Network

- Efficient networks that use less energy and produce less waste
- Enabling digital technologies across the Net Zero lifecycle

Reference: <https://www.curtin.edu.au/news/media-release/moving-to-smart-zero-digital-technologies-to-accelerate-the-transition-to-net-zero/>

What is Net Zero?



Cisco's SBTi Commitment

Cisco's 2040 Net Zero target is approved by the Science Based Targets Initiative (SBTi). This means we have pledged to reduce our emissions by **at least 90%** (compared to our base year of 2019). We will invest in verified carbon removal offsets to compensate for any residual emissions.

What do people mean when they talk about “sustainability”?

“Sustainability meets the needs of the present generation without compromising the ability of future generations to meet their needs”

(Brundtland, 1987)

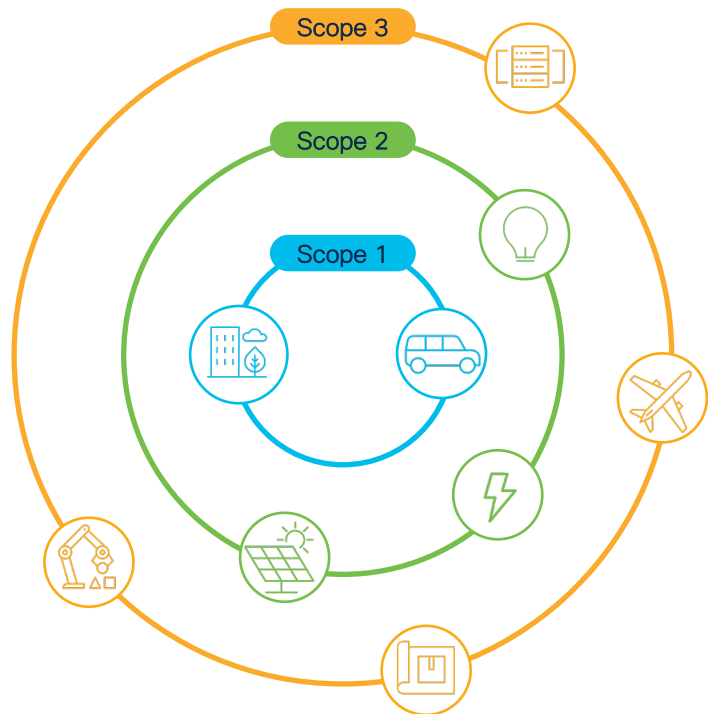


Source: <https://www.globalgoals.org/goals/>

Carbon and greenhouse gas (GHG) emission reduction strategies are at heart of sustainability efforts

You will hear them classified as “Scope 1, 2 or 3” emissions, along with efforts to become “net zero”

Understanding Corporate Emissions



Greenhouse gas (GHG) emissions of organizations are classified in 3 scopes:

Scope 1

Direct emissions from operations owned by the company

Examples: Heating fuel, company vehicles

Scope 2

Indirect emissions from the generation of purchased electricity, steam, heating and cooling

Examples: Electricity used in company buildings

Scope 3

All other **indirect** emissions that occur in a company's value chain

Examples: Employee business travel and commuting, supplier emissions, use of sold products, transportation and distribution

Dual Responsibility

“Sustainability in IT”



- Renewable Energy
- Greener Data Centre
- Cloud Migration
- Energy Optimization
- Increased Asset Utilization
- Equipment Modernization
- Extended Life
- Remanufactured Equipment
- Supplier Management

2-4%



15%



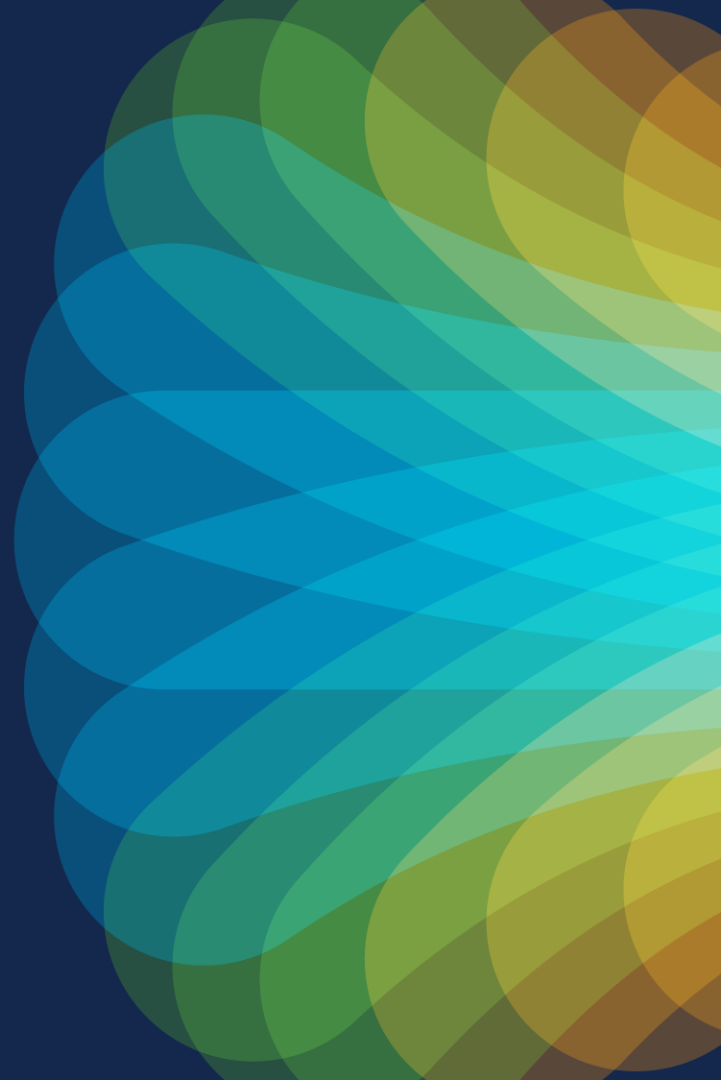
“Sustainability by IT”



- Connected Transport
- E-Work / Hybrid Work
- E-Health
- E-Learning
- E-Commerce
- Smart Buildings
- Smart Grid
- Smart Agriculture
- Smart Manufacturing

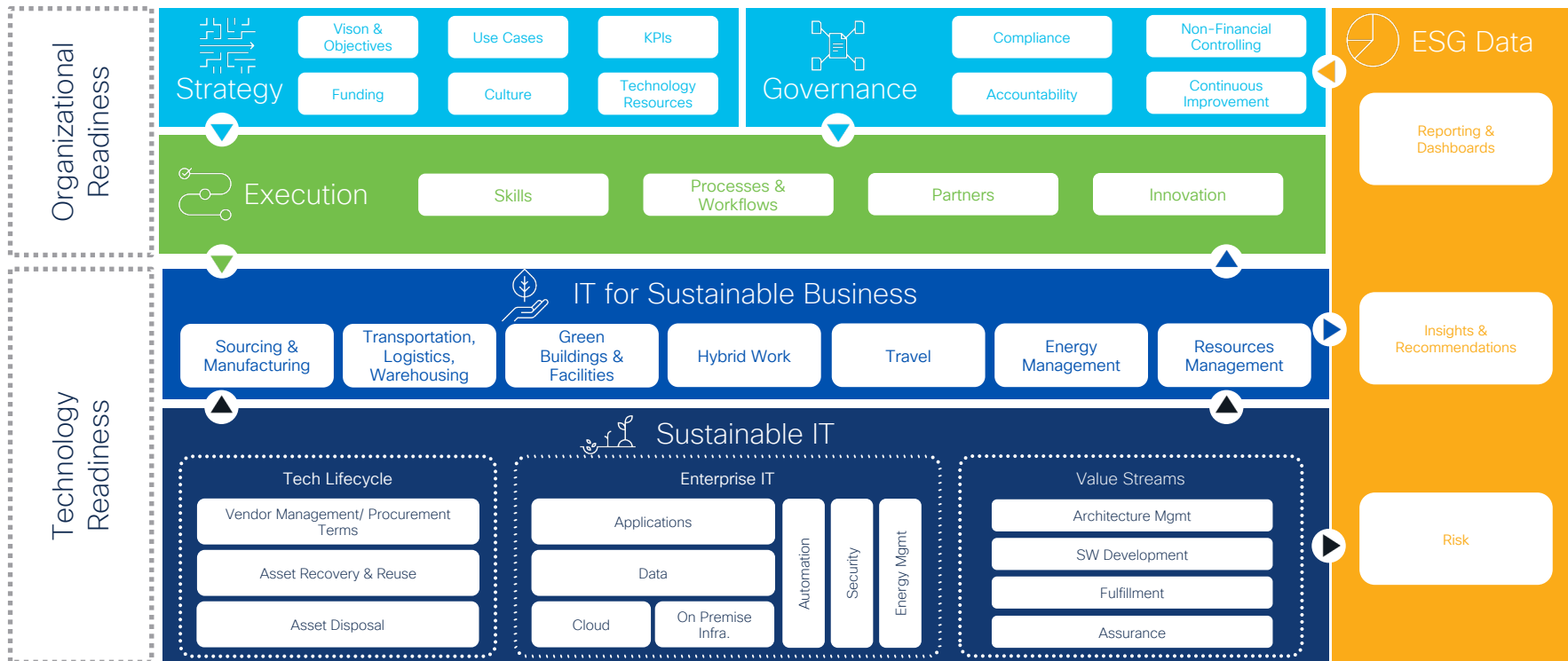
*Based on Exponential Roadmap 1.5.1 (2020),
Smarter 2030 (GeSI 2015), Malmodyn (2015)*

A Sustainable Framework



CX Sustainability Framework

Six Key Dimensions to Driving a Holistic Approach to Sustainability



Cisco IT Sustainability Framework

Align & Support Company Sustainability Goals & Initiatives

Sustainable by Design



- Design principles / Best practices
- Life Cycle & System Thinking
- Review design impact with stakeholders

Responsible Procurement



- Analyze IT spend
- Prioritize focus areas
- Supplier scorecard / goal tracking
- Supplier Code of Conduct

Optimization of Operations



- Holistic service view
- Extend life / Improve performance
- Asset utilization / Remove excess
- Automation to scale

Asset Lifecycle Management



- Consider at design phase
- Process assets to next-best use
- Leverage supplier best practices
- Asset traceability

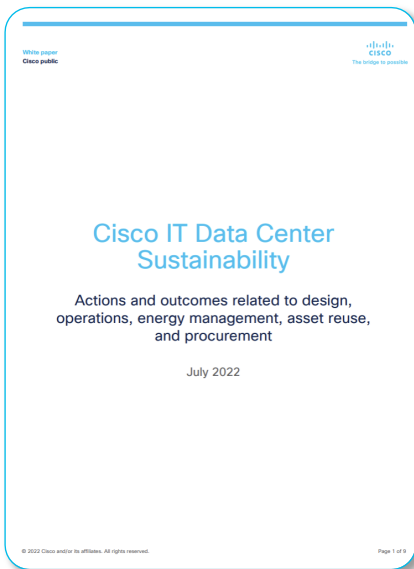
Energy Management



- Source renewables
- Measure & monitor use / energy visibility
- Improve power efficiency
- Optimize energy consumption

Employee Culture

Cisco IT Data Center Sustainability Results



Align & Support Company Sustainability Goals & Initiatives

- Cisco Goal of Net Zero for Scope 1, 2 & 3 by 2040

Sustainable by Design

- Global design standards
- 312% more VM (virtual machines) per blade
- 27% reduction in power (watts) per VM

Responsible Procurement

- Main DC suppliers sent surveys on carbon emission data

Optimization of Operations

- 38% fewer data centers from 26 sites to 16
- 23% reduction in data center facility OPEX costs
- ACI everywhere

Increase Asset Recovery & Reuse

- 43 tons of cabling infrastructure and equipment reused
- 1,813 Cisco UCS servers sold for reuse

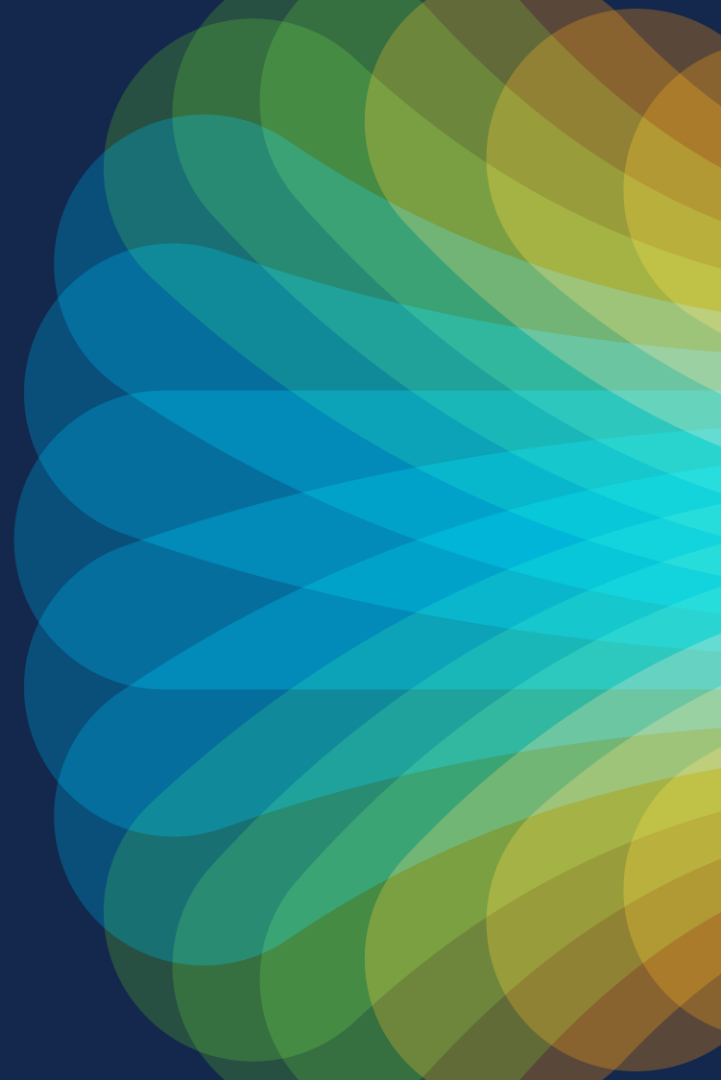
Energy Management

- 100% of US DC power and 72% DC power globally from renewables
- Reduced average DC monthly power capacity by 40%.

Employee Culture

- 90% of patch cables recertified

Sustainable Data Centers



Energy Consumption in Data Centers

Data centers represent
1% electricity use globally

2021: 200 terawatt hours (TWh) per year
2030 Growth Estimate: 3,000 (TWh) per year

- Servers
- Chillers, Fans & pumps
- Network
- Storage

86%

Cooling, power
systems & servers

Modernizing your
infrastructure can
help to improve
energy and
resource
efficiency

Source: akcp.com

Data Center use cases

Use case	Use case description	OpEx	Net zero/ Sustainability	Power provisioning mismatch	Nexus	Nexus cloud	Intersight	UCS-X Series	Meraki sensors	Partner
Energy visibility and management	Software management capabilities that enable visibility, insights, and action on energy consumption.	X	X	X		X	X			
Rack and space optimization	Making optimal use of expensive conditioned space and per rack-level resources			X				X		
IT Cooling efficiency	Improve cooling performance of IT equipment (air cooling and liquid cooling)	X	X		X			X		X
IT Energy efficiency	Increase work per watt ratio of IT equipment	X	X	X	X			X		
Environmental monitoring	Temperature and humidity metrics measured through sensors and cameras	X	X				X	X	X	X
Asset lifecycle management	Reduce the carbon footprint of hardware through circular consumption, aaS, and open standards strategies		X		X			X		X
Workload optimization	Modulating online hardware based on load	X	X	X	X	X	X	X		X
Power optimize network connectivity	Right-size transceiver to task	X	X		X	X		X		
Facilities control integration (Partner-led)	TBD - More of a partner capability Automation through BMS integration to optimize lighting, shades, HVAC		X						X	X



UCS-X

Un/Box the future



Overview

It's any box you need, and more. The Cisco UCS® X-Series Modular System powered by Intersight is an adaptable, future-ready system engineered to simplify IT and innovate at the speed of software. The system now includes Cisco UCS X-Fabric Technology.



Modular

Modular, upgradeable design helps to future-proof the device and extend the use of chassis, modules, and common parts



Sustainable packaging

Offers **multipack options** to reduce packaging for high-volume orders



Accessory opt out

Customers can **opt out** of unneeded product accessories, minimizing waste



Recycled materials

Plastic parts use **post-consumer recycled resin**



Energy-efficient

Reduces energy consumption through technology innovations with 54V power distribution, intelligent fan controls, zone-based cooling, Titanium-rated power supplies, and a mid-plane less design



Easy repair

Easy to upgrade and repair – standard screws enable quick disassembly, supporting reparability and recyclability



Materials Compliance

Cisco has policies and procedures in place to comply with applicable product-related laws and regulations



Supply Chain Sustainability

Cisco works to uphold human rights, promote worker well-being, and minimize negative environmental impacts in our supply chain



Product Takeback and Reuse

Return end-of-use gear for free in a simple, secure, and sustainable way. Certified remanufactured products and available through Cisco Refresh

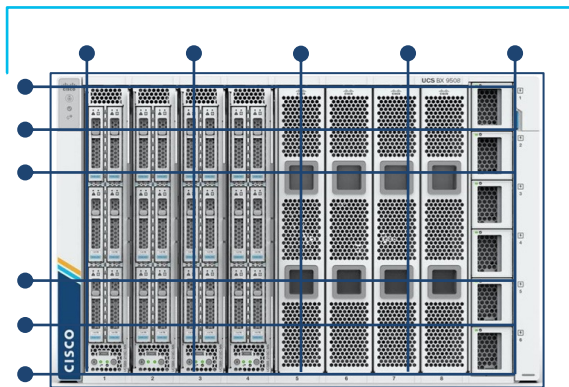


Certifications

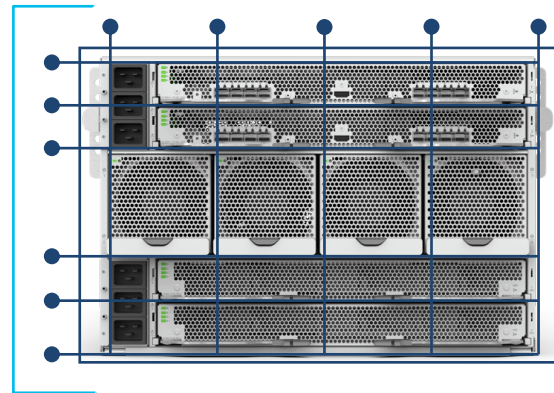
The UCS-X is a modular product. The UCS X210C M6 Compute Nodes are both Energy Star certified and have achieved an EPEAT Bronze rating.

Zoned Based Cooling: Chassis

Vertical
Zones



Horizontal
Zones



- Vertical and horizontal zones
- Independent fan speed control based on sensors participating in each zone
- Reduces fan power consumption by right-sizing air flow on a per-zone basis, and increases overall power efficiency

Energy Efficiency

Advantage of modern equipment

80 PLUS Certification	230V EU Internal Non-Redundant				230V Internal Redundant			
% of Rate Load	10%	20%	50%	100 %	10%	20%	50%	100 %
80 PLUS	-	82%	85% PFC $\geq$ 0.90	82%	-	-	-	-
80 PLUS Bronze	-	85%	88% PFC $\geq$ 0.90	85%	-	81%	85% PFC $\geq$ 0.90	81%
80 PLUS	-	87%	90% PFC $\geq$ 0.90	87%	-	85%	89% PFC $\geq$ 0.90	85%
80 PLUS	-	90%	92% PFC $\geq$ 0.90	89%	-	88%	92% PFC $\geq$ 0.90	88%
80 PLUS	-	92%	94% PFC $\geq$ 0.95	90%	-	90%	94% PFC $\geq$ 0.95	91%
80 PLUS	90%	94% PFC $\geq$ 0.95	96%	91%	90%	94% PFC $\geq$ 0.95	96%	91%

<https://www.clearesult.com/80plus/program-details#program-details-table>

The UCS X-Series* is equipped with modular, titanium-rated power supply units (PSUs) and a 54-volt DC-power delivery system that minimizes the many internal power conversions, internal copper cabling, and amperage – saving on both overhead and power loss.

* <https://www.cisco.com/c/en/us/products/collateral/servers-unified-computing/ucs-x-series-modular-system/ucs-x-series-modular-system-aag.html>

X-Series 54V Power Distribution

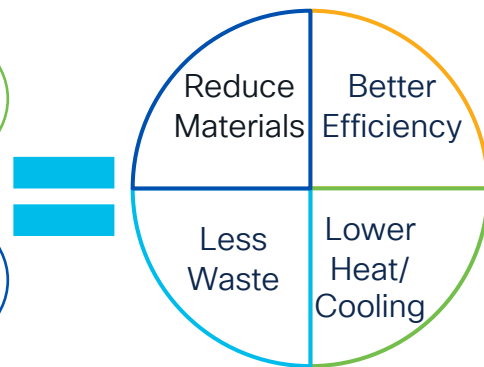
What's the Big Deal?

Distribute same power with 80% less current

Reduces heat generation and lower cooling burden

Improves DC-DC conversion efficiency

Less copper required to carry current
Smaller server power distribution components



Cisco Nexus 9800

Massive bandwidth single chip

(36x 400G 2W/100G)

12.8 Tbps per slot | 36 400G ports per slot

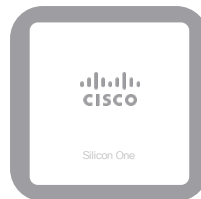
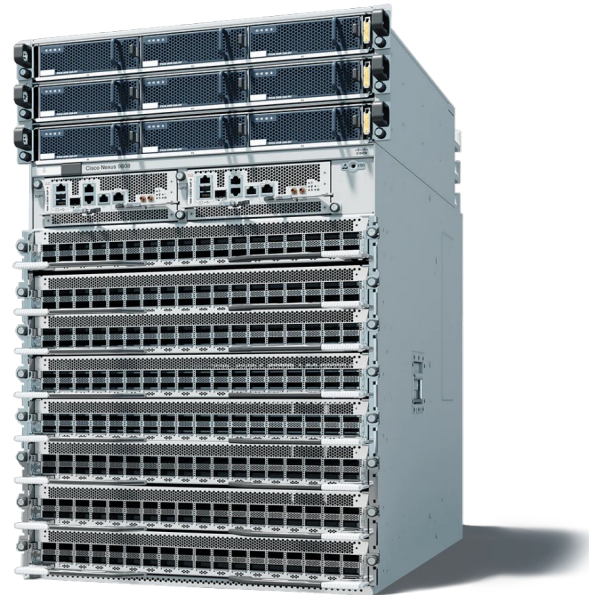
New PSUs

Higher efficiency, improved single-feed power

Heat sink innovation

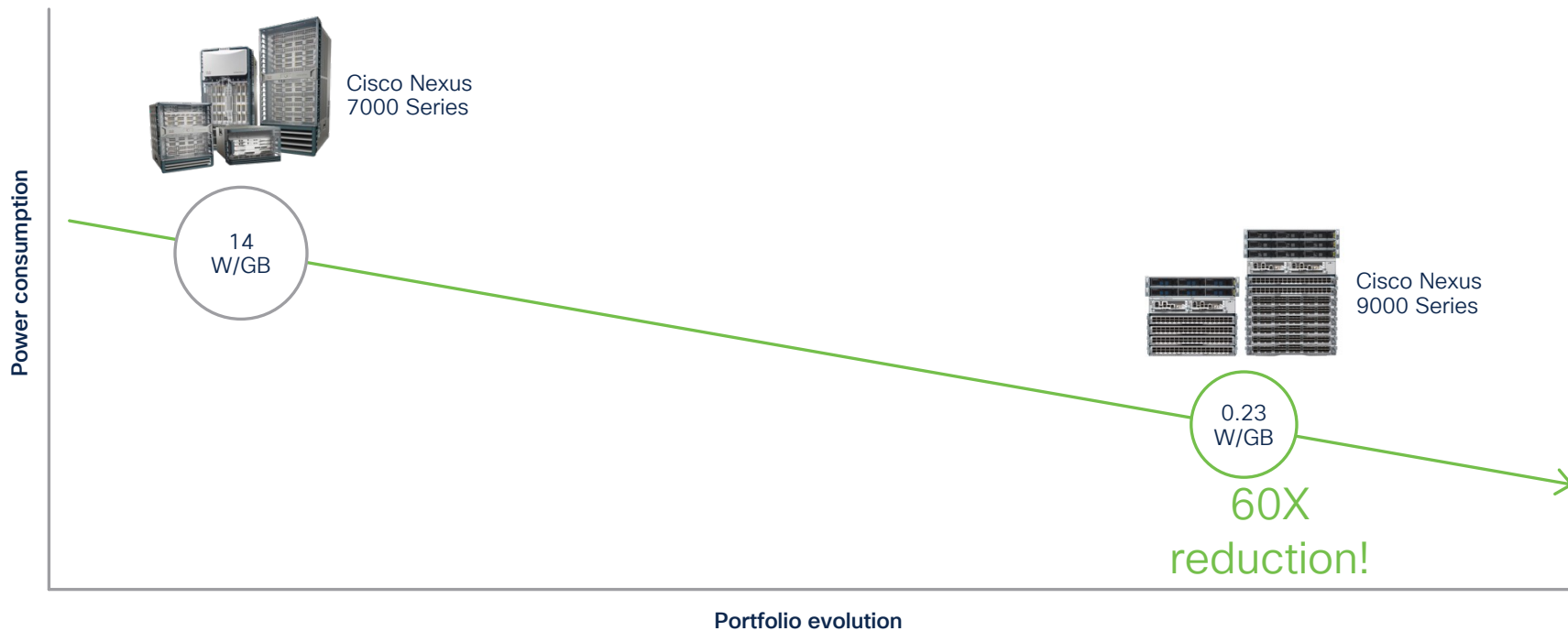
54V -> 3.3V

(Removed intermediate voltage conversion)

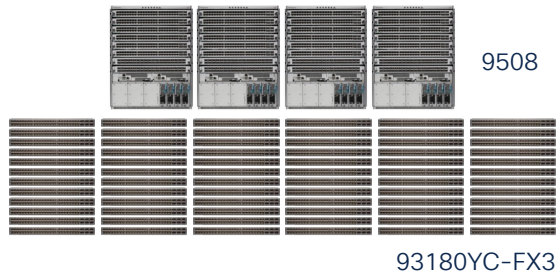


Groundbreaking energy efficiency innovation

With more to come...



Example: AI/ML : Architecture consideration



3456 x 25G access layer ports

72 x 93180YC-FX3

3:1 LINK oversubscription

56,907W

16.5 watts/25G access port

124 RU



25G → 100G

61% less
total power

71% less
total space



3584 x 100G access layer ports

32 x 9332D-GX2B

7:1 LINK oversubscription

22,968W

6.41 watts/100G access port

36 RU

What's next?

Liquid cooling

Liquid cooling can handle the increasing density in data centers. It can significantly reduce energy consumption and uses less water than air cooling systems, leading to lower operating expenses, produces less noise, ingests less contamination, and provides for greater system reliability.

Direct-to-chip-plate-based

Keep standard server packaging and ecosystem

Very minor changes to server components

Same footprint as existing air-cooled system

Immersion-based

Server packaging and ecosystem changes

Cools the entire system for the same cost and complexity

Larger footprint in mixed air and liquid cooled environments, potentially denser in purpose-built facilities

CoolIT
systems™

Fujikura

liquid°stack

submer

GRC GREEN
REVOLUTION
COOLING
The Immersion Cooling Authority

wiwynn

Asperitas
IMMERSED COMPUTING®

motivair
COOLING SOLUTIONS

inspur

TMGCORE

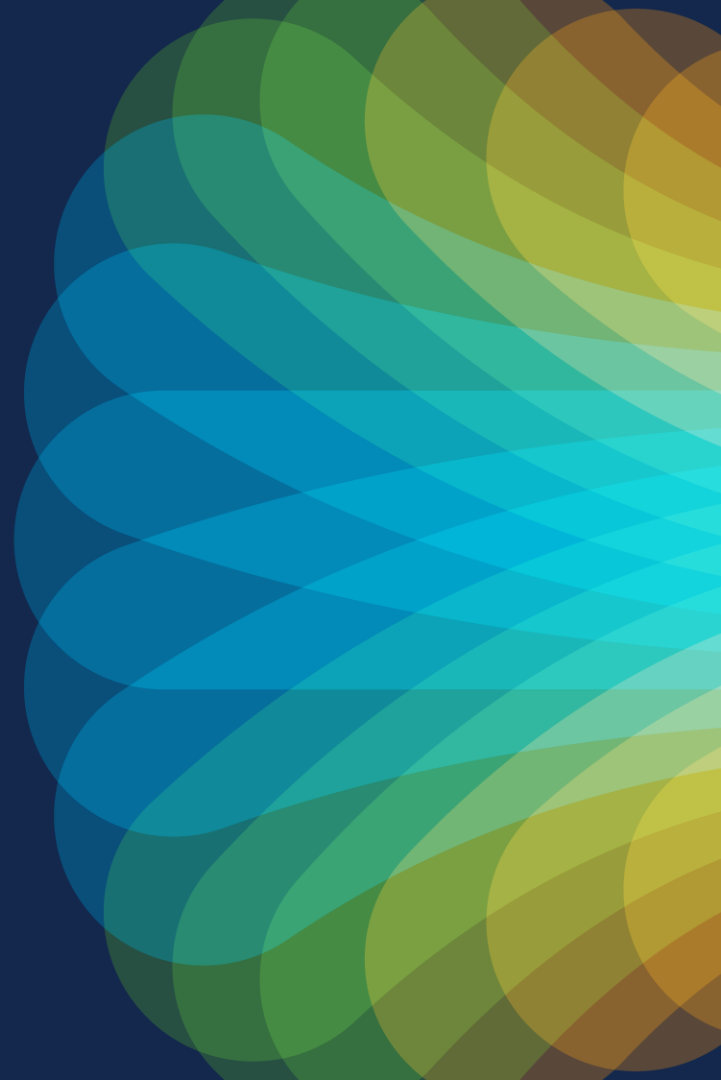
ICEOTOPE

ZUTACORE™
UNLOCKING THE POWER OF COOLING

CHILLDYNE
LIQUID COOLING SOLUTIONS

LiquidCool Solutions
INNOVATIVE IMMERSION

Sustainable Buildings / Hybrid Work



Did You Know?

Building
operations and construction
account for an estimated

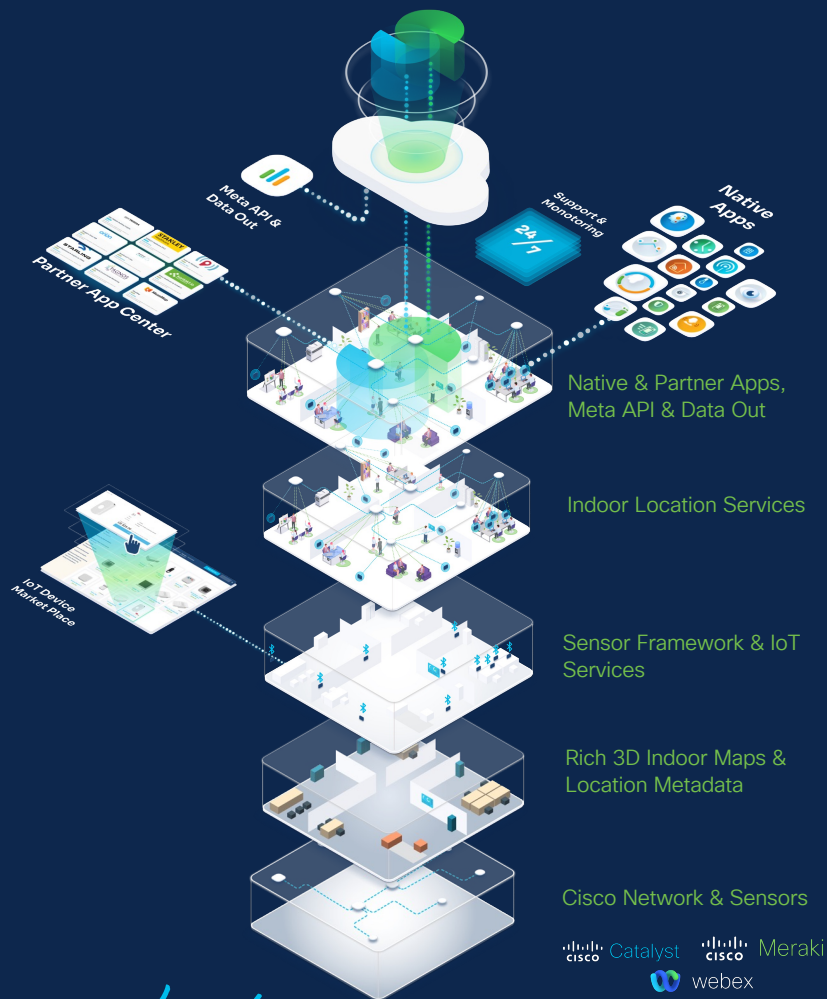
37% CO₂
emissions globally

Source: UN Programme Report

Cisco's cross-architecture portfolio,
can help accelerate the workplace
transformation in support of today's
priorities: hybrid work, sustainability, digital
real estate and employee well-being

Smart buildings use case matrix

Use Case	Use Case Description	Sustainability (CSO)	Health and wellbeing (CHRO)	Digital real estate (Facilities)	Hybrid work (CHRO)	Catalyst	Webex	Cisco spaces	Meraki	Partner ecosystem
Occupancy data	Capture of occupancy data through sensor and camera devices	X	X	X	X	X	X	X	X	X
Space insights (real estate)	Integration and visualization of space utilization to optimize use of space	X	X	X	X			X		X
Space insights (employee)	Availability of occupancy insights and space availability to drive employee experience		X	X	X			X		X
Environmental wellness metrics	Temperature, humidity, and air quality metrics measured through sensors and cameras	X	X	X		X	X	X	X	X
Smart building controls	Automation through BMS hosting and integration to optimize lighting, shades, and HVAC.	X	X	X	X	X		X*		X
PoE lighting	LED luminaires powered through Power over Ethernet technology	X	X	X		X				X
Connected hotdesking	Dynamic desk space connected by Power over Ethernet and Webex devices	X		X	X	X	X			X
Energy management	Software management capabilities that enable visibility, insights, and action on energy consumption.	X		X		X		X	X	X
Wayfinding and digital signage	Digital displays connected through PoE to enable visitor and employee experiences			X	X					
Visitor services				X	X		X			X
Asset tracking	Ability to locate high-value assets in real-time			X	X		X	X		X
Access control	Secure access management to physical assets and network connectivity			X	X					X
Condition/ Maintenance Monitoring	Prolong asset life and reduce travel required to repair	X		X						X



The Cisco Spaces Cloud

Use cases that make your spaces safe, smart, sustainable and seamless Multi-sensor & location API designed for high volume data streaming

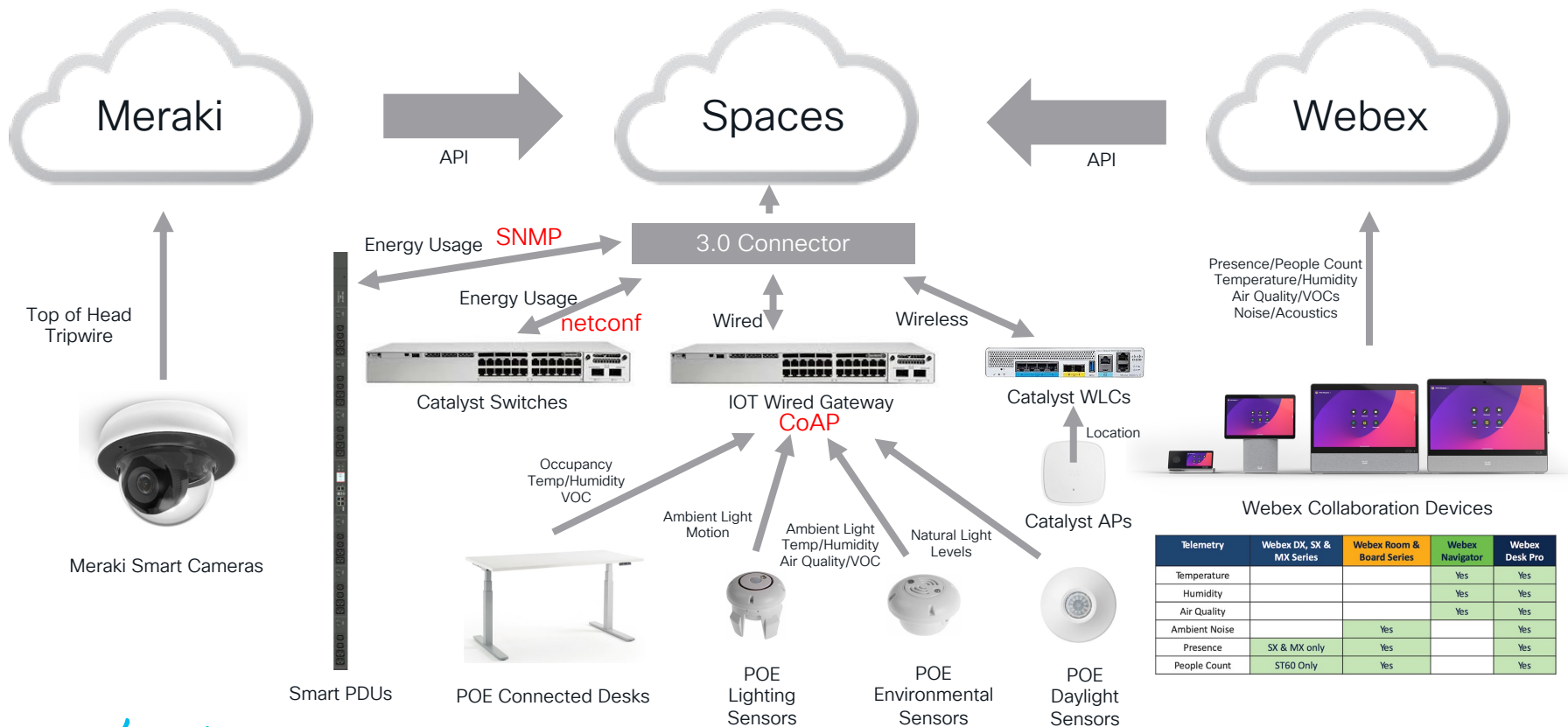
Onboard people & things seamlessly. Understand their presence and identity across all your locations

Purchase, onboard, monitor and manage pre-validated & integrated multi-vendor sensors on top of your existing Cisco network

Transform your static floor plans into interactive 3D maps with uniform metadata & location context

Connect your robust Cisco networking & collaboration products to a seamless smart building cloud

Spaces Sensor and Energy Data



Telemetry	Webex DX, SX & MX Series	Webex Room & Board Series	Webex Navigator	Webex Desk Pro
Temperature			Yes	Yes
Humidity			Yes	Yes
Air Quality			Yes	Yes
Ambient Noise		Yes		Yes
Presence	SX & MX only	Yes		Yes
People Count	ST60 Only	Yes		Yes

The Power of PoE

Cisco is a leader in PoE innovation for over twenty years

By deploying 90W Power over Ethernet (PoE) through the Cisco Catalyst portfolio, organizations can **consolidate power and data networks, reduce embodied carbon** from the use of steel conduits and copper wiring and improve energy conversion efficiency.

39%



Cisco Penn1 energy consumption reduction from April 2019 to April 2022



Simple Cabling, Less Materials and Cost



On Par with AC in Overall Energy Efficiency



More Efficient with Renewable Energy

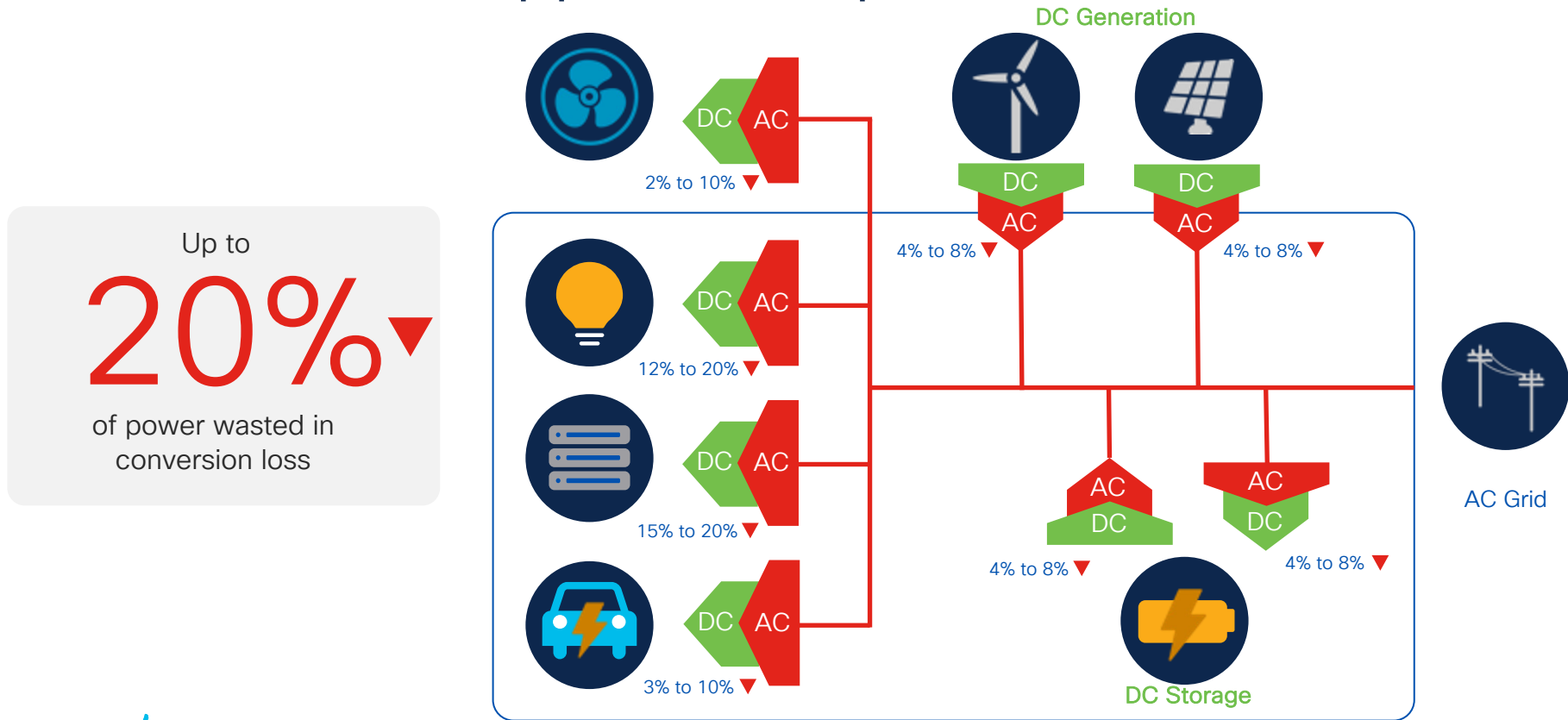


Granular Visibility and Control



Large and Growing Eco System

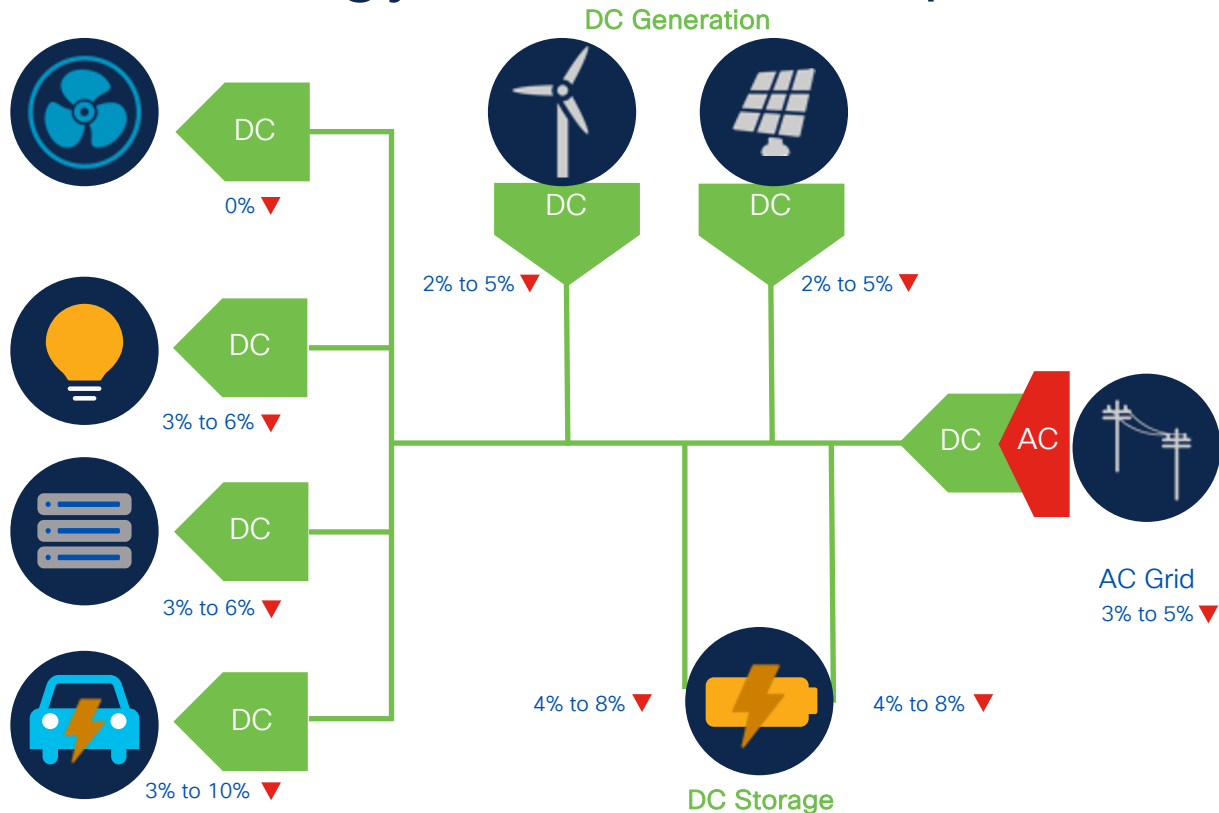
The traditional approach to power is wasteful



Smart buildings save energy, cost less to operate

45%+

Reduction in energy waste
by using DC power



Meraki use-cases that advance sustainability

Energy savings schedule (Scope 2)

- Monitor energy trends and power down equipment during off-hours

Temp/Air Quality Sensors (Scope 2, 3)

- Improve HVAC efficiency, reduce energy costs and emissions
- Prevent spoiled goods (food, medical substances, etc.)

Smart cameras (Scope 1, 2)

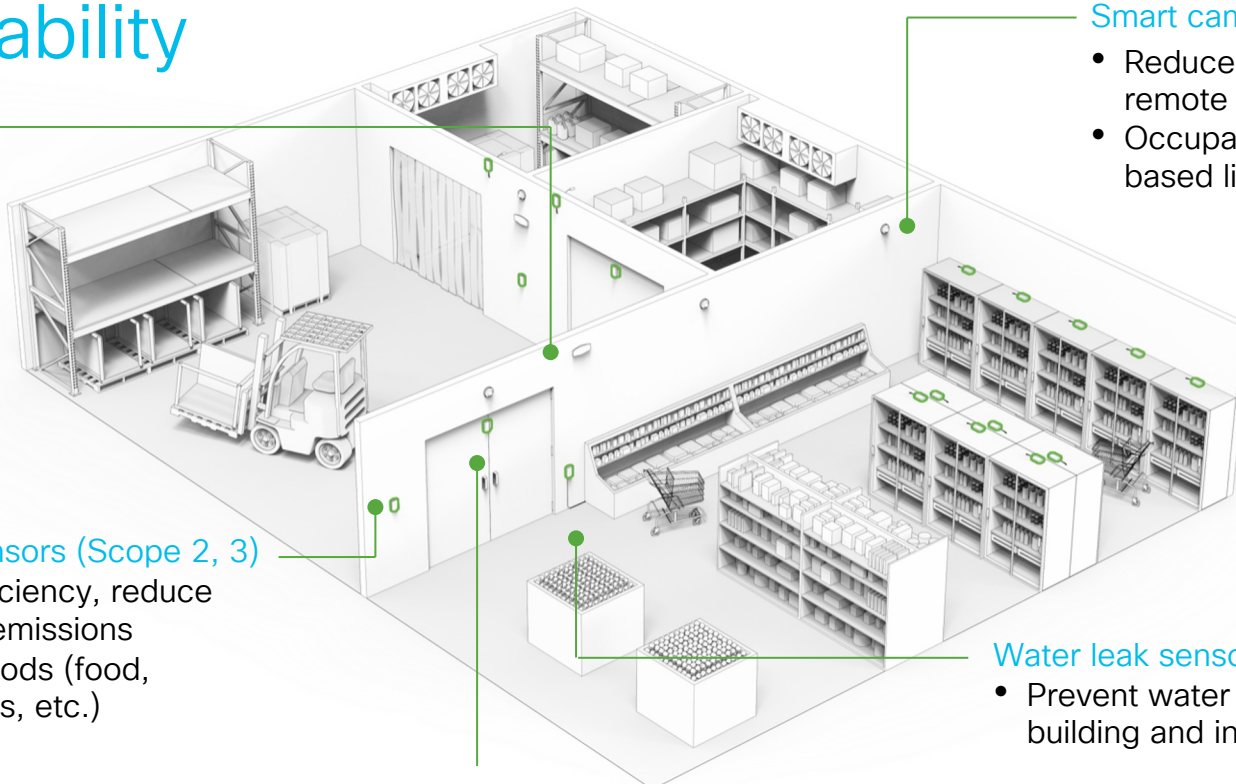
- Reduce on-site visits with remote visibility
- Occupancy / usage-based lighting

Water leak sensor (Scope 2, 3)

- Prevent water damage to building and infrastructure

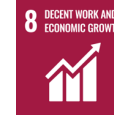
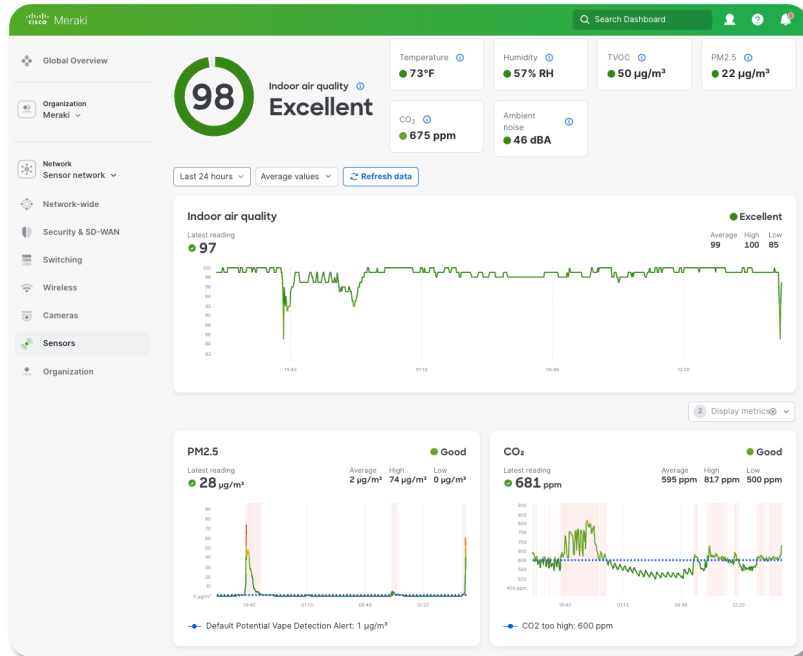
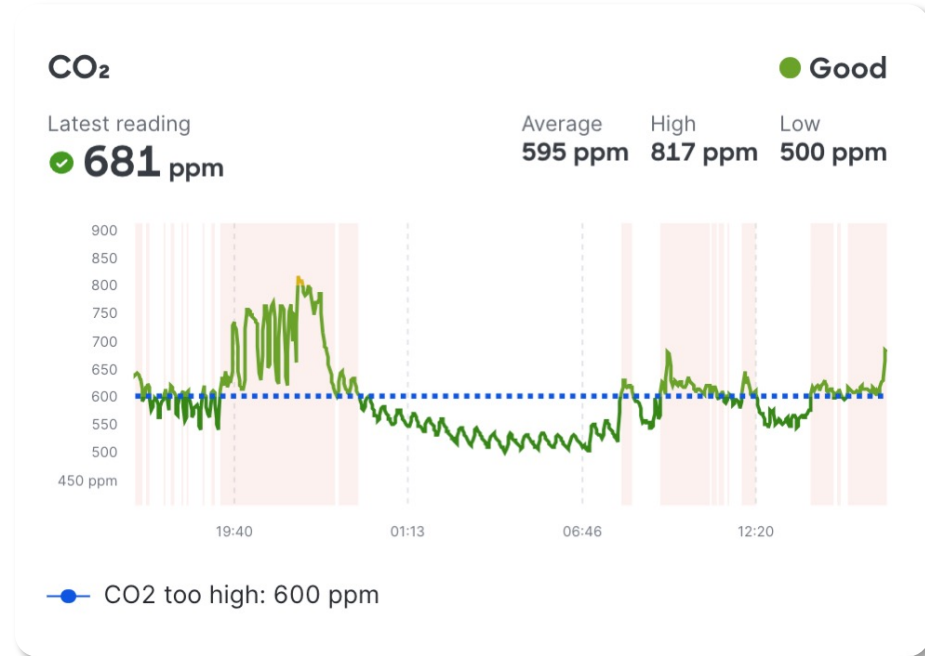
Door open/close sensor (Scope 2)

- Improve HVAC efficiency



Air quality reported on dashboard

– Meraki MT15



What's next?

Evolution of energy Networking

Energy Networking combines power and data together over the same cable, signifying a fundamental shift in how the world will build smarter buildings, design more sustainable data centers, and harness renewable energy. These networking practices will be the foundation for powering any device without needing a separate electrical infrastructure.

Creating networks that connect and distribute energy more simply, safely, and sustainably.



AC power
Alternating current



DC power
Direct current



FMP power
Fault managed power



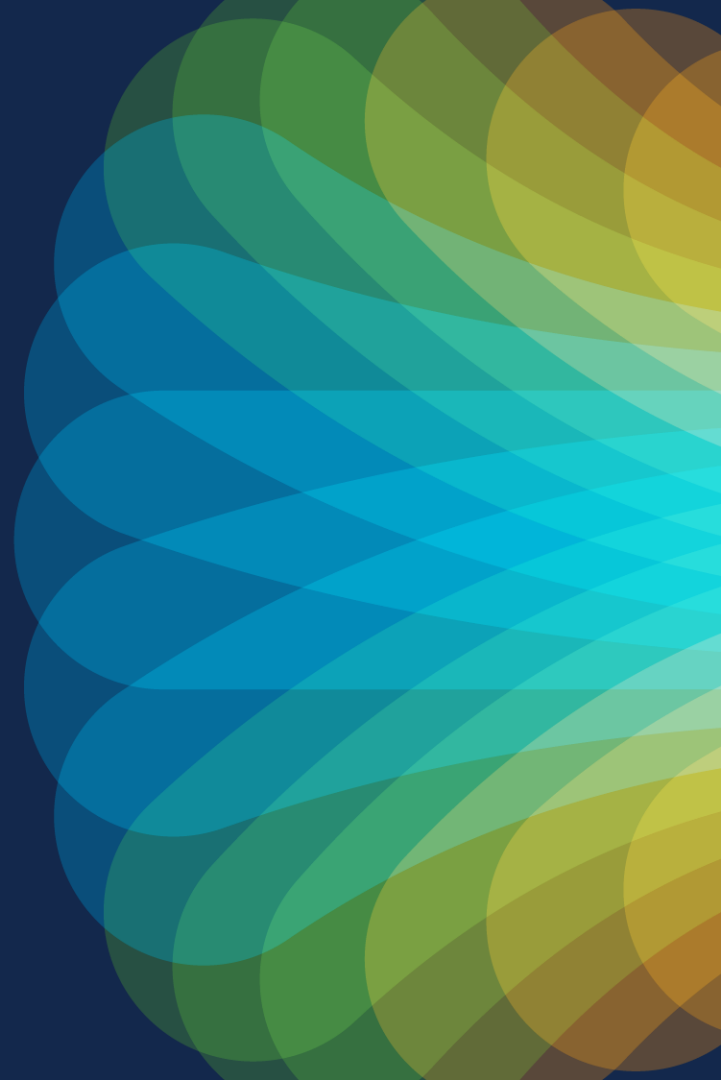
AC power systems

90W PoE

380V DC

Class IV FMP 380V

Sustainable Telemetry and Reporting



Sustainability KPI Metrics



Energy Consumption

- Total kWh use/day
- kWh use % on-peak/off-peak
- kWh by Location
- kWh by product/service (TBC)



Energy Efficiency

- Total Power Utilization Effectiveness (PUE)
- PUE by Location
- Network Utilization Efficiency
- Total kWh saved/day
- Power Consumption Ratio
- Inverse Power Consumption Ratio



Cost Savings

Calculated in local currency of facility location

- Month over Month net cost or net savings
- \$ spent on-peak/off-peak



GHG Emissions

Based on Greenhouse Gas Protocol standards

- Total CO2E / day
- Total CO2E / day by location
- % Renewable Energy Sources

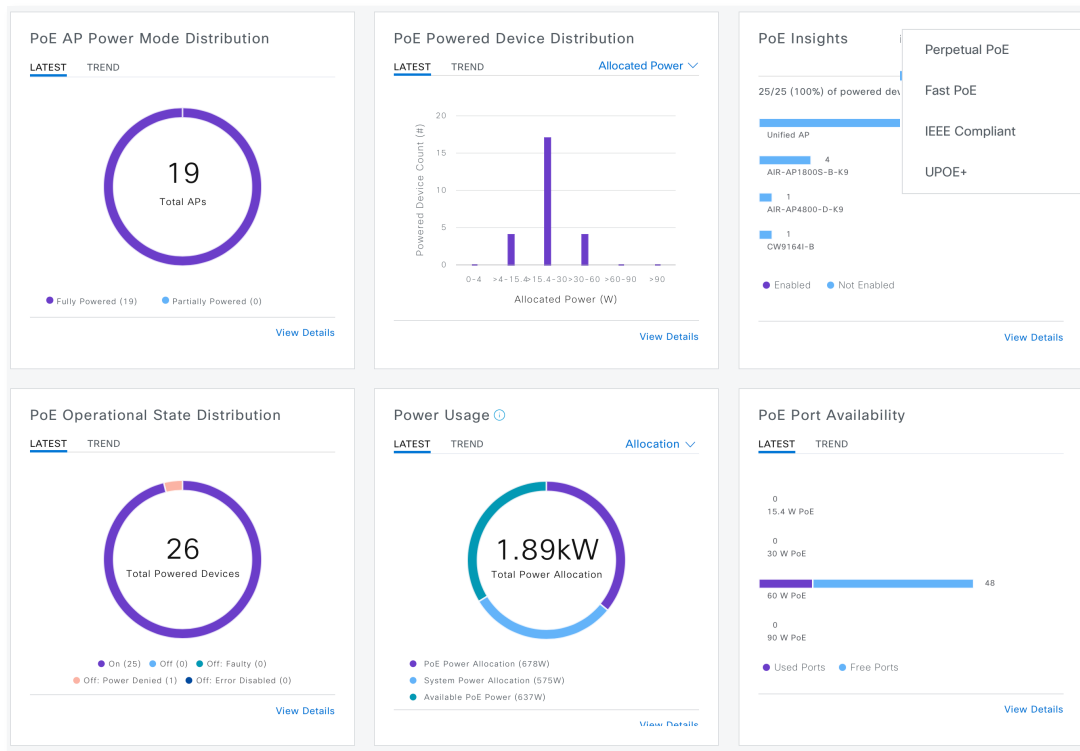


Avoidance / Net Positive

- Circular Design / Consumption (TBC)
- HVAC metrics (TBC)
- kWh usage avoidance

PoE Power Management

In Catalyst Center Dashboard



- Monitor Catalyst switches and PoE enabled devices power consumption
- Provides information such as:
 - Used power, remaining power, and power usage
- Monitor switch's power budget
- Relay on streaming telemetry from Catalyst switches to DNA Center

Save Energy with AP Power Save

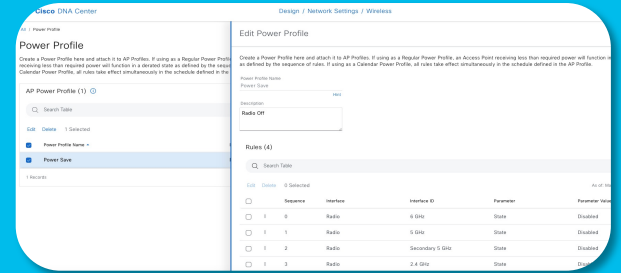
We estimate that using Power Save on 2,000 APs (1.5 W) for 10 hours a day (10pm to 8am), saves up to ca.*:

- 54,750 kWh energy
- \$22,705 cost
- 43,253 metric tCO2e emissions

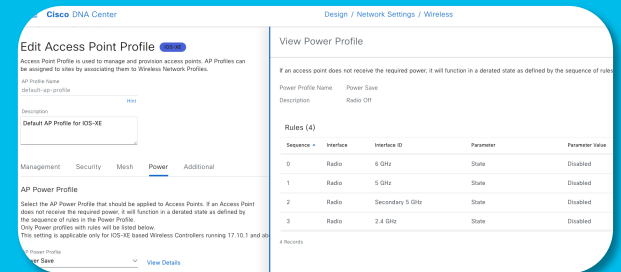
over 5 years.

*Based on internal analysis. Actual estimate that varies depending on the location where the devices are operated. Location in the example: Sydney, assumed energy price: \$0.414711/kWh

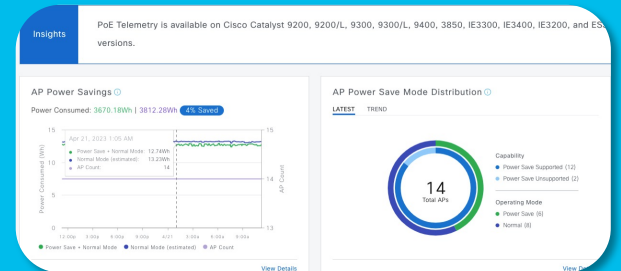
Design



Act



Report



Sustainability Insights with Nexus Cloud



Carbon footprint

Understand greenhouse gases emissions(GHG) of managed devices



Ecosystem

Know your rack/device (*compute, network, storage*) power consumption with PDU vendor integration(*Panduit, Vertiv**)



Key sustainability metrics*

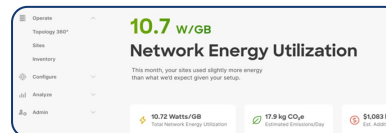
Total Power Utilization Effectiveness (PUE)

Monitor energy usage per site

View trending of your energy costs

Know the sources of energy and consumption

Automated monthly reports



Intersight Infrastructure Service simplifies energy efficient operations



Power policies

- Global setting for Chassis Power behavior
- Power Restore modes and Power Priority

Power profiling policy

- Node, Blade and Rack server
- Tests and determines actual min and max power draw

Power Allocation (capping) policy

- Chassis level power capping
- Sets the total allocated power budget for the chassis in watts

Dynamic power rebalancing

- Competitive advantage
- Chassis level redistribution of available power between servers and fans

Power Save Mode

- PSUs can be placed in power saving mode if requested power budges is less than the available power capacity

Fan speed control policy

- Global or individual non disruptive server setting
- Controls power usage and airflow noise levels

Power Redundancy policy

- Sets chassis power protection level
- Grid, Redundant, N+1 and N+2 modes

Extended Power Capacity

- Chassis Policy allowing the available power to be increased in Grid mode
- Borrows power from redundant PSUs

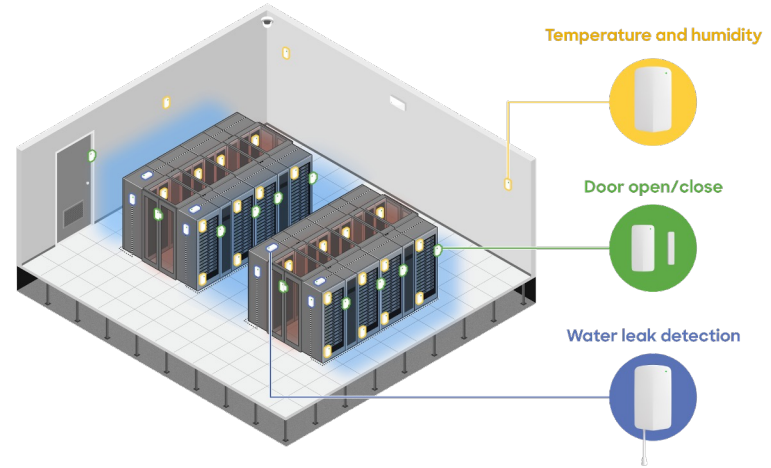
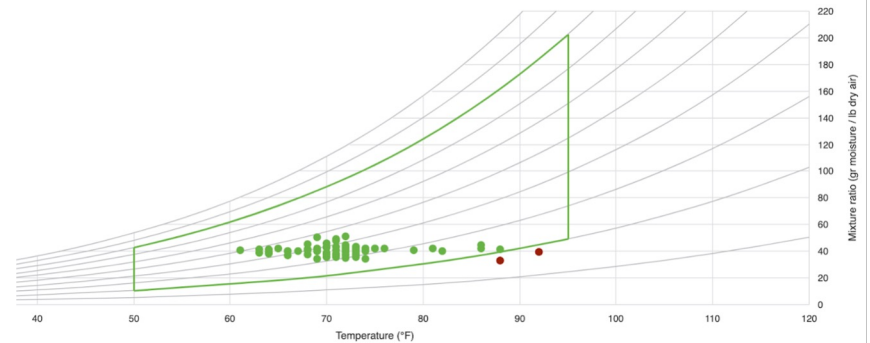
BIOS and OS power policy

- Use BIOS tokens to adjust power based on app needs
- OS level power recommendations

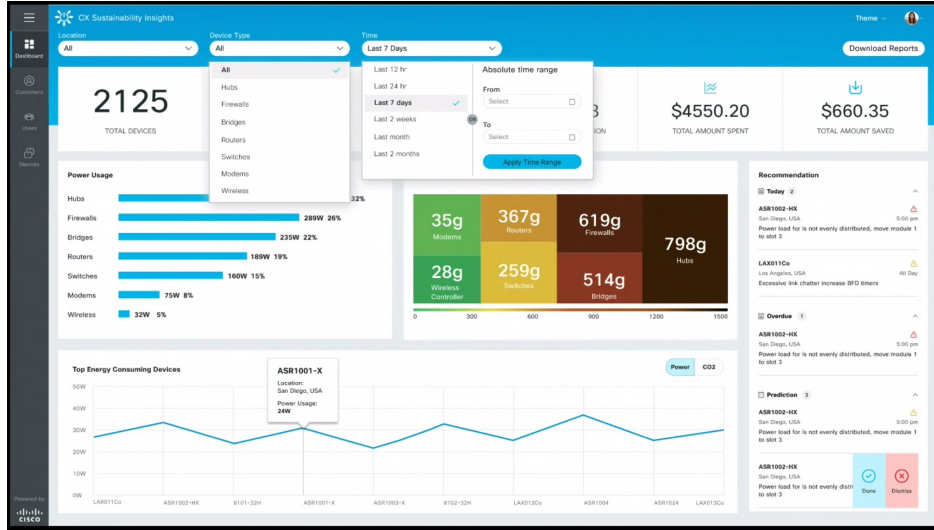
Meraki - Customer Story



- Leading digital marketing firm with 107k employees, 60 sites
- Implemented hot aisle containment in datacenters to optimize HVAC efficiency
- Reduced HVAC costs and carbon footprint
- Saving up to **\$72k and 175 tonnes of CO2** per year per campus



What's Next : Sustainable Telemetry



For Demo Purposes Only. Based on Hypothetical, Not Actual Customer Data.



Under Structured Market Trial (SMT)

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Industry Standardization

IETF116 I-D: Sustainability Insights

Network Working Group
Internet-Draft
Intended status: Informational
Expires: 14 September 2023

P. Andersson
1. Lindblad

Internet-Draft Sustainability Insights March 2023

Sustainability
draft-almpr-sustain

Abstract

This document motivates the collection of sustainability environmental relationship and requirements to collect including but not limited to power circular economy properties, and an environmental impact analysis. It is an industry-wide, open-source framework for greenhouse gas emissions, enabling the overall impact on the environment, applications, services, and solutions.

Status of This Memo

This Internet-Draft is submitted in full to the IETF for publication as a Proposed Standard Track document as part of the provisions of BCP 78 and BCP 79.

Internet-Drafts are working documents of the Internet Engineering Task Force (IETF). Note that other working documents as Internet-Drafts are at <https://datatracker.ietf.org/doc/draft-almpr-sustainability/>.

Internet-Drafts are draft documents and may be updated, replaced, or obsoleted. It is inappropriate to use material or cite them other than as "work in progress".

This Internet-Draft will expire on 14 September 2023.

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Andersson, et al. Expires 14 September 2023

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<https://datatracker.ietf.org/doc/draft-almpr-sustainability-insights/>

Conclusion and Key Takeaways

“What you do makes a difference, and you have to decide what kind of difference you want to make.”

Dr Jane Goodall, Scientist & Activist

- ✓ IT has significant role for Business reaching sustainability goals
- ✓ Net Zero requires Advanced, Modern Networks
- ✓ The Network will become the platform to sustainable Business goals and growth



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Friday	10:30am – 1:30pm

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Thank you

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The background is a vibrant, abstract graphic. On the left, there are overlapping, wavy shapes in shades of red, orange, and yellow. On the right, a bright white light source emits a series of colorful rays in shades of blue, green, and yellow, creating a sunburst effect. The overall color palette is a rainbow spectrum.

cisco *Live!*

Let's go

#CiscoLiveAPJC