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Moving towards a reliable and secure energy transition

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EMERGING low-carbon fuels like hydrogen and ammonia need to be an integral part of South-East Asia's – and Malaysia's – phased roadmap towards net-zero, says Izumi Kai, CEO of Japanese power company JERA Asia.

Low-carbon solutions such as hydrogen, ammonia, and carbon capture and storage (CCS) are central to decarbonising thermal power and achieving net-zero goals. Low-carbon fuels or emerging technologies refer to fuels that produce lower net carbon dioxide (CO₂) emissions when burnt.

In recent years, hydrogen and ammonia have moved from concept to real-world application, said Kai.

While they are not yet practical at full scale, these novel energies are key as South-East Asian countries navigate the multiple pressures from rising energy demand and affordability concerns to building infrastructure and meeting climate goals, he said.

"The key is not to wait until everything is perfect. Jera is helping to build the foundation, so countries do not have to start from scratch when the time comes," he said, citing Jera's ammonia fuel substitution at its Hekinan Power Plant in Japan as an example. The plan there is to progressively



The Hekinan Power Plant in Japan. Jera's plan is to progressively increase ammonia substitution towards 100% for zero-emission power generation. – Photos: Jera Asia

increase ammonia substitution towards 100% zero-emission power generation.

Across the region, particularly in Singapore, new gas-fired projects are being designed to be hydrogen-ready from day one – a significant shift from five years ago, he said. Pilot projects for hydrogen value chain development are also underway in countries such as Thailand, Vietnam and Indonesia.

Jera has also conducted ammonia substitution feasibility studies and collaborated on ammonia cracking in the region.

"These early-stage initiatives

help build confidence, identify technical and regulatory requirements, and determine the next steps for pilots. They also guide eventual larger-scale deployment once policies, demand signals, and cost curves are in place," Kai added.

Ammonia, which has seen tangible progress in the power sector, is also a hydrogen carrier. And Malaysia has an advantage, said Amogy CEO Seonghoon Woo when met at the 2025 Singapore International Energy Week (SIEW 2025).

Amogy, founded in 2020, believes it has the technology to

finally unlock ammonia as a major fuel source.

"Malaysia, as well as Indonesia, is producing ammonia today as a fertiliser; the infrastructure dealing with the ammonia as a fuel and as fertiliser is the same, so that's the biggest advantage of using ammonia as a fuel."

Woo said that Malaysia also already has the storage and transportation infrastructure for ammonia.

"Of course, you need more of this infrastructure, because there will be more ammonia if you are using it for fuel. But at the same time you can piggyback on the existing infrastructure to quickly start ammonia as a fuel industry."

According to Woo, ammonia, as well as the other forms of clean energy like nuclear and renewables like solar, can be used together in the region's decarbonisation efforts.

Concurring, Kai said Malaysia's strong liquefied natural gas (LNG) capabilities are complementary to the low-carbon fuel value chain.

Malaysia can leverage LNG with renewables and low-carbon fuels to tailor its energy approach.

"Ultimately it is also important to recognise that there is no single solution for Asean. Malaysia, like each country in Asean, has different energy systems, policy struc-

tures and resource profiles."

Scaling up framework

What South-East Asian countries need to scale up novel energy technologies in the region are stronger regulatory framework, regional cooperation and blended finance mechanisms, said panelists in a roundtable discussion on the region's energy future at SIEW 2025.

While the region is also tapping into renewable energy, the use of novel energies like green hydrogen is especially relevant for sectors like steel because of their reliance on high temperatures, which can be reached only through burning fuels.

Cost remains a big barrier, said Beni Suryadi, senior manager for Asean Plan of Action for Energy Cooperation and Strategic Partnerships at the Asean Centre for Energy.

The use of green hydrogen, for one, is still costly, he pointed out.

However, Suryadi said the demand for this fuel is projected to grow significantly and it is becoming part of "realistic energy planning" among many countries in Asean.

One way to help the transition to clean energy technologies is through blended finance, said

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Kai: The key is not to wait until everything is perfect.

Kelvin Wong, managing director and global head of energy, renewables and infrastructure at DBS Bank

Blended finance initiatives that involve concessional capital with higher risk tolerance, such as governmental funding, could lower the barrier to entry for investors to get involved in such projects, he said.

While noting that clean ammonia is also still expensive, Woo is confident that moving forward the cost will decrease.

"Clean ammonia has not been cost-effective just yet because production has been limited.

"However, the trend right now, especially in the clean ammonia space, is that the green ammonia [produced using renewable energy] from India and China that is coming out very, very cheaply – much lower than from the other side of the world.



Woo: We believe the cost of clean ammonia will fall in five years.

"We see a lot more ammonia now simply because the demand for ammonia as a fuel is increasing, so the upstream production has been increasing as well. So even if it's expensive today, we believe it will become half of the price of today in the next five years."

For Jera, early alignment between public and private sectors to close the gap between policy ambition and market reality is crucial.

"In Malaysia, similar collaborations will be important. While next generation fuels and technologies such as CCS are long-term solutions, the country's most immediate need is to strengthen the LNG import infrastructure to meet rapidly growing energy demand, particularly electricity for data centres and industrial clusters.

"New regasification terminals

and hydrogen-ready gas-fired power plants will provide Malaysia with both immediate energy security and a credible pathway to low-carbon fuels in the future. Jera sees significant opportunities to contribute to these areas and is keen to explore partnerships in the country," said Kai.

Another key area is the development of talent for the energy sector.

"The energy transition is fundamentally about people, not just technology or infrastructure. Skilled professionals and technical expertise are essential for deploying emerging fuels safely and effectively, while ensuring the transition is reliable, secure, and sustainable.

"A private-sector initiative like Jera and Aboitiz Power's Global Technical Center of Excellence in the Philippines can foster collaboration with various stakeholders such as universities, government, and industry to develop talent for the energy sector. This model can be scaled regionally and expanded in the future to include emerging technologies," he said, underscoring the importance of developing local expertise and strong partnerships in the region.

Crucially, he noted: "South-East Asia's energy transition will be multi-speed and multi-pathway, reflecting each country's development stage, infrastructure readiness, and resource availability."