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ADIPEC

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ENERGY IN CONTEXT SERIES

DECARBONISING TODAY'S ENERGY SYSTEMS

CASE STUDY

Paving the path to
2050: Accelerating
e-NG adoption

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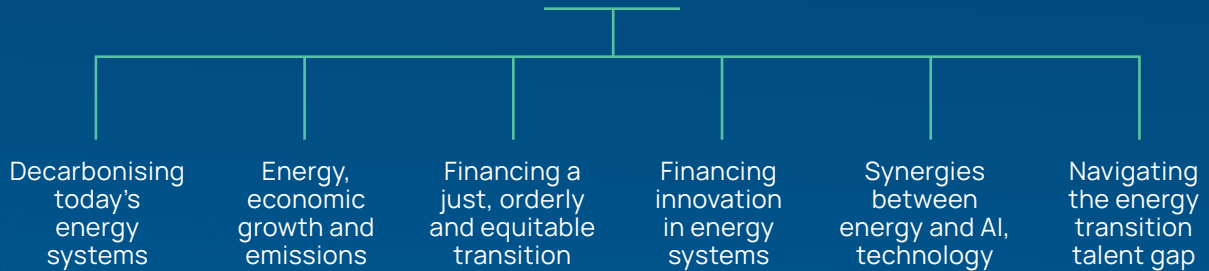
▶ WHAT IS THE ENERGY IN CONTEXT SERIES?

The transformation of the world's energy system offers a unique opportunity for economic growth, with the energy sector driving global advancement.

ADIPEC's **Energy in Context** series presents high-value briefs and case studies that showcase progress, foster dialogue and fast-track innovation to accelerate the energy transition.

The series explores key pillars driving the industry's transformative journey towards a secure, equitable, and sustainable energy future.

KEY PILLARS OF ADIPEC



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Paving the path to 2050: Accelerating e-NG adoption

CONTEXT

The year 2050 stands as a pivotal milestone for two crucial reasons: the global economy is projected to soar to US\$250 trillion, a significant leap from its current state of just over US\$100 trillion. Also, 2050 marks the target year for several countries to achieve net-zero emissions.

Balancing climate goals with economic growth necessitates investments and innovation in energy. A recent collaboration between Itochu Corporation and Tree Energy Solutions to develop electric natural gas (e-NG), a synthetic natural gas produced from renewable hydrogen and CO₂, demonstrates major opportunities to pursue energy growth without harming the environment.

ADVANCING GREEN ENERGY

Tree Energy Solutions (TES), a global leader in the production of electric natural gas (e-NG), has announced a strategic collaboration with Itochu Corporation, a Japanese general trading company. The partnership aims to develop innovative solutions for global decarbonisation of hard-to-abate sectors through e-NG, a green molecule created by combining green hydrogen with biogenic or recycled CO₂.

This collaboration explores various avenues of cooperation, including equity participation in TES's e-NG projects, the establishment of e-NG production and marketing ventures, and engagement in regulatory affairs to support the development and adoption of e-NG in key regions such as North America, Europe, and Japan. These cooperative activities

2.5 Mt

Amount of carbon emissions avoided annually by 2030 by use of e-NG⁵

96%

Percentage drop in carbon emissions, if fossil fuels are replaced by e-NG⁴

26%

Share of natural gas in the global energy mix by 2050⁶

5.36 Tcm

Global natural gas demand by 2050⁶

Organisations involved

- Tree Energy Solutions (TES)
- Itochu Corporation

Industry

Logistics, supply chain, heavy industry, energy

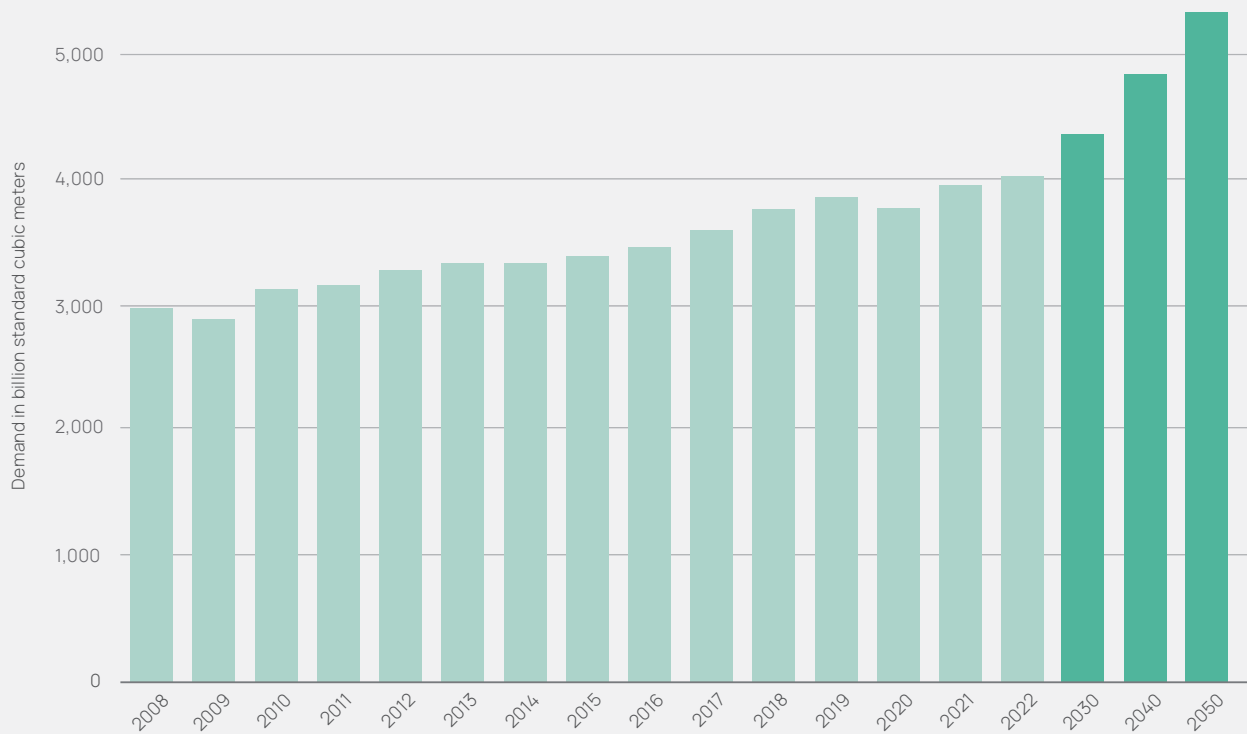
Location

Global with focus on North America, Europe, and Japan

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Global demand forecast for natural gas

Natural gas, a vital component of the global supply of energy, is expected to make up more than a quarter of the world's energy mix by 2050. The rise of e-NG will provide a viable sustainable alternative that helps mitigate the demand for natural gas and curbs emissions.



Source: Statista 2024 & GECF Global Gas Outlook 2050

intend to scale up e-NG production, which could replace fossil fuel in hard-to-abate sectors, including power, steel, cement, transportation and mobility, and ultimately power economic growth.

Additionally, the collaboration between the two companies entails potential long-term offtake agreements to supply e-NG to low-carbon fuel users mainly in Japan, exploring opportunities to produce and promote e-NG using CO₂ emissions from hard-to-abate sectors in North America.

e-NG stands out for several reasons. First, it is a sustainable fuel that can be transported and stored using existing infrastructure. Second, it can be produced at scale by combining green hydrogen with climate-neutral CO₂, making it a pragmatic solution for integrating renewable energy without requiring significant infrastructural changes.

This innovation offers hope for a swift transition to green energy and the decarbonisation of heavy industries, especially as the global demand for

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natural gas continues to grow. Over the past two decades, the global demand for natural gas nearly doubled, from 2.4 trillion cubic metres (Tcm) in 2000 to 4.1 Tcm in 2022. The trend is expected to continue in the coming decades. GECF Global Gas Outlook 2050 notes that gas will remain an essential element of the global primary energy mix for decades. Moreover, its share in the global energy mix evolution will rise from 23% in 2023 to 26% in 2050¹.

However, the widespread use of natural gas in homes and industries comes with environmental drawbacks. The drilling and extraction of natural gas and its transportation via pipelines result in methane leakage, a potent greenhouse gas. Methane is 34 times more effective than CO₂ at trapping heat over a 100-year period, and 84 times more effective over 20 years².

As a result, the technological maturity and compatibility of e-NG and other e-fuels with existing systems is particularly appealing. These

alternative fuels can bridge the gap between affordable green electricity sources and global end users. Countries like Japan and Germany are already incorporating such technologies to enhance their renewable energy usage.

In an opinion piece for the World Economic Forum, Marco Alverà, Chief Executive Officer of TES, said that the company meticulously assessed carbon emissions and capture at every stage of e-NG production for its Texas project. "Those findings revealed that e-NG's entire life cycle has a net-positive climate change potential of about 3.5 grams of CO₂ equivalent per megajoule. That's significantly lower than the life cycle of fossil-based fuels, which emit around 94 grams of CO₂ equivalent per megajoule," he explained.

Integrating renewable energies into our systems and industrial processes through long-distance offshore cables, green hydrogen, and e-fuels like e-NG is essential.

The transformation of the world's energy system represents an unparalleled opportunity for economic development. The collaboration between TES and Itochu signifies a pivotal advancement in developing innovative solutions for global decarbonisation and offers a strong model for companies globally to follow.



“e-NG's entire life cycle emits about 3.5 grams of CO₂ equivalent per megajoule, significantly lower than the 94 grams of CO₂ equivalent per megajoule emitted by fossil-based fuels.”

Marco Alverà
Chief Executive Officer of TES

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