ABU DHABI SUSTAINABILITY WEEK

WORLD FUTURE ENERGY SUMMIT

ADSW ADVISORY COMMITTEE INSIGHTS REPORT

ENERGY

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Contents

Foreword

2025 has already seen accelerating progress across several technological fronts that will determine whether the world can make a timely pivot towards clean energy. Technical advances, combined with falling renewable energy costs, are strengthening the business case for rapid decarbonization and investment in cleaner solutions across legacy energy sectors.

While this momentum can be portrayed as leading to inevitable success, significant hurdles remain. Trade dynamics and tariff adjustments spell trouble for low-carbon sectors that rely on the steady flow of specific materials and technologies. Uncertainty in politics and international partnerships frequently translates into hesitancy in, greenlighting new projects. AI, advancing daily in terms of its technical capabilities, is still throwing out as many questions as answers regarding its future impact on carbon emissions.

With so much change in the air, how are government institutions, clean energy developers, financiers and technology providers navigating the current landscape? What are their main priorities for the coming year and the rest of the decade? What challenges keep them up at night? Most importantly, what in their opinion needs to happen to ensure that progress on clean energy stays on track? Masdar, host of Abu Dhabi Sustainability Week (ADSW), believes that the transformation of global energy systems towards a truly sustainable global economy can only occur within a viable timeframe if we collaborate at every level. Every stakeholder from every major industry has a role to play and invaluable perspectives to contribute.

Each year, Masdar hosts a series of ADSW Advisory Committees on a series of sustainability topics. These sessions are designed to gather leaders from the most internationally respected organizations across the business, academic and public service spheres, and engage in open, transparent discussion about what they are doing, what they are currently witnessing in their industry, and what they want to see happen next.

This report analyzes one of nine ADSW Advisory Committee meetings held in 2025. Each section is dedicated to a specific trend affecting the energy transition, complete with first-hand experience and expert analysis from the advisory committee members. Collectively, these insights serve as a snapshot of where the Middle East region, and the wider world, is positioned regarding efforts to create a clean energy future.

Optimizing Grids for Clean Energy

Despite rapid growth in renewable energy capacity worldwide, grid management remains a primary concern. "It's not like the old days when utilities sat back and relied on standard connections. Production is changing, and they have to change with it. They must be equipped to manage base loads ramping up and down very quickly," the committee noted.

Variance of output from renewables, whether it's wind, solar, or otherwise, remains one of the biggest challenges to building a reliable clean energy system. Members pointed towards countries such as Ireland and Poland, where an overabundance of wind at peak production times can lead to negative energy prices, causing consternation for their operators and leading to the unenviable position of "wasting" renewable energy due to a misalignment of supply and demand factors.

Storage builds confidence

Better storage is the obvious solution, and significant advances have been made in utility-level batteries, molten salt storage, and other smaller, more modular storage solutions. For batteries in particular, technical advances are still going hand-in-hand with declining costs – up to 40% lower (2024-2025) in some cases.

Committee members claimed that the arrival of "very commercially competitive batteries" will be critical in the short-to-mid-term for balancing the grid, but in the long term they will need to be supported by other storage solutions suitable for the necessary upscaling of grids to reliably accommodate the intermittency factor involved in an energy mix dominated by renewables.

However, "balance" was the key recurring word from this committee session. The committee emphasized the importance of prioritizing demand-side management alongside storage improvements as key to balancing the grid. Normalizing demand with more effective forecasting, monitoring, and where appropriate, creative pricing strategies should be a priority for countries looking to maximize the efficacy of their renewables. Ultimately a more flexible energy infrastructure setup is needed to ensure that pricing remains fair without forcing counterintuitive scenarios where profit motive outweighs sustainability considerations.

As an example of the out-of-the-box thinking that is needed to make renewables a more flexible fit for existing grids, committee members pointed out instances where bitcoin mining is being employed to utilize excess clean energy that would otherwise be wasted during peak production. While bitcoin and other cryptocurrencies are frequently criticized for their energy intensive nature, this approach provides an alternative revenue stream when there are no buyers.

> **We're seeing such a strong penetration of renewables, but for lots of countries, intermittency and curtailment are a big issue. If peak production times are driving the price of renewable energy to zero or even negative, it undermines the business model. Efficient storage is needed to manage supply, but we also need to get more creative with normalizing demand.**

What's Powering Progress Beyond Wind and Solar?

While solar and wind grab most of the headlines, especially in the Middle East, the global shift to clean energy depends on a diverse mix of production methods and novel approaches to reduce emissions.

The nuclear option

The role of nuclear remains unclear, with some countries ramping up production and others veering away from it entirely. One prominent example cited by the committee is how the Spanish phase-out of nuclear energy (which accounts for 20% of the country's energy production) is still proceeding despite urgent calls to reconsider the strategy.[1]

More broadly, social pressures in several leading economies are causing hesitancy regarding the commissioning of new nuclear projects, while pushing for the decommission of existing plants. However, there is still appetite for nuclear power in both mature and developing economies. 63 reactors are in construction around the world, which the International Energy Agency (IEA) claims will contribute over 70GW of capacity.[2]

The committee highlighted the growing potential of Small Modular Reactors (SMRs), noting their increasing flexibility and reliability as a key factor in nuclear's future. For developing economies, the possibility of SMRs represents a viable route to bringing nuclear capacity online quickly, where they might balk at the upfront costs and timelines of traditional projects. For nations looking to leapfrog coal and heavy fuel oils, SMRs are of growing interest, even if the global consensus on their viability is still developing.

Waste-to-energy slowly gains ground

On the waste-to-energy (WTE) front, the price pressures involved have not changed significantly in the past year. WTE remains expensive, especially compared to utilizing landfill, while its energy generation capabilities are not significant enough to make them attractive compared to clean energy alternatives. However, for countries who are finding the societal costs of landfill too high WTE is an attractive way for municipalities to avoid "wasting their waste."

Sustainable fuels earmarked for faster progress

Developments in the production of Sustainable Aviation Fuel (SAF), maritime fuels, and more sustainable land transport fuels have also gained more attention this year. General policy support has increased, and specific mechanisms have been implemented to encourage the development of more sustainable fuels as a concrete means of tackling emissions.

> **"Turning off nuclear [in Spain] is going to kill 20% of energy production. That's highly stable production, which needs to be replaced with renewables. This makes the need for more reliable storage even greater. That pressure could spur the maturity of batteries and other storage technologies, but it's an example of how political decisions can override common sense approaches to very practical issues."**

Trade Tensions, Supply Risks, and the Case for Certainty

Continuing the theme of emerging challenges in clean energy deployment, the committee discussed the growing influence of global trade dynamics. Recent tariffs introduced by the USA and subsequent responses from China, Europe, and others, have underscored how quickly supply chain disruptions can emerge. Materials such as steel, critical minerals, and other advanced components are facing tighter availability as market participants adopt a wait-and-see approach.. Grid batteries are in for a particularly tough time, as the applicable 65% tariff could rise to more than 80% by next year.[3]

Such major interruptions to global supply chains, coupled with emerging price volatility, have slowed progress on some renewable energy projects. Longer decision-making and development cycles, an increase in stalled or cancelled projects, and instances of paused or withdrawn financing — all highlight how policy uncertainty could impose a broad range of real-world costs.

For committee members, this reinforces the need to improve the resiliency of existing supply chains and forge deeper partnerships that can go beyond the politics of the day. One thing is clear: clean energy projects thrive when demand signals from governments reinforce private sector confidence. On the flip side, a lack of clarity from the top is enough to create major supply chain disruptions and a reduction in available investment capital from both the public and private pools.

Potential supply constraints also strengthen the case for improving existing infrastructure . One member reiterated the importance of the COP28 goal of doubling efficiency by 2030; this is plausibly a more cost-effective way of tackling rising energy demand.

> **“We need clear demand signals from governments. They need to show they’re willing to commit to the clean energy transition all the way, or at least not get in the way. Still, there’s lots we can do to improve supply chain resiliency and make sure we’re prepared for whatever comes next, without being disrupted by a major political shift.”**

AI – An Evolving Role to Play

A recurring question in global energy discussions is whether AI can offset the energy it consumes. According to the committee, this may become a reality within the next few years, The seemingly eternal question asked of AI in the context of the global energy transformation is: can it pay for its own energy consumption?

Committee members agreed that AI may well be capable of doing just that in the next few years. Data centers were at the heart of the discussion; as the world's demand for AI surges, the demand for energy to power them grows almost exponentially. One contributor cited that the biggest planned centers may end up consuming the annual energy equivalent of 5 million US households. Such a vast increase in energy consumption also comes with a huge cooling bill, with a predicted 10 billion liters of water needed next year for this purpose.

Designing the future of energy

While steep, the costs attached to AI may soon be outweighed by the benefits it brings in the form of efficiency gains, comprehensive data analysis, and the novel insights arising from it. Committee participants were all keen to point out that AI will be needed to fuel the ambition and innovation needed to forge radically new global energy infrastructure. Upgrading the grid intelligently, rebalancing its supply and demand fairly, forming more efficient approaches to construction, maintenance and integration – AI's evolving capabilities will be essential for finding solutions for the biggest challenges.

Plugging in collectively

Electric vehicles were used as a specific example to illustrate the growing role of AI in new energy systems. As more EVs hit the road and are plugged in to be charged each night, they will form a steadily growing base of batteries that could be used as viable storage for surplus energy from the grid. However, reliably managing this highly complex supply/demand scenario will need AI assistance to create this potentially game-changing outcome.

Overall, the picture is changing rapidly. AI-enabled tools are now routinely being deployed for grid optimization efforts, with specific solutions excelling at forecasting, digital twinning, and life cycle management. AI is increasingly adept at finding new efficiencies and even its own data centers may soon become a viable source of district heating in the not-too-distant future, demonstrating the power of AI to fuel the clean energy transformation through circular economics alongside the rise of clean energy itself.

> **"As ever, it's impossible to put a definitive value on AI's role in energy transition. You can certainly avoid a lot of unnecessary CAPEX if you use AI tools correctly; it's tremendous for optimizing setups for different kinds of homes and industrial settings. Still, nobody can say with certainty how much AI might accelerate the transition overall – that's still crystal ball territory."**

Carbon Markets – Signs of Life at Last

COP29's long-awaited agreement on carbon markets has reignited interest in this promising yet problematic concept of commoditizing carbon abatement. Committee members believe that the idea should be viewed in a global context, with countries working together to create internationally recognized and standardized rules. However, the current reality is that formalizing carbon markets is still very much a piecemeal process with individual countries slowly formulating their own path, sometimes with tentative efforts to bring in close regional allies and trading partners.
Regardless, the committee's view is that carbon markets are finally ready to move towards more formal and widespread acceptance. While greenwashing fears still persist, the emergence of just a small number of carefully thought-out carbon market frameworks from individual countries should be enough to give the broader concept some much-needed momentum again.

Japan is a pioneer to watch

Eyes are turning towards Japan, as next year will see its voluntary carbon trading scheme GX-ETS become a compliance-based system. This means that all Japanese companies will eventually be required to stay within emissions limits and participate in allowance trading. GX-ETS is expected to become Asia's second-largest carbon market, with the Japanese government pledging $1 trillion over 10 years to help accelerate the country's transition to a low-carbon economy.[4]
Committee members noted that this provides an ideal opportunity for UAE companies to observe how Japanese businesses and investors prepare for the rules to change and apply the experience to their own carbon market context in the coming months.

Wider agreements and ambitions are needed

While country-specific experiences will no doubt provide plenty of useful insights, faster progress on developing multinational carbon markets is necessary for global decarbonization efforts. While the current political temperature might not be conducive to such talks, the issue will inevitably come into sharper focus later in the year as COP30 draws nearer.

Like last year, this will be the most important forum for building ambition and dialogue for multilateral agreements and standardized rules for carbon trading. The committee noted that clarity and consistency are needed on the issue more than ever, if there is to be any hope of turning carbon markets into a truly dynamic mechanism for unlocking vast new tranches of climate finance, rather than merely facilitating tokenistic ESG efforts.

> **Every country is slowly trying to create its own mechanisms on carbon markets but in the UAE at least, it's a market that's ready to explode. We still have to wait for the details to emerge from the government, but this has been a long time coming.**

Key Takeaways

Uncertainty is a killer: Whether we're talking about emerging technologies, new regulatory frameworks or just the politics of the day, uncertainty over market conditions and general business norms severely hampers the decision-making capabilities of clean energy stakeholders. At the very moment when stronger climate action is most needed, tightening financing conditions, unclear demand signals from governments, and investor hesitation risk slowing momentum behind large-scale clean energy projects.

Creative thinking is needed: Looking outside established industry norms and embracing innovative approaches is becoming a necessity rather than a choice. The committee highlighted the need to re-imagine global energy infrastructure is crucial to better accommodate flexible grids, AI-empowered demand management systems, improved energy storage solutions and the participation of billions of everyday end users in an integrated energy setup.

Carbon markets finally show promise: While the lack of progress on multinational, multilateral carbon markets is frustrating for many, the clear signs of political support from pioneering countries seem to signal the "beginning of the end" for its bleakest period. With renewed efforts and more clarity, carbon pricing and trading could finally start to live up to its enormous potential.

Efficiency matters more than ever: The COP28 target to triple renewable capacity is crucial to maintaining a viable timeline for an effective climate solution, but so is the goal to double efficiency levels. According to the committee, improving existing clean energy infrastructure may not have the same appeal in terms of generating news headlines (compared to announcements of new capacity installations), but they have the advantage of working with established, proven assets and a lower CAPEX requirement than a wholly new facility.

Build resilience wherever you can: Recent geopolitical developments have shown that the global energy landscape can change dramatically in no time at all. Committee members urge all clean energy stakeholders need to assess their own supply chains, key partnerships, and existing operational setups and look for ways to build greater resilience in the face of unpredictable market conditions.

About the ADSW Advisory Committees

Abu Dhabi Sustainability Week (ADSW) Advisory Committees serve as a platform for high-level dialogue and knowledge exchange on pressing sustainability topics. Convened by Masdar as part of the ADSW initiative, these committees bring together a diverse group of leaders and experts from business, government, academia, and civil society. Each committee focuses on a specific theme – such as smart cities and mobility, water, or, in this case energy – reflecting the complexity and interdependence of sustainable development challenges.

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.

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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.

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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.

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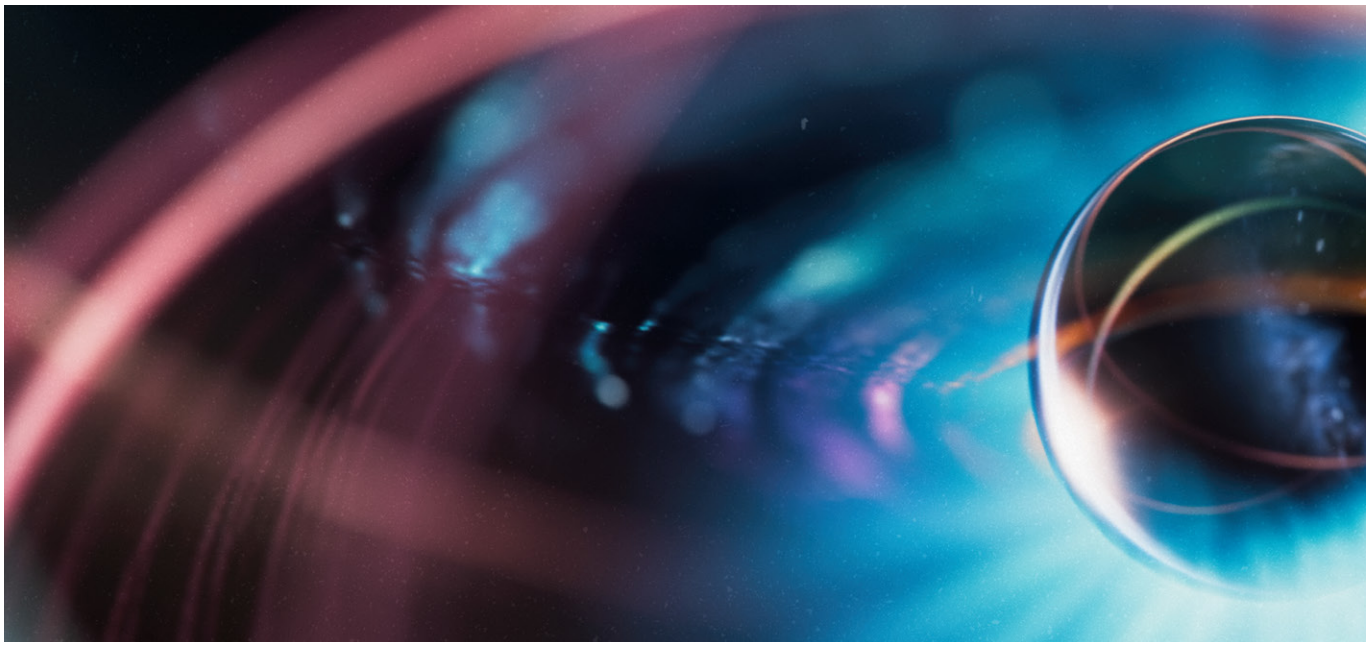

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