

Sustainable Architectures Summit London 2025

*“Evolving Technology
Architectures for Responsible and
Sustainable AI”*



**Sustainable
Architectures**

LISA A. PRATICO - CHAIR &
CO-FOUNDER

KACY CLARKE - CO-FOUNDER



*“WE ARE THE GENERATION WITH THE POWER TO CHANGE THE WORLD.
LET’S USE THAT POWER TO CREATE A SUSTAINABLE FUTURE FOR ALL.”*

— ISRA HIRSI



Agenda

Sustainable Architectures Summit Kickoff

Speakers:

- Chitra Sundaram, Cleartelligence
- Wendy Marshall, Rackspace
- Panel: Kacy Clarke, Simon Bennett, Claire Robinson, Howard Holton
- Bharghava Vamsikrishna Bhogireddy, Legal and General
- Dr. Katia Chaban, Gadhu Sundaram – NTT Data

Working Group Roundtables

Working Group Readouts

Closing Remarks

Cocktail Reception

Sustainable Architectures Summit Kickoff Lisa Pratico

Chair and Co-Founder: SustainableArchitectures.org



*“TO DO GOOD, YOU ACTUALLY HAVE TO DO
SOMETHING.”
– YVON CHOUINARD, FOUNDER OF PATAGONIA*



The Environmental Impact of Artificial Intelligence

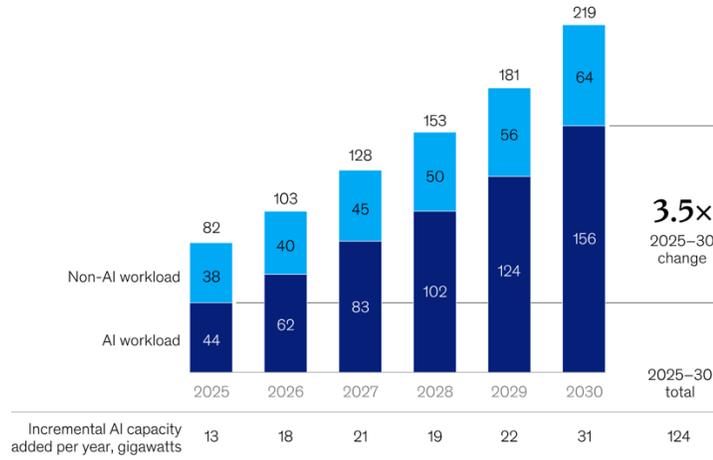
AI energy consumption is hitting the headlines



GREEN ENERGY
PRODUCTION IS
NOT KEEPING UP

Both AI and non-AI workloads will be key drivers of global data center capacity demand growth through 2030.

Estimated global data center capacity demand, 'continued momentum' scenario, gigawatts



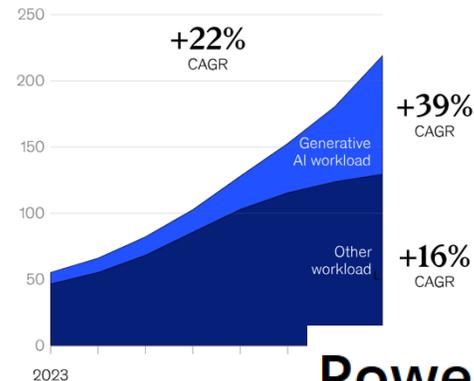
Note: Figures may not sum to totals, because of rounding.
Source: McKinsey Data Center Demand Model; Gartner reports; IDC reports; Nvidia capital markets reports

McKinsey & Company

AI demand alone will require \$5.2 trillion in investment

AI is the key driver of growth in demand for data center capacity.

Estimated global data center capacity demand,¹ gigawatts

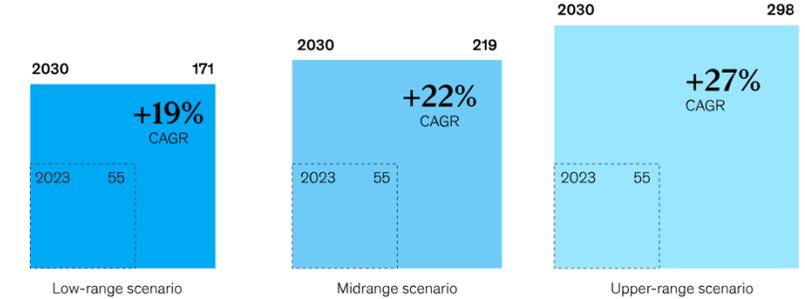


¹Midrange scenario is based on analysis of AI adoption (processing units, etc) and associated power consumption to reflect the number of servers a facility can house.
Source: McKinsey Data Center Demand model

McKinsey & Company

Global demand for data center capacity could more than triple by 2030.

Demand for data center capacity,¹ gigawatts



¹Three scenarios showing the upper-, low-, and midrange estimates of demand, based on analysis of AI adoption trends; growth in shipments of different types of chips (application-specific integrated circuits, graphics processing units, etc) and associated power consumption; and the typical compute, storage, and network needs of AI workloads. Demand is measured by power consumption to reflect the number of servers a facility can house.
Source: McKinsey Data Center Demand model

McKinsey & Company

AI to drive 165% increase in data center power demand by 2030

Amazon Doubles Down on AI Infrastructure with \$30B in New U.S. Data Center Investments

OpenAI's Biggest Data Center Secures \$11.6 Billion in Funding

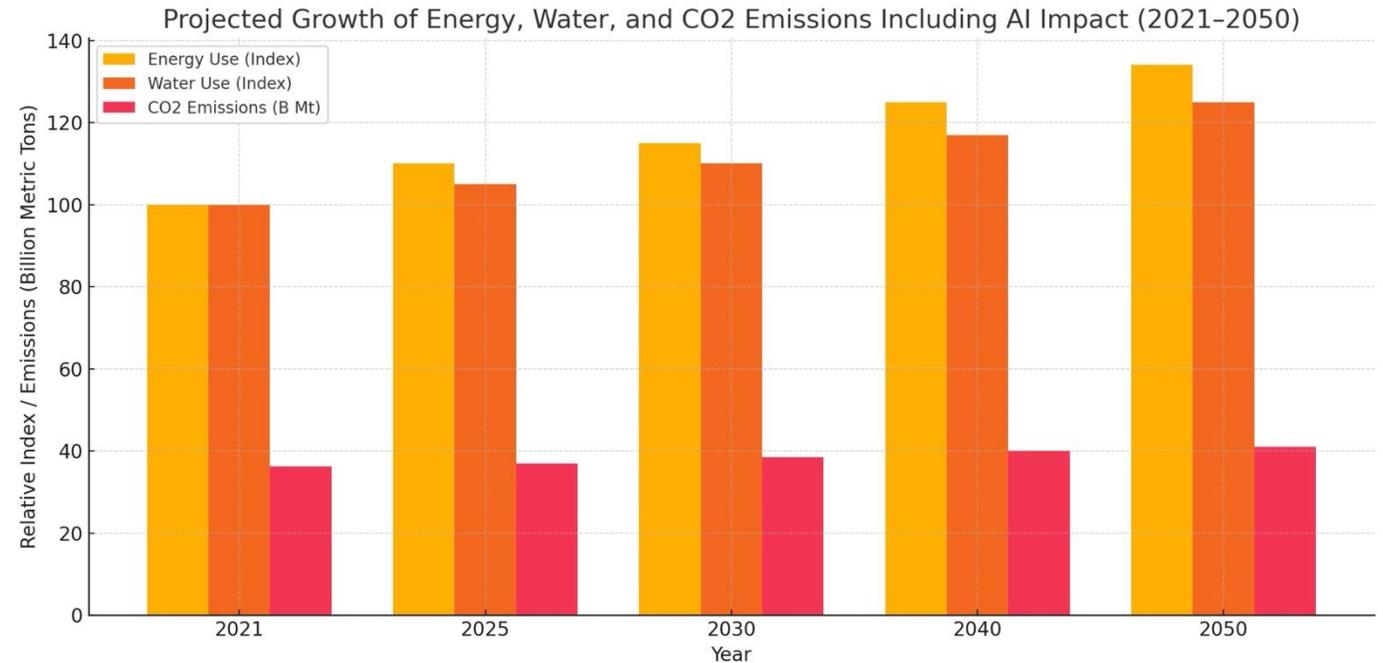
The eight-building Texas project is a central piece of OpenAI's efforts to reduce its reliance on Microsoft for computing power

Powering the AI Data Center Boom: A Growing Strain on Energy Infrastructure

Power-hungry, water-thirsty: How AI is quietly devastating the planet

Projected Growth including AI Impact (2021-2050)

- **Energy Use (Index):** Continues rising steadily due to both general demand and compute-intensive AI workloads.
- **Water Use (Index):** Grows due to the increase in data center cooling needs, driven by AI training and inference operations.
- **CO₂ Emissions (Billion Metric Tons):** There will be a sharper rise through 2030–2040, with AI workloads significantly contributing to energy demand, pushing emissions toward the **41.0 B Mt mark by 2050** in the reference case provided in the appendix.



Root Causes of Increases Due to AI

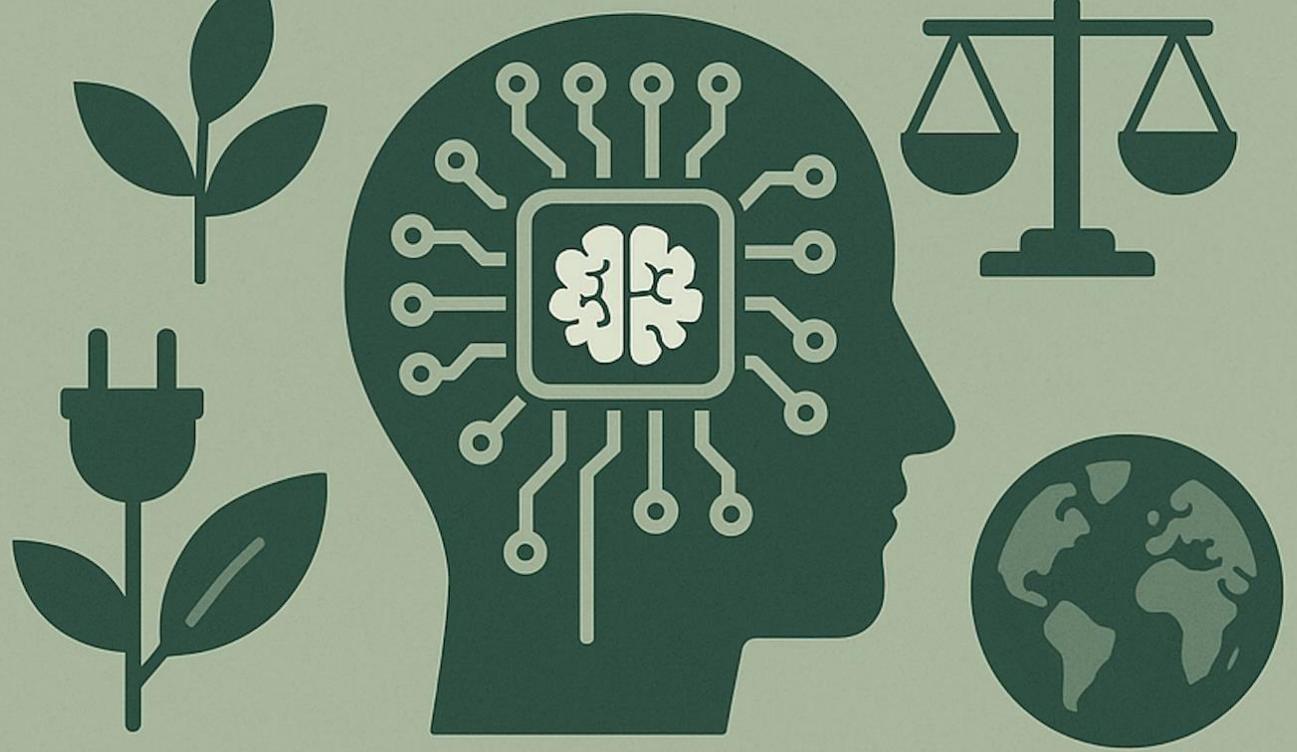
- **Computational Intensity:** Training and running large AI models require immense computational resources, demanding high-performance computing infrastructure and consuming massive amounts of electricity.
- **Data Processing and Storage:** AI relies on processing and storing large datasets, which further contributes to energy and water consumption in data centers.
- **Cooling Requirements:** AI servers generate significant heat, necessitating extensive cooling systems that often rely on water, especially in regions facing water scarcity.
- **E-waste Generation:** The production and short lifespan of specialized hardware (GPUs, TPUs) used in AI contribute to growing electronic waste. Looking further ahead to 2050, the amount of global e-waste could reach a staggering 120 million tonnes.*
- **Manufacturing and Resource Extraction:** The production of AI hardware requires the extraction of rare earth minerals and other materials, potentially leading to environmental degradation.

Key Concerns for Sustainable / Responsible AI

Environmental	Ethical & Societal Impacts	Governance & Risk Management	Architectural & Operational Concerns	Measurement & Reporting Gaps
<ul style="list-style-type: none"> • Carbon Footprint • Water Usage • Energy Demand • E-Waste • Embodied Carbon 	<ul style="list-style-type: none"> • Bias and Fairness • Transparency & Explainability & Accountability 	<ul style="list-style-type: none"> • Lack of Unified Oversight • Security & Privacy Risks • Model Lifecycle Management 	<ul style="list-style-type: none"> • Non-optimized Infrastructure • Toolchain Fragmentation • Lack of Reuse and Modularity • Lack of Enterprise Architecture deliverables 	<ul style="list-style-type: none"> • Insufficient Metrics • Lack of transparency • Calculations relying on carbon credits or RECs • Frequency of reporting • Third party / supply chain carbon • No ESG Integration
<p>Action Plan:</p> <ul style="list-style-type: none"> • Development of GreenOps metrics to track and reduce energy, carbon, and water impacts.* • Toolkits for CIOs and architects to measure and manage environmental costs of AI solutions. 	<p>Action Plan:</p> <ul style="list-style-type: none"> • Integrate ethical and sustainable design principles into enterprise architecture. • Create role clarity across architecture layers—e.g., Business, Data, Application, Infrastructure, and Security—for embedding responsible AI. 	<p>Action Plan:</p> <ul style="list-style-type: none"> • Continue to build out the Responsible AI Governance Framework aligned to SDGs and ESG reporting.* • Introduce the Responsible AI Runbook to guide roles, decisions, and development checkpoints across operationalizing AI.* • Updating governance inclusive of weighting viable sustainable and AI solutions. • Define architecture metrics. 	<p>Action Plan:</p> <ul style="list-style-type: none"> • Advocates for composable, reusable AI components. • Development of Enterprise Architecture patterns, principles and standards in the BTABok • Publishing reference architectures for green AI and sustainable product solutions, balancing innovation with energy efficiency. 	<p>Action Plan:</p> <ul style="list-style-type: none"> • Provides actionable metrics for AI such as: <ul style="list-style-type: none"> ○ Energy per prediction ○ Water used per inference ○ Carbon per AI use case • Mature real-time tracking and architecture refactoring based on performance and impact. • Mature engineering and development best practices**

*In concert with SustainableIT.org deliverables, **In concert with GSF and tool vendor deliverables

Enterprise Architecture
for Sustainable
Responsible AI



**SUSTAINABLE
RESPONSIBLE AI
ARCHITECTURE**

Guardrails for Sustainable and Responsible AI

ARCHITECTURE DESIGN

- **Modular & Explainable AI:** Composable, interpretable models with clear traceability.
- **GreenOps & Efficiency Patterns:** Optimize energy/water usage and deploy carbon-aware models.
- **Privacy & Security by Design:** Use federated learning, encryption, and threat modeling.
- **Data Ethics & Provenance:** Tag data for fairness, track lineage, enforce minimization.
- **Assessment and viability of the solution**

ARCHITECTURE GOVERNANCE

- **Stage-Gate Reviews:** Sustainability, ethics, and fairness at lifecycle stages.
- **Architecture Review Board:** Require model cards, impact analysis, bias testing.
- **Policy-Driven Design:** Align with ESG principles and responsible AI patterns.

Enterprise Alignment & Accountability:

- **Integrate Sustainable and Responsible AI KPIs into frameworks** (e.g., TOGAF, SAFe, Zachman, IASA BTABok).
- **Maintain central registry** for solutions (AI & other solutions') to endure your sustainability posture.
- **Link EA dashboards with IT sustainability goals.**
- **Ensure vendor compliance**

MITIGATION & RISK MANAGEMENT

- **Optimizing AI models for energy efficiency.**
- **Developing energy-efficient hardware and cooling systems.**
- **Transitioning AI data centers to renewable energy sources.**
- **Considering the geographic location and efficiency of data centers to reduce environmental impact.**
- **Exploring policies and regulations to manage AI's environmental footprint.**



Call to Action:
Building Sustainable Technology
Architectures

Our Challenge

Tech is missing the ESG boat

- CIO's, CTO's and Technology Architects **lag far behind** their business colleagues in understanding their roles in achieving their organization's **ESG goals**.
- Few understand the current **environmental impact** of their technology portfolios, even as the **impact is accelerating** with digitization, big data and **AI**.
- Organizations are relying on technology leadership to both provide data and solutions for **improving technology sustainability**.
- Global regulatory organizations are demanding more **detailed ESG reporting** for both owned and outsourced services.
- Technology architects play a key role in **optimizing the sustainability of technology architectures**, but few are trained or prepared to provide solutions.

*“We don't need a handful of people doing zero waste perfectly.
We need millions of people doing it imperfectly.”*
– Anne Marie Bonneau



 **79%**

of consumers are changing preferences based on sustainability

Source: Capgemini

 **46%**

of employees would only work for a company with sustainable practices

Source: HP

 **18%**

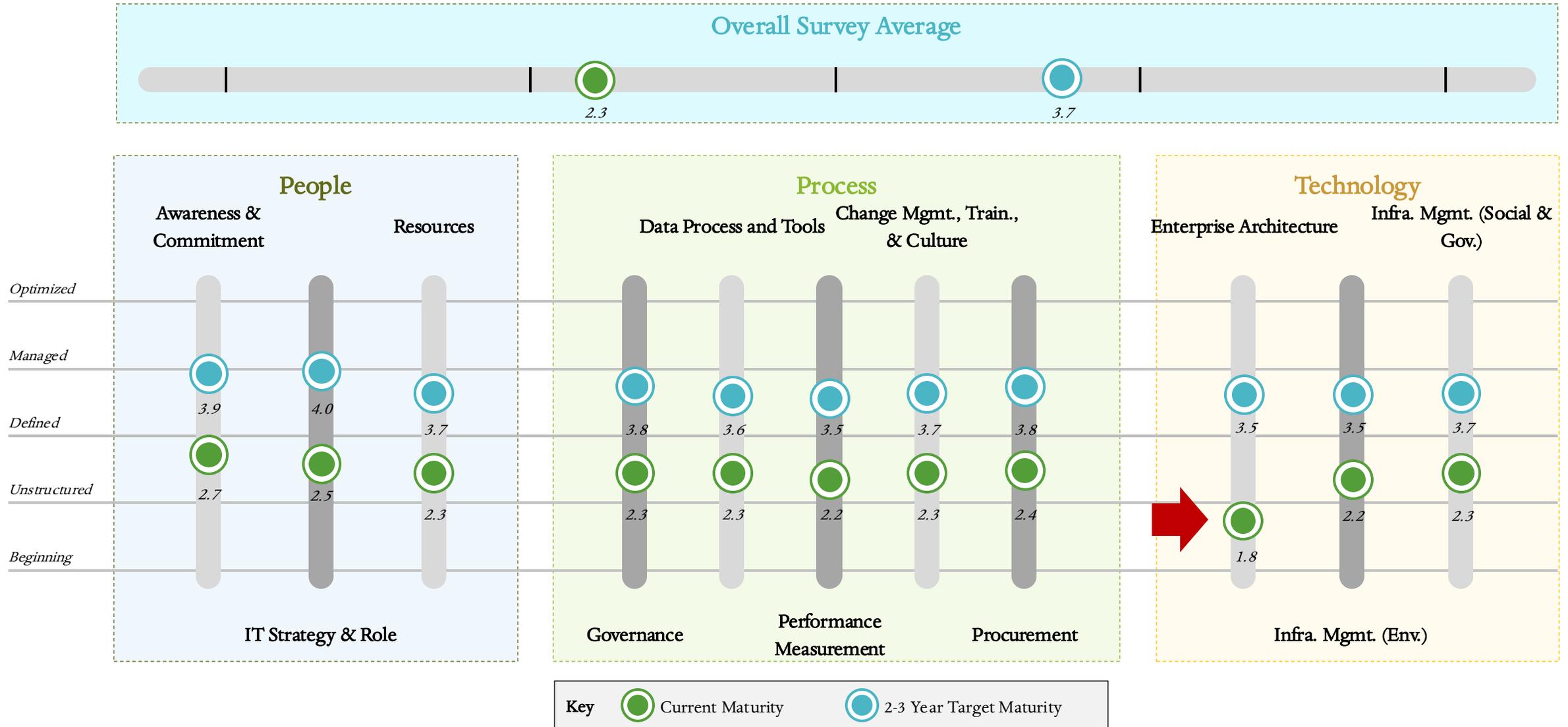
of large organizations have a specific, comprehensive, sustainable IT strategy with well-defined goals and target timelines

Source: Capgemini

Enterprise Architecture Maturity - Technology infrastructure design guidelines and standards for sustainability.

- 1 **Level 1 - Beginning:** Technology enterprise architecture generally lacks environmental and social sustainability principles for infrastructure design.
- 2 **Level 2 - Unstructured:** There are some architecture sustainability principles and plans for migration to a more sustainable model, but progress has been sporadic or slow.
- 3 **Level 3 - Defined:** A sustainable architecture model has been fully mapped and significant progress is underway in migration.
- 4 **Level 4 - Managed:** A sustainable architecture model is fully applied across the enterprise and migration is progressing at or above expectations.
- 5 **Level 5 - Optimized:** Legacy and new infrastructure largely conform to sustainable architecture principles for the enterprise and reflect industry-wide goals or norms.

Deloitte/SustainableIT Results: Average IT Maturity Levels



About SustainableArchitectures.org



Sustainable Architectures is a development track for IASA Global



Focused on creating a community of architects to develop best practices, patterns, principles and frameworks for sustainable systems design and operations



Contributions will be posted to the BTABoK – the open- source business technology architecture book of knowledge



Development of education, assessments and certification to spread sustainability principles and best practices



Collaborating with the GSF and SustainableIT.org



Our Mission

To advance the adoption of Sustainable IT and Responsible AI patterns and practices in the global architecture community.

- **Inspire** commitment to sustainability and responsible AI across technology leadership.
- **Create** an open community of architects dedicated to advancing sustainable architecture and operations.
- **Gather** metrics, stories, patterns and best practices to showcase sustainable architecture implementation successes.
- **Design** reusable tools, frameworks and techniques for achieving ESG-aligned goals.
- **Educate** organizations on sustainable IT strategies.
- **Promote** responsible AI use to meet evolving customer expectations while reducing negative environmental impacts.



Our Approach Leveraging IASA Global

POWERED BY OPEN SOURCE



- BTBoK...
 - Patterns, Reference Models, Styles, Principles, Decisions
 - Business Cases Methods, Value, ++
- SustainableIT.org body of knowledge

PROFESSIONALLY DRIVEN



- Leverage Thousands of Architects at Fortune 100 organizations
- Skilled in consulting, strategic planning and Architecture as well as operations.

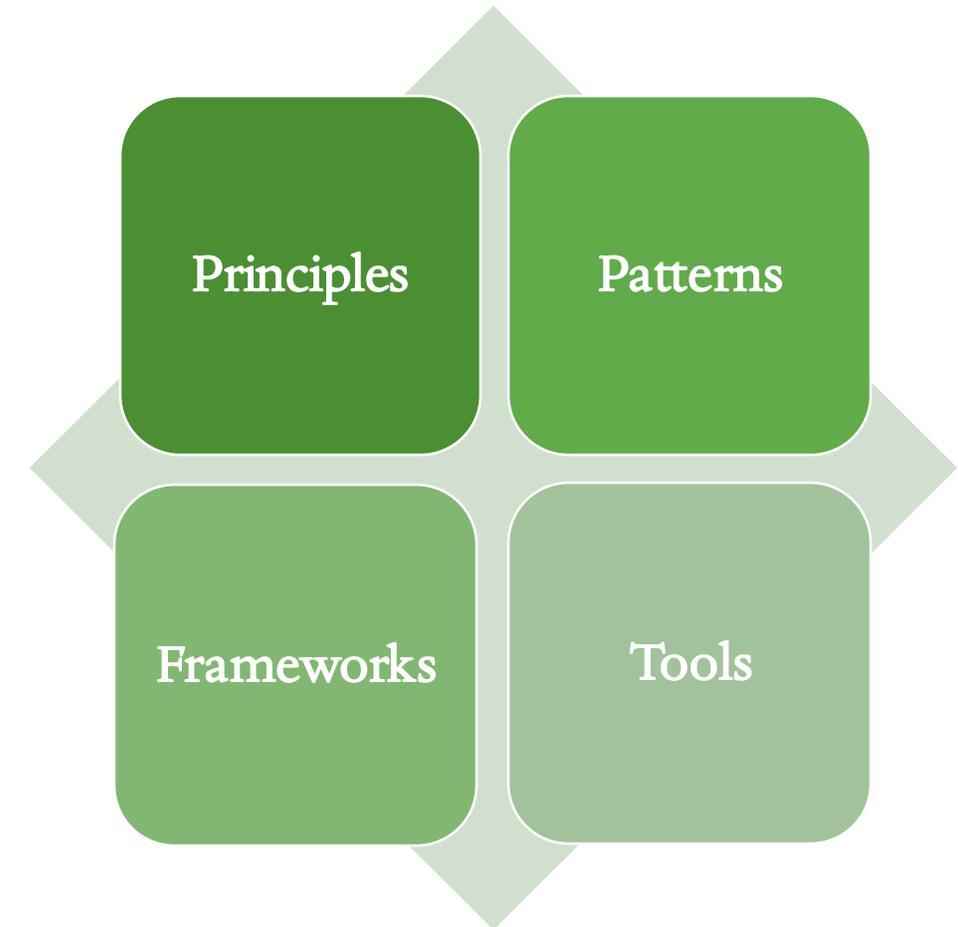
ADOPTION FOCUSED



- Number of organizations adopting architecture methods
- Impact assessments and maturity
- Training and certification levels per organization

Sustainable Architectures Deliverables

- **Educational Programs:** Courses on Sustainable Technology metrics, ESG mandates and IT's environmental impact.
- A new offering for Architects: **Sustainable Architectures certification program** including a focus on sustainable responsible AI under IASA Global.
- **Research Repositories:** Curated patterns, principles and frameworks for Sustainable Architectures, GreenOps and Green Computing in the BTABoK.
- **Assessments:** Tools and frameworks to evaluate IT maturity and ensure sustainability readiness.
- **Architectural Artifacts:** Templates, frameworks and guidelines for ESG-aligned technology strategies.





Our Thanks to Our Co-hosts and Sponsors

Our Co-Hosts



The Business Technology Architect Association

Gold Sponsor



Silver Sponsors



Today's Agenda

9:00 – 9:25 Lisa Pratico, Kickoff

9:25 – 09:50 Chitra Sundaram, Cleartelligence

9:50 – 10:15 Wendy Marshall, Rackspace

10:15 – 10:45 Panel:

Kacy Clarke, Simon Bennett, Claire Robinson, Howard Holton

10:45 – 11:00 break

11:00 – 11:25 Bharghava Vamsikrishna Bhogireddy, Legal and General

11:25 – 11:45 Daisy Schuchmann, Value Blue

11:45 – 12:25 Dr. Katia Chaban, Gadhu Sundaram – NTT Data

1:30 - 4:30 Working Group Roundtables:

- Strategy and Governance
- Solution Architecture
- Infrastructure
- Data and Responsible AI
- Metrics and GreenOps
- Security, Risk and Compliance

4:30 – 5:30 Final Readout

5:30 – 6:30 Cocktail Reception



Sustainable Architectures Summit Speakers

Chitra Sundaram

Digital Analytics Executive @
Cleartelligence

**Aligning AI and Data with Responsible
Practice**



Wendy Marshall

Lead Technical Consultant, Professional
Services @ Rackspace

**Paving the way to Sustainable and
Responsible AI**



Bharghava Vamsikrishna Bhogireddy Green
IT Practitioner, SRE and Devops Advocate
@ Legal and General

**From Code to Community: Innovating
Responsibly in the Age of AI**



Welcome to Our Panelists

*“Architecture Decision
Frameworks for Responsible AI”*



Kacy Clarke - Moderator

Co-founder @ Sustainable Architectures
CTO, Chiefly & Co



Simon Bennett -

CTO & Technical Solutioning – Private
Cloud @ Rackspace Technology



Claire Robinson

Director of Sustainable Business Consulting @
Transform



Howard Holton

COO @ Gigaom



Daisy Schuchmann

Chief Revenue Officer @
ValueBlue

**Smart Rationalization: Aligning Your
Technology Landscape with Sustainable Goals**



Dr. Katia Chaban

VP, Global Head of IT Sustainability
Center of Expertise @ NTT Data

&

Gadhu Sundaram

Innovation Lead – Sustainable
Technology Strategy and Advisory
@ NTT Data

Implementing Sustainable IT at scale



Sustainable Architectures Working Groups Kacy Clarke

Co-Founder: SustainableArchitectures.org



*“SUSTAINABILITY IS NO LONGER ABOUT DOING LESS
HARM. IT’S ABOUT DOING MORE GOOD.”
– JOCHEN ZEITZ, CEO OF HARLEY-DAVIDSON*



Sustainable Architectures Working Groups

Strategy and Governance

Solution Architecture

Infrastructure

Data and Responsible AI

Metrics and GreenOps

Security, Risk and Compliance



How We Engage and Our Focus

SustainableIT.org	CIO level Focus on strategy, principles and compliance
SustainableArchitectures.org	Architecture level Focus on Sustainable and Responsible AI Principles, Patterns, IT strategies
Green Software Foundation	Engineering level Focus on Engineering patterns & development
GreenOps Various vendors/Solutions	IT operations Focus on R/T analytics and operational efficiencies



About SustainableArchitectures.org



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Focused on creating a community of architects to develop best practices, patterns, principles and frameworks for sustainable systems design and operations



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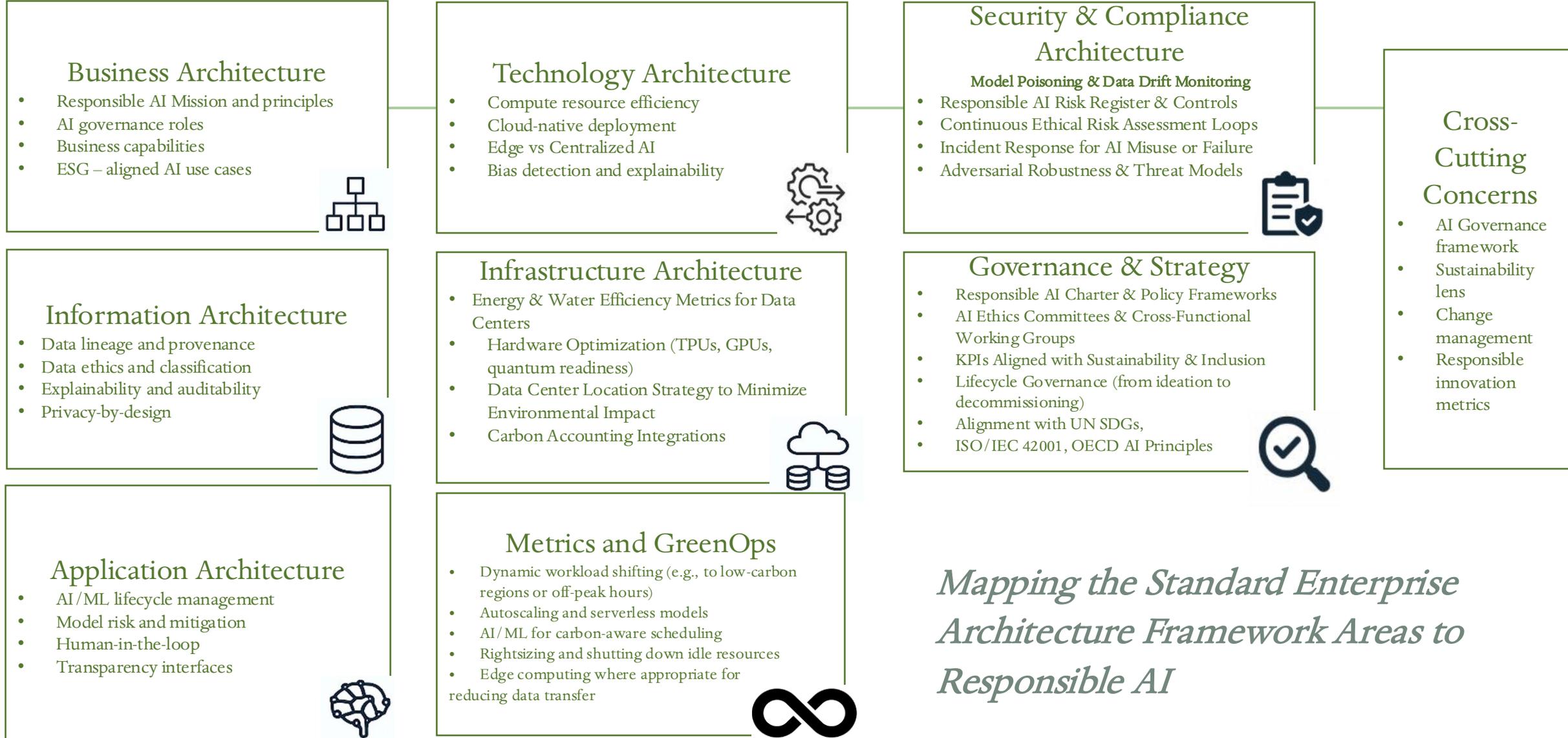
Development of education, assessments and certification to spread sustainability principles and best practices



Collaborating with the GSF and SustainableIT.org



Sustainable Technology Architecture and Responsible AI



Mapping the Standard Enterprise Architecture Framework Areas to Responsible AI

Mapping Sustainable IT Architecture Principles to Sustainable Architecture Working Groups

Architecture Principles

- Business 
- Information 
- Technology 
- Application 
- Security 
- Governance 
- Integration
- Green IT 

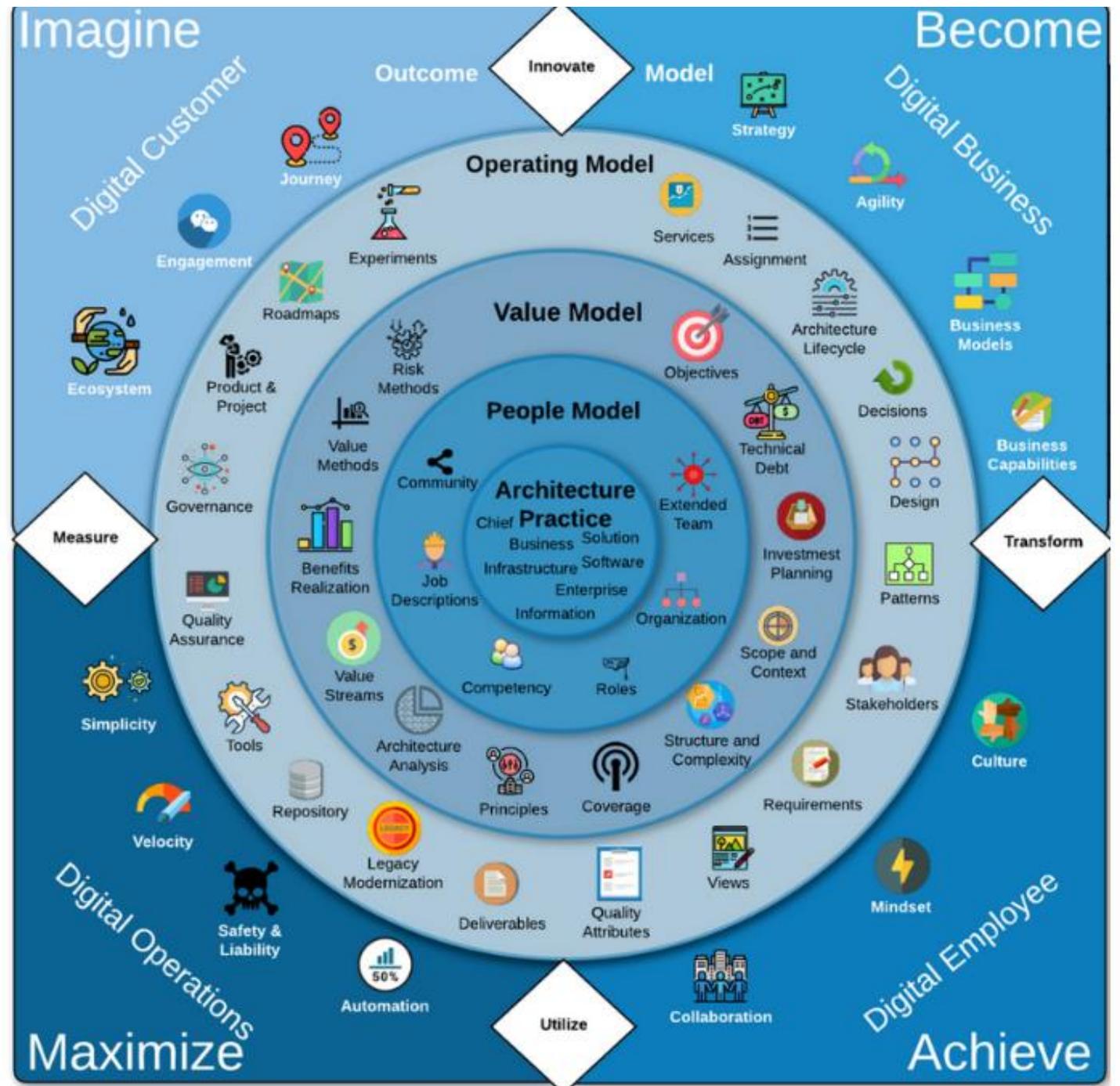
Working Group

- Strategy & Governance
- Data and Responsible AI
- Infrastructure
- Solutions Architecture
- Security / Risk & Compliance
- Strategy & Governance
- Multiple
- Metrics and Green-Ops

Sustainable Architectures Working Groups

MAPPING TO THE BTABOK

Sustainability Topic Area
Sustainable Data Principles



Sustainable Architectures Working Groups

Working Groups	Working Group Areas	Leads
Strategy and Governance	Sustainable/ ESG Strategies and Governance, Business Architecture, Technology Strategy	Lakshmanan Velayutham
Solution Architecture	Solution Design and Patterns, Principles, Guidelines and Guardrails	Santhosh Gottigere
Infrastructure	Infrastructure, Cloud, Energy, Data Center	Christain Siegers Abhishek Kumar Singh
Data and Responsible AI	Data Architecture and AI	Chitra Sundaram
Metrics and GreenOps	GreenOps - Scoring, Metrics, Reporting, Optimization, Vendor Metrics	Michael Eydman
Security and Compliance	Security, Risk and Compliance	Jody Elliott

Working Group Roundtable Instructions

Review and Complete

- Working Group Overview
- High Level Outline
- Chapters
- Key Pain Points/ Opportunities
- Action Plan

End of Session Readout (10-minute presentation by each working group)

Sustainable Architectures Working Groups

WORK STREAM:
STRATEGY AND
GOVERNANCE



Priority Goals

- **Establish Sustainable Architecture Principles:** Define architectural standards that incorporate energy efficiency, carbon footprint reduction, and ethical AI usage.
- **Align Architecture Decisions with Sustainability Goals** – Ensure architecture decisions support corporate Environmental, Social, and Governance (ESG) commitments, business resilience, and long-term innovation.
- **Optimize Technology and Infrastructure** – Prioritize energy-efficient cloud solutions, reduce technical debt, and leverage AI/ automation for resource optimization.
- **Measure, Report, and Continuously Improve** – Track sustainability KPIs, enhance transparency, and refine strategies to improve environmental and operational efficiency.

Next Steps

- Define architecture principles for sustainability
- Create governance process to help with the technology/ architecture decision making based on the principles and the sustainability goals
- Create a scoring framework for measuring the sustainability score and define KPIs
- Define guidelines to improve the KPIs and the sustainability scores

Impact Team

Lakshmanan Velayutham (lakshmananv@gmail.com)

Ingo William (Bus Arch)

Petra t' Veld-Brown (petra@diaphanum.nl)

Join Us and Announcements Closing Remarks



*"A SUSTAINABLE BUSINESS IS RESOURCE EFFICIENT,
RESPECTS THE ENVIRONMENT AND IS A GOOD NEIGHBOR"*

— PHIL HARDING

Join Us

Become	Influence	Contribute	Drive
Become part of a community shaping sustainable IT and responsible AI practices.	Influence global best practices.	Contribute to educational and research initiatives.	Drive impactful, sustainable innovation.

Individual Contributors

- Contribute articles, white papers and case studies
- Lead or participate in events, tracks and governance
- Design training materials
- Research and contribute to BTABoK artifacts

Company Sponsors

- Assign dedicated resources to contribute to building our community and practice
- Sponsor events and education to expand sustainability training and best practices
- Join other sponsors to influence priorities

To join the Sustainable Architectures community, register at: www.sustainablearchitectures.org

Announcements

- ❖ **Continued support and engagement with SustainableIT.org**
 - Includes co-branded webinars and community workshops
- ❖ **GSF: Will be joining into a joint relationship in the July timeframe**
 - We will be linking our architectural outputs by working groups with GSF Engineering and development principles.
- ❖ **Future Events/ Future Educational Programs**
 - Green IO Conferences
 - Sustainable Architectures Podcast
 - Sustainable and Responsible Certification leveraging IASA early fall.

Final Thoughts

We at SustainableArchitectures.org are deeply passionate about evolving our architecture practice to embed sustainability and responsible AI principles—ensuring our designs not only deliver business value, but also help CIOs meet their critical sustainability goals.

For me personally, ultimately the people in this room and your peers become a catalyst for sustainable innovation, ensuring that AI solutions are not only intelligent but also ethically and environmentally responsible by design.

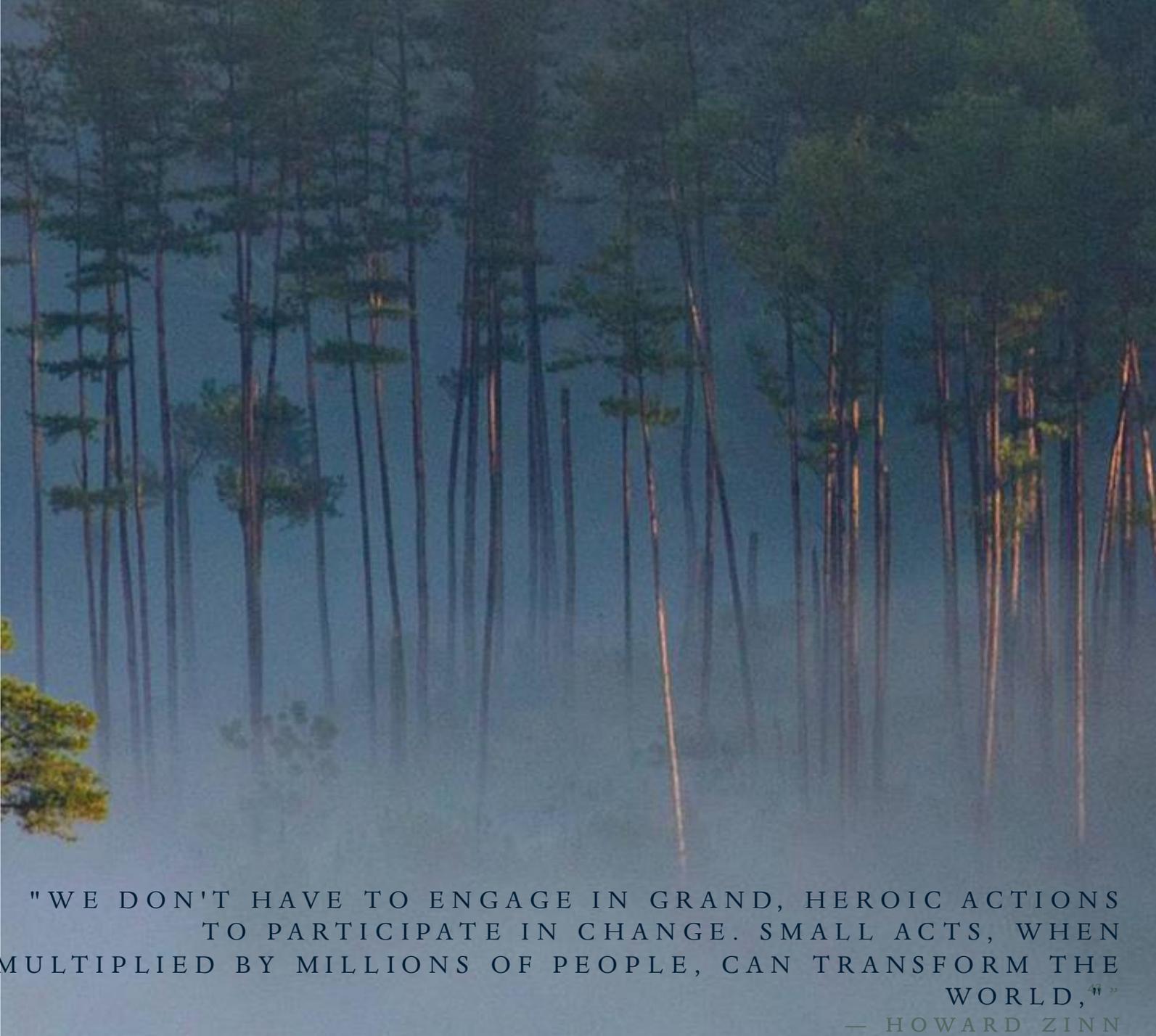
Thank you

Email:

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Website:

www.sustainablearchitectures.org



"WE DON'T HAVE TO ENGAGE IN GRAND, HEROIC ACTIONS
TO PARTICIPATE IN CHANGE. SMALL ACTS, WHEN
MULTIPLIED BY MILLIONS OF PEOPLE, CAN TRANSFORM THE
WORLD,"

— HOWARD ZINN

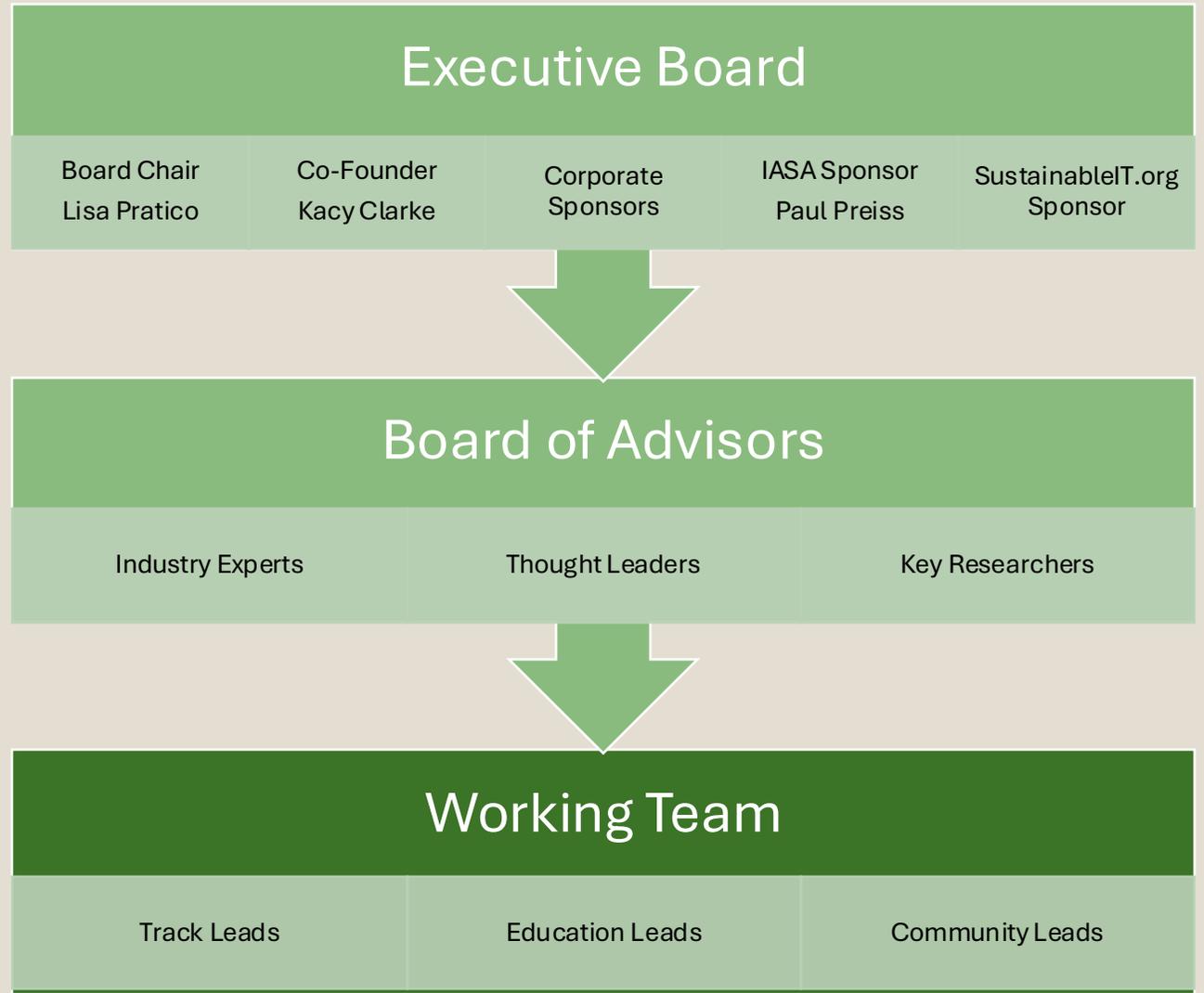
Appendix



*"THE MORE YOU LIVE IT, THE MORE SUSTAINABLE
YOUR BUSINESS APPROACH BECOMES."*

— SATYA NADELLA, CEO MICROSOFT

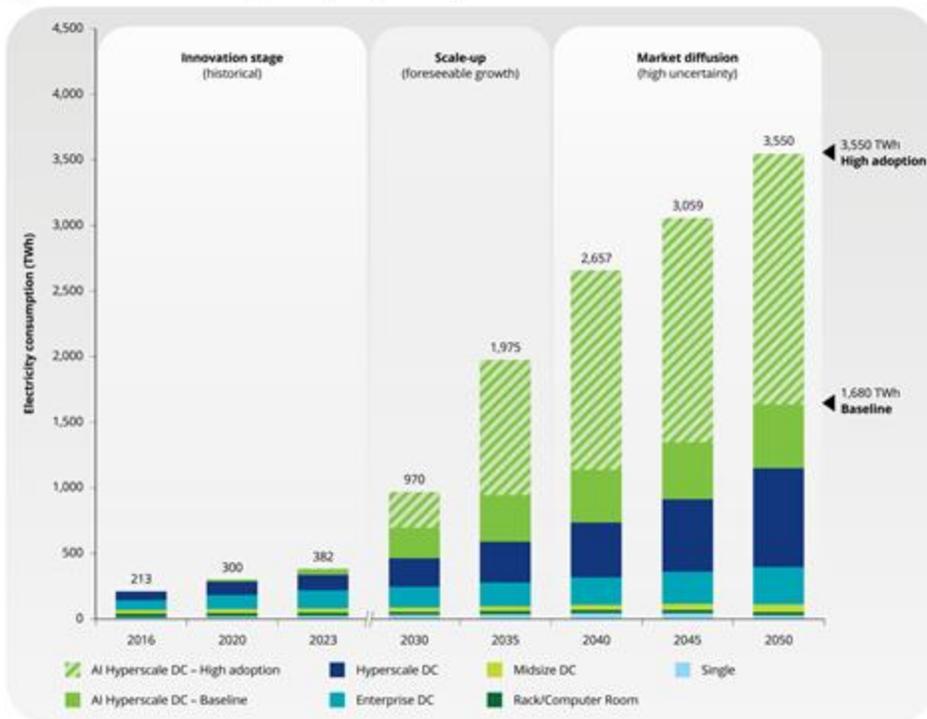
Sustainable Architectures Org



US data center energy demand could grow to 12% of available power by 2028

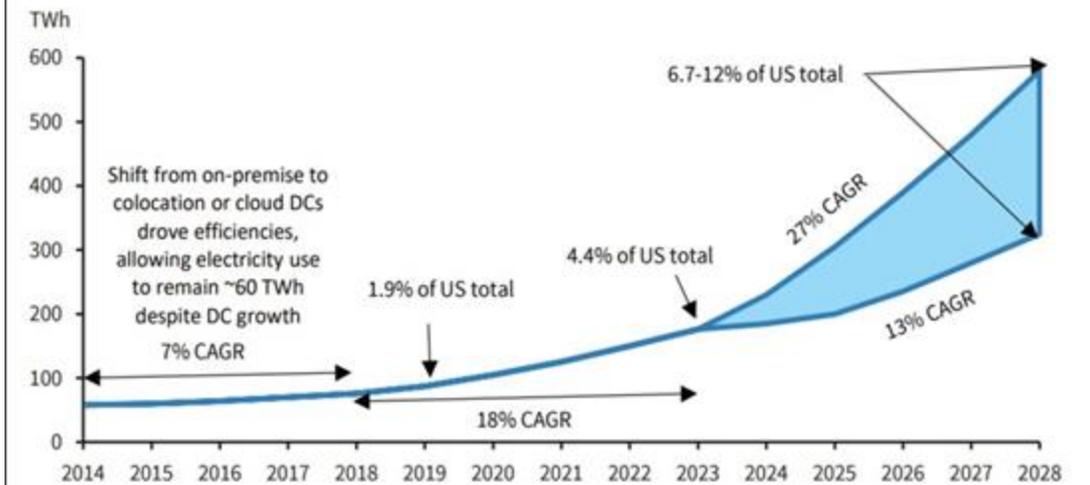
The U.S. Department of Energy 2024 Report on U.S. Data Center Energy Use predicts the electricity demand of U.S. data centers will increase by approximately 13-27% annually, reaching 325-580 twh by 2028, accounting for 6.7%-12% of U.S. electricity.

Figure 3. Data centers' electricity consumption by server type and scenarios



Source: Deloitte Global analysis.

FIGURE 1. US DOE forecast for US data center electricity demand



Source: US DOE Lawrence Berkeley National Laboratory & Barclays Research

Global data center energy demand is accelerating faster than expected

Deloitte's assessment of growing demand for AI will likely drive global data center energy requirements to a compound annual growth rate (CAGR) as high as 43% between 2023 and 2030.

Expansion of hyperscale facilities could push consumption from 382 twh in 2023 to 970 twh by 2030 and up to 3,550 twh by 2050 in the "high adoption" deployment scenario.

REFERENCES

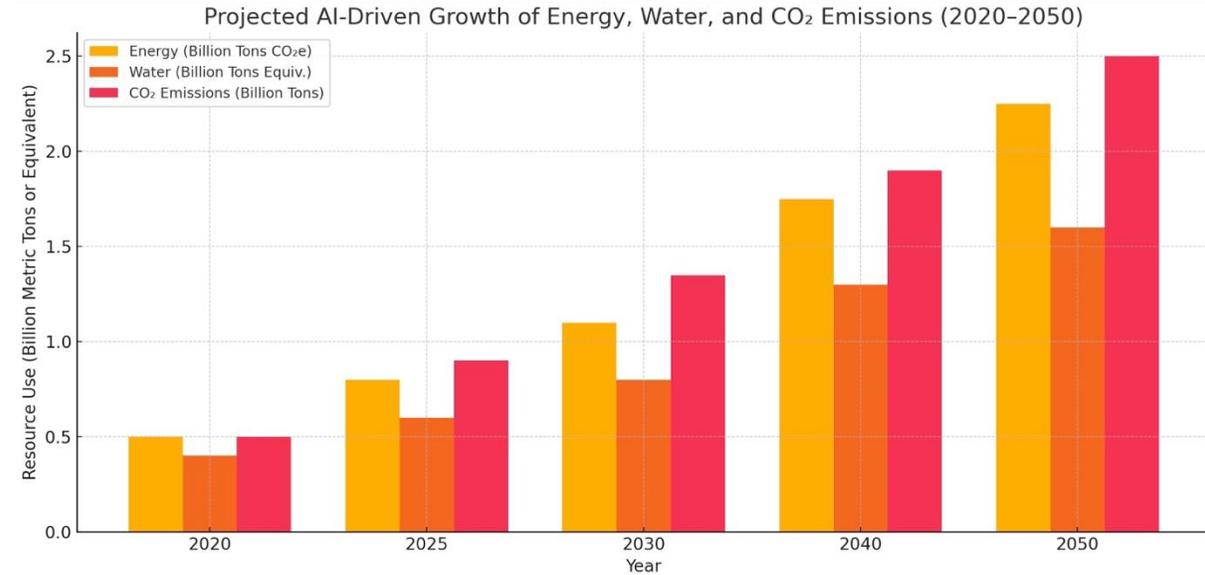
<https://www.iea.org/reports/electricity-2024/executive-summary>

<https://solarimpulse.com/news/ai-data-centres-and-their-expanding-impact-on-the-environment>

<https://www.foodandwaterwatch.org/2025/04/09/artificial-intelligence-water-climate/#:~:text=By%20one%20projection%2C%20AI%20server,needs%20of%2018.5%20million%20households.&text=Check%20out%20our%20so%20and,Water%20Footprints%20Threaten%20Climate%20Progress.>

[https://unesdoc.unesco.org/ark:/48223/pf0000372876#:~:text=The%20rate%20of%20greenhouse%20gas,WWC/OECD%2C%202015\).](https://unesdoc.unesco.org/ark:/48223/pf0000372876#:~:text=The%20rate%20of%20greenhouse%20gas,WWC/OECD%2C%202015).)

<https://static1.squarespace.com/static/5877e86f9de4bb8bce72105c/t/67ab1779a68f9a35968e51f9/1739265952473/GEI+data+centers+report+-1.15.2025+clean-E.4.pdf>



Root Causes of Increase Due to AI

Energy Water and Carbon Growth Metrics

- **Energy growth:**

- Data centers' electricity consumption in 2026 is projected to reach 1,000 terawatts, roughly Japan's total consumption

- **Global primary energy demand** projected to grow **+16% to +57%** by 2050.
 - **Electricity demand** projected to increase **+33% to +75%** globally.

- AI-Driven Growth:

- *Data center electricity use may **double by late 2020s**.*
 - *The IEA projects usage to reach **1,000+ terawatts by 2026** (\approx Japan's total electricity use).*

- **Water growth:**

- *Global water use expected to rise **+20% to +50%** by 2050.*

- AI-Driven Growth:

- *AI Servers in the US could use **720B gallons/year by 2028** — enough for **18.5M households**.*

- **Carbon growth:**

- **Global CO2 emissions could increase to some 43.08 billion metric tons in 2050. US. Energy Info Admin projects 41.0 billion tons in 2050.**

- AI-Driven Growth:

- **Tech companies' indirect emissions have surged due to data centers powering AI. For example, between 2020 and 2023, Amazon's operational carbon emissions increased by 182%, Microsoft's by 155%, Meta's by 145%, and Alphabet's by 138%.**

WORKING GROUP PRESENTATIONS

WILL CALL EACH WORKING GROUP LEAD UP TO PRESENT THEIR FINDINGS AND ACTION PLANS FOR THE DAY

- Strategy & Governance
- Data and Responsible AI
- Infrastructure
- Solutions Architecture
- Security / Risk & Compliance
- Metrics and Green-Ops

