ABU DHABI SUSTAINABILITY WEEK

WORLD FUTURE ENERGY SUMMIT

ADSW ADVISORY COMMITTEE INSIGHTS REPORT

# AI AND TECHNOLOGY

2025

Hosted by MASDAR

Built by RX
In the business of building businesses

# Contents

# Foreword

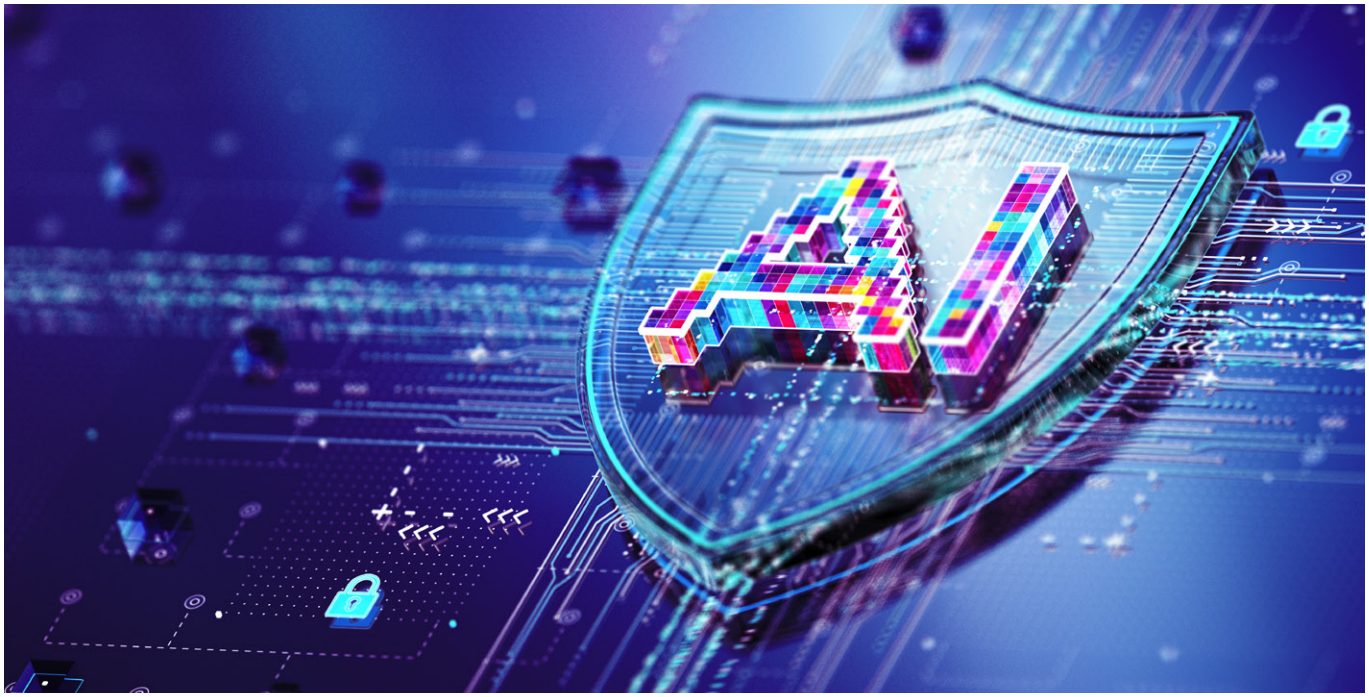
2025 has emerged as a pivotal year for artificial intelligence (AI) in the context of sustainable development. Over the past year, breakthroughs in AI have captured global attention with their promise to deliver rapid progress on net-zero, more efficient healthcare, smart city ambitions, and a host of other interconnected sustainability goals.

However, enthusiasm for AI's development is often tempered by lingering concerns about its downsides. Unethical usage, a lack of inclusivity, and even the carbon footprint of the technology itself has come under the microscope. While eager to put this technological marvel to work, both policymakers and practitioners have plenty of hurdles to navigate to ensure that it is deployed to the best possible effect, not just with the best of intentions.

How will stakeholders across governance, industry, commerce, academia, and dedicated sustainability sectors find a way through the complexities of next-generation AI? Most importantly, what is needed to ensure that emerging technologies genuinely help achieve climate targets and inclusive development, rather than derail or delay progress? Abu Dhabi Sustainability Week (ADSW) – hosted by Masdar – recognizes the critical importance of collaboration at every level and embracing innovation responsibly. Every player, from utilities and city planners to tech entrepreneurs and health providers, has a role in steering AI's evolution toward the public good.

Each year, ADSW convenes a series of Advisory Committees on key sustainability topics. These sessions gather leaders from across business, academia, government, and civil society for open, forward-looking dialogue on what is happening on the ground and what should happen next. In 2025, the ADSW Advisory Committee on AI & Technology brought together experts from around the world to discuss how digital innovation can drive sustainable development.

This insights report addresses the committee's candid discussions, separating them into key themes and observations spanning energy and infrastructure, environmental protection, health and biotechnology, smart cities, the sustainability of AI itself, and governance and inclusion in the AI era. Each section highlights real-world examples and expert perspectives on the opportunities and obstacles at hand. Collectively, these insights provide a snapshot of how AI is reshaping global sustainability efforts in 2025 – and what steps are needed to ensure these technologies deliver on their potential to create a more sustainable, equitable future for all.



## Energy, Infrastructure, and Grid Optimization

AI is becoming an indispensable tool in managing energy systems and critical infrastructure. "We're just scratching the surface of what is possible," shared one committee member. Despite only being at the beginning of their AI journey, that member outlined how AI had already delivered $500 million of net value from integrating AI solutions across their organization's value chain, while also being responsible for removing a million tonnes of CO2 emissions from its carbon footprint. This is one of many examples that AI has firmly moved from theories and pilot programs to fully implementable applications suitable for even the most complex industrial operations.

One area where AI is proving its worth is in balancing the supply/demand/storage equation for renewable energy production. The committee noted that smart grids powered by AI are better at matching supply with demand in real time, which is becoming increasingly valuable as electric grids incorporate more renewable sources and face dynamic demand patterns. In regions with emerging renewable capacity, AI-driven grid management can help save on infrastructure costs by increasing the utilization of existing power lines rather than building new ones. Using AI to increase the capacity of constrained grids (for instance, by dynamically rerouting power flows or optimizing voltage) can defer costly infrastructure upgrades, effectively "managing demand, not just adding more supply."

> **AI is already proving invaluable for managing grids by gaining a better understanding of demand patterns. It's a huge data issue, and AI is finally giving us the ability to not just respond to demand, but actively predict it. It's like anything else, if you see the whole problem, you can deal with it better. AI is giving us the flexibility to see demand flows in real time and respond in the most efficient and sustainable way.**

Beyond power grids, AI is optimizing other infrastructure systems such as water and transport. Utilities are deploying predictive analytics to anticipate equipment failures in power plants and pipelines, enabling predictive maintenance that prevents breakdowns before they happen. With water utilities, pumps and treatment facilities can be scheduled to run when renewable energy is plentiful (such as midday solar peaks), acting as a form of energy storage by timing energy-intensive tasks to coincide with green power availability. The broader vision is an AI-orchestrated infrastructure where electricity, water, and transportation demand are intelligently aligned to consistently use only clean energy supply. "Follow-the-sun" computing was one approach under discussion – shifting non-urgent data center workloads across time zones to locations where solar or wind power is currently abundant. Because data can travel globally almost instantaneously, a task could be processed in a region where the sun is shining and later handed off to another region at sunset. Such concepts underscore AI's potential to maximize the use of renewable energy on a planetary scale.

However, technology alone won't solve energy challenges without human oversight and strategic intent. AI can provide decision-makers with options and optimal parameters, but humans must set the objectives – for example, prioritizing emissions reduction or resilience – and make the final calls when trade-offs arise. Moreover, massive deployment of sensors and IoT devices in infrastructure yields torrents of data, and cities or utilities "need to invest not just in sensors and networks," said one committee member, "but in analytic capacity and skills" to interpret this data effectively.

## Environmental Monitoring and Climate Resilience

From climate change to biodiversity loss, environmental challenges are so complex that tackling them demands new levels of data analysis and predictive capability. AI is increasingly critical in monitoring environmental conditions, modeling future scenarios, and guiding climate resilience strategies.

AI has enabled exceptional accuracy for a new climate modeling and weather forecasting project being developed by G42 and NVIDIA[1]. With the ability to analyze over 100 petabytes (equivalent to 100 million gigabytes) of data, the AI-empowered solution can accurately gauge weather conditions down to an area as small as a single square meter. This short-term weather forecasting is of invaluable aid to farmers and smart agriculture planners; armed with accurate, predictive knowledge of weather conditions they can make the best decisions on crop choices, yield expectations, maintenance procedures, direct interventions, and more.

The longer-term insights unlocked by AI in this space may be of even greater value. The growing range of AI-based solutions can model climate risk, an essential consideration for stakeholders as diverse as smart city planners, emergency response agencies, real estate groups, insurance firms, and countless others. Gaining a clearer understanding of climate-related risks can allow such stakeholders to implement appropriate safeguards and solutions before disaster strikes, price their services and assets more effectively, and generally mitigate said risk rather than waiting for the damage to occur. The heightened capabilities of AI in this area brings the added bonus of prompting action on climate resilience. "If people understand the true extent of the risk they face, they'll be more willing to invest resources to lessen it," one committee member theorized.

> **AI isn't limited to the carbon emissions space; it is now plugged into the wider sustainability industry. A lot of climate risk analytics platforms are now quantifying what is the financial value of the risk that you might be facing, such as rising sea levels or the chance of flooding across a certain time horizon. The really sophisticated solutions can tell you the minimum, the mean, and the maximum expected financial exposure your asset will face from a specific climate risk.**

AI-driven early warning is making communities safer against floods, storms, and droughts. By training models on decades of hydrological data and weather forecasts, for example, scientists have dramatically improved flood prediction accuracy for vulnerable regions. Equally, understanding the extent and likelihood of flooding allows communities to develop the appropriate infrastructure to protect themselves. A large-scale drainage system might cost $3 million or $30 million – by understanding the risk and choosing a suitable solution, companies and communities can give themselves adequate protection while saving millions of dollars.

However, AI still faces challenges with models that are only as good as the data and assumptions fed to them. Technology must augment human intelligence, not replace it. When it comes to climate resilience, AI should empower local communities and planners with better information, while local knowledge and leadership guide the ultimate response.

## Health, Wellbeing, and Biotech

AI's influence extends deeply into health and biotechnology, areas the committee identified as both high-impact and sensitive. Health and wellbeing are pillars of sustainable development – a society cannot thrive if its people are unhealthy. In recent years, AI-driven tools have shown they can dramatically improve medical diagnosis, personalize treatments, and make healthcare delivery more efficient.

During the session, participants from the healthcare sector shared how AI is enabling "humanized healthcare provision" that also reduces environmental impact. For example, telemedicine platforms powered by AI triage systems allow patients to receive consultations and monitoring remotely. Ada Health's AI-powered platform uses AI to assess user-reported symptoms and generate personalized health assessments, recommending next steps like self-care or medical attention.[2] In clinical settings, Ada's technology has improved patient pathways, increasing primary care selection by 77% and reducing uncertainty by 66% at CUF, Portugal's largest healthcare network. Platforms like these not only make healthcare more accessible but also cut down on unnecessary hospital visits, thereby reducing the carbon footprint associated with travel and large hospital facilities. By leveraging digital health apps and remote monitoring, one committee member's organization aims to lower the resource consumption of the health system – less energy usage in hospitals and clinics and less strain on staff – while improving patient outcomes. In essence, smarter healthcare can be greener healthcare.

> **AI is the driving force behind humanized healthcare provisions. This is the epitome of "prevention is better than cure" If we can gain a comprehensive understanding of an individual's health through AI and treat them proactively, that will stop more serious problems developing. This produces better outcomes for the individual, and everyone else because it lessens the pressure on the healthcare system.**

AI is also accelerating medical research and biotech innovation. Machine learning algorithms are being used to scan through vast datasets of chemical compounds and genomic information to identify potential new drugs or therapies faster than traditional methods. A striking example is in medical imaging: AI models can analyze X-rays, MRIs, or CT scans to assist doctors in detecting diseases like cancers or neurological conditions earlier and more accurately. The committee cited research where AI systems trained on thousands of imaging scans were able to help clinicians diagnose conditions in a fraction of the time a doctor would require.[4]

This kind of AI-augmented diagnosis can save lives by catching illnesses sooner and can reduce costs by avoiding unnecessary procedures. Likewise, in biotechnology, AI techniques have revolutionized protein folding predictions, which aids in drug discovery and in designing enzymes for industrial processes. These innovations hint at solutions for some environmental problems emerging from biotech labs, where AI plays a key role.

Despite these promising developments, there is a need for responsibility and equity in health AI. Medical AI systems must be rigorously validated to ensure they are safe and effective – a flawed algorithm in healthcare can have life-or-death consequences. The risk of AI models inadvertently reflecting biases is real. For instance, if training data under-represents certain ethnic groups or genders, diagnoses for those populations might be less accurate. Therefore, transparency and diversity in medical AI development are crucial to avoid widening health disparities.

## Sustainable Urban Design and Smart Cities

When it comes to sustainable cities, examples abound of cities using AI to optimize traffic light timing, manage public transit routes based on real-time data, or control building heating/cooling systems for maximum energy efficiency. However, technology should serve people and the planet, not the other way around. Emerging AI tools are best used to guide urban planners towards outcomes that enhance the liveability and enjoyment of a city, rather than ignoring the human context for the sake of pure efficiency alone.

Data-driven approaches such as digital twins of cities, virtual models continuously fed with real-time sensor data on everything from traffic flow to air quality to energy use, are moving smart city concepts from buzzword to tangible results. A city can pre-emptively adjust operations (like diverting traffic from a flooded road or ramping up cooling in a heatwave) to improve resilience and efficiency.

Yet, "smartness" is not measured by the number of sensors and gadgets deployed, but by the quality-of-life improvements the system produces. Some past smart city initiatives have chased flashy innovations without a coherent vision of how they make life better for citizens. Human-centric design must remain at the core of innovation, a concept echoed across several ADSW Advisory Committees. "You have to ask: does this AI system or technology address a real user need? Does it make the city more liveable, equitable, and sustainable for its residents?" said one committee member. This emphasizes how public adoption is the linchpin of success. Co-designing solutions with community input, pilot-testing them in diverse neighborhoods, and ensuring accessibility for all ages and abilities were recommended to keep smart city efforts grounded in peoples' real experiences.

AI also has a role to play in integrating nature and cultural context into urban design, allowing forward-looking cities to blend technology with green spaces and respect for local heritage. AI algorithms can identify where to plant urban forests for the best cooling effect, or how to design public spaces that encourage walking and social connection.

AI can support the conservation of the "DNA" of traditional architecture and urban layouts. Abu Dhabi, for example, uses AI platforms to marry traditional wisdom with modern digital optimizations, allowing for the urban environment to be both cutting-edge and rooted in its unique heritage. Masdar City, a key urban development project in Abu Dhabi, incorporates AI in its infrastructure to create a sustainable, smart city. AI is used to optimize energy use, monitor traffic, and manage waste, while the city's layout and architectural design are rooted in traditional Arabic principles like wind towers (known as barjeels) and shaded courtyards, blending modern efficiency with cultural heritage.

Another notable project is BiodiverCity in Penang, Malaysia, designed by Bjarke Ingels Group.[5] This development aims to transform mudflats into eco-friendly islands, featuring mixed-use developments, cultural venues, and recreational areas. The design incorporates traditional local architecture and sustainable practices, including renewable energy sources and resilient infrastructure adaptable to climate change.

> **New isn't always better; we don't want to tear down a city's heritage and replace it with something unrecognizable in the name of progress. Besides, Abu Dhabi has architectural styles and features from the 70s that are much more sustainable than some modern buildings. You cannot leave culture out of the picture – work with it to preserve a city's identity while improving its sustainability.**

Achieving better smart city design and tangible outcomes through AI requires cross-sector collaboration (urban planners with technologists with community leaders) and an emphasis on governance. Cities can use AI to become not just "smarter" in the technical sense, but greener, more liveable, and more inclusive, without trampling on the past.

## AI Model Efficiency and Data Center Sustainability

The environmental footprint of AI itself cannot be ignored – specifically the energy and resources consumed by the vast data centers and computation power needed. AI can improve efficiency in a host of ways that contribute to decarbonizing energy systems, but training a single cutting-edge AI model can emit as much carbon as multiple cars do in a year.

The rise of AI has led to exploding demand for computing power. From training complex neural networks to running millions of AI-driven services and devices, data centers around the world are working overtime. These server farms require enormous amounts of electricity and cooling. By some estimates, data centers (as a sector) already account for about 1%–2% of global electricity use, and this share could double within a decade if efficiency doesn't keep pace with demand.[3]

> **"No matter how much you optimize the model or how well the code is written, data centers writ large for both cloud and AI consume an increasing amount of energy. The problem is that the data center industry globally is very averse to change; there is a massive amount of institutional inertia around the types of cooling systems that are used. This problem of exponential energy consumption is getting worse, and we need radical change to solve it."**

Both industry and researchers are intensely focused on greening AI. In addition to improving the energy efficiency of AI models and hardware, companies are exploring ways to run data centres on 100% renewable energy by moving workloads to follow the sun or wind. Major cloud providers are already investing heavily in renewable energy projects to power their facilities, and some data centers in regions like the Nordics use free cooling from the cold climate and clean hydroelectric power to minimize their footprint.[4]

The UAE has abundant solar energy and is building large solar farms coupled with battery storage. If AI data centers tap into these, they can operate with near-zero carbon emissions. The ability to use renewable energy as a baseload for round-the-clock clean energy solutions is exemplified by a Masdar-led initiative aiming to guarantee constant clean energy via solar and BESS that could be a game-changer for running critical AI systems without fossil fuel backup.

Beyond power sources, designing smarter data centers is key. New facilities are being engineered with AI systems that manage cooling and airflow far more precisely, cutting down on wasted electricity. Data center builders now consider efficiency metrics (like Power Usage Effectiveness, PUE) as essential guides for long-term operational viability.[6] AI solutions can help in these efforts by dynamically adjusting cooling systems, predicting server loads, and even scheduling intensive tasks for cooler nights or weekends. Essentially, data centers are using AI to optimize themselves.

However, transparency is needed: companies and AI developers should disclose the energy and carbon cost of their models. This could drive competition to build more efficient models and inform policymakers in crafting incentives or regulations for sustainable computing. As AI scales up globally, it must also scale up sustainably. The future of AI innovation should be as much about breakthroughs in efficiency and green energy integration as it is about model accuracy.

# Key Takeaways

**AI is an enabler, not an end goal:** AI is a powerful means to accelerate sustainability solutions – from cutting energy waste to improving health outcomes – but it must be guided by clear human-defined goals. Technology deployments should focus on solving real problems rather than adopting AI for AI's sake. Human oversight, strategic vision, and multidisciplinary collaboration are essential to convert AI's promise into tangible progress.

**Transform energy systems:** AI can significantly enhance the efficiency and reliability of energy and infrastructure networks. Smart grid algorithms can accurately predict and then balance electricity supply and demand in real time, integrate renewables, and reduce the need for constructing new power plants. Investment in digital infrastructure and skills is recommended, so that utilities can harness data for grid optimization and predictive maintenance. Sharing data and best practices across regions will amplify these benefits, helping even constrained grids deliver more capacity sustainably.

**Boost climate resilience:** Advanced AI analytics enable better monitoring and analysis of environmental threats, leading to more effective climate action. From early warning systems for disasters to AI-assisted ecosystem restoration, these tools help anticipate risks and target interventions. By understanding climate risks, all stakeholders have the clarity needed to develop appropriate solutions and safeguards in a timely manner.

**Revolutionize healthcare:** AI is driving breakthroughs in humanized healthcare provision, leading to better outcomes with fewer resources. Telehealth and AI diagnostics can expand care access while cutting the carbon footprint of healthcare systems overall. However, rigorous validation and equity must underpin health AI deployment. More international collaboration is needed to ensure that developing regions benefit from AI healthcare advances, and standards must be established (or even regulatory approval processes) for high-stakes AI medical tools to ensure they are safe, effective, and unbiased.

**Design and build human-centric smart cities:** Sustainable smart cities must keep people and nature at the heart of the design discussion. AI can enhance urban mobility, reduce congestion and pollution, and improve city services through data-driven management, but cities should define clear objectives (like accessibility, safety, and low emissions) and measure AI projects against those metrics. Citizen engagement is key: urban innovations should be co-created with the communities they serve, allowing them to voice their concerns, preserve their heritage, and improve liveability levels.

**Improve data centres for greener AI:** As AI workloads grow, so does the energy consumption of data centers. Energy-efficient AI models and green data centers through increased R&D in AI optimization techniques, using renewable energy and sustainable cooling methodologies, and greater transparency from AI firms about the carbon footprint of training and running AI models.

## About the ADSW Advisory Committees

The committees are designed to foster candid discussions that break down silos between sectors and regions. Participants include CEOs and senior executives of international companies, government policymakers, leading researchers, and technology innovators. This diversity ensures a wide range of perspectives. In closed-door sessions, members share insights, highlight key challenges, and propose actionable solutions and areas for collaboration. Discussions are held under the Chatham House Rule, allowing participants to speak openly about successes and setbacks, learn from one another, and identify common ground. The dialogue is intentionally forward-looking and focused on practical outcomes.

Insights from the committees help shape ADSW's content, direction, and related initiatives. Recommendations are distilled into official reports such as this one and shared with a broader audience to inspire continued dialogue and action. These findings often inform the agendas of ADSW summits, panels, and workshops, and may guide Masdar and its partners in developing new initiatives or advancing policy advocacy aligned with the committee's conclusions. In past years, the committees have contributed to meaningful outcomes, from catalyzing cross-border partnerships to introducing new topics into global forums such as the World Future Energy Summit.

# Advisory Committee Members

**Albarah El-Khani**
Senior Director of Operations
M42

**Anand Verma**
Founder and CEO
ExpectAI

**Biren Gandhi**
Executive Partner & Global Industry CoE Leader-Energy, Environment & Utilities
IBM

**Chris Cooper**
Executive Advisor, Group Digital & Cybersecurity, Group Digital & Cybersecurity
ADNOC

**Fan Zhu**
CTO
G42

**Hans Jessen**
Senior Advisor, AI
ADNOC

**Hosni Ghedira**
Director of Research Engagement
MBZUAI

**Ibraheem Almansouri**
Director, Engineering
Masdar

**Leena AlOlaimy**
Founder & CEO
Symbaiosys

**Magda Davila**
CEO Middle East
Clarity AI

**Marco Sosa**
Associate Professor
Zayed University

**Mehdi Ajana**
Senior Manager - Venture Building % VentureOne

**Naoufel Werghi**
Professor of Computer Science
Khalifa University

**Oussama Rami**
Senior Project Manager for AI and Data Transformation
UAE Ministry of Education

**Trenton Thornock**
Founder | CEO
Prometheus Hyperscale

**Xiaodong Zhou**
Chief Technology Officer
Presight

## Meeting Co-Chairs

**Valerie Peyre**
Director, Abu Dhabi Sustainability Week
Masdar

**Oisin Commane**
Head, Thought Leadership and Programing ADSW
Masdar

ABU DHABI SUSTAINABILITY WEEK

### About Abu Dhabi Sustainability Week

Abu Dhabi Sustainability Week (ADSW) is a global platform supported by the UAE and its clean energy leader, Masdar, to address the world's most pressing sustainability challenges through crucial conversations accelerating responsible development and fostering inclusive economic, social and environmental progress.

For more than 15 years, ADSW has convened decision-makers from governments, the private sector and civil society to advance the global sustainability agenda through dialogue, cross-sector collaboration and impactful solutions. Throughout the year, ADSW conversations and initiatives facilitate knowledge sharing and collective action that will ensure a sustainable world for future generations.

abudhabisustainabilityweek.com

WORLD FUTURE ENERGY SUMMIT

### About the World Future Energy Summit

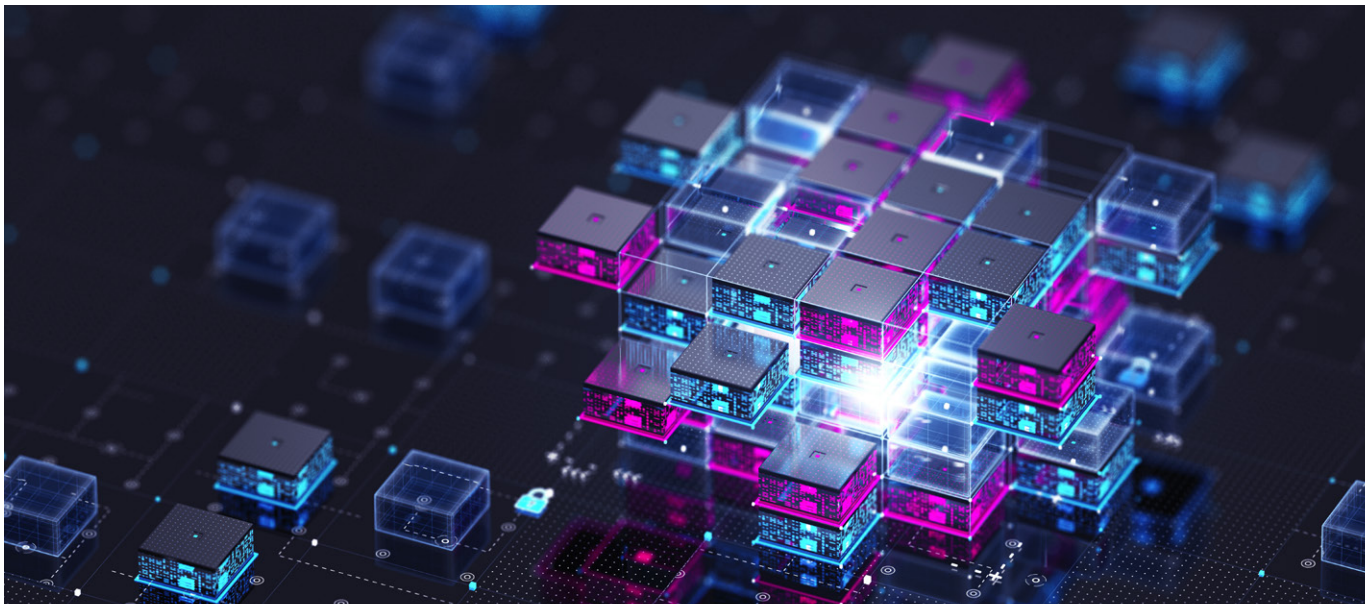
The World Future Energy Summit is the leading global event for clean energy and sustainability, bringing together innovators, business leaders, policymakers, and investors to turn ambition into action.

Over three days, the international exhibition and conference addresses the most pressing challenges of our time—clean energy, climate change, sustainable cities, water security, waste management, green finance, and the transformative power of artificial intelligence.

By uniting almost 42,000 attendees from public, private, and non-profit sectors, it serves as a critical bridge between bold policy and real-world solutions.

worldfutureenergysummit.com

@worldfutureenergysummit



## References


[1] G42, G42 Collaborates with NVIDIA to Deliver Next-Generation Climate Solutions Using Earth-2, 20/9/2024
https://www.g42.ai/resources/news/g42-collaborates-nvidia-deliver-next-generation-climate-solutions-using-earth-2
[2] National Library of Medicine, Artificial intelligence in disease diagnosis: a systematic literature review, synthesizing framework and future research agenda, 13/01/2022
https://pmc.ncbi.nlm.nih.gov/articles/PMC8754556/
[3] IEA, What the data centre and AI boom could mean for the energy sector, 18/10/2024
https://www.iea.org/commentaries/what-the-data-centre-and-ai-boom-could-mean-for-the-energy-sector
[4] Forbes, What Can Be Done About Power-Hungry And Thirsty Data Centers? 13/09/2024
https://www.forbes.com/sites/jamiehailstone/2024/09/13/what-can-be-done-about-power-hungry-and-thirsty-data-centers/
[5] Architectural Digest, How Bjarke Ingels Group Will Redesign Malaysian Islands for an Eco-Friendly Future 15/09/2020
https://www.architecturaldigest.com/story/bjarke-ingels-group-redesign-malaysian-islands-eco-friendly-future?utm_source=chatgpt.com
[6] The Economist, Data centres improved greatly in energy efficiency as they grew massively larger, 29/07/2024
https://www.economist.com/technology-quarterly/2024/01/29/data-centres-improved-greatly-in-energy-efficiency-as-they-grew-massively-larger