

# Japan's Ammonia Co-firing Plans Threaten Paris Goals

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## 1. Japan's Policies to Promote Ammonia as a Fuel Source

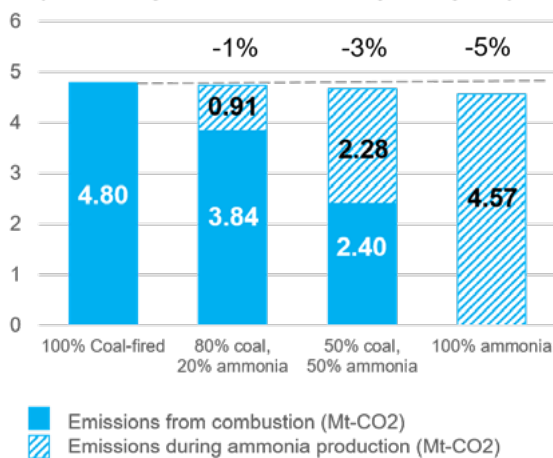
Deviating from the global understanding of abatement, the Japanese government considers co-firing ammonia with coal as an "abatement measure" to reduce CO<sub>2</sub> emissions. To develop and expand ammonia co-firing, Japan has passed laws such as the GX (Green Transformation) Basic Policy and established a system to financially support power companies who promote it. However, for the reasons discussed below, ammonia co-firing in coal-fired power plants is NOT a CO<sub>2</sub> emission reduction method consistent with the Paris Agreement.

## 2. Issues with Ammonia Co-firing

### (1) No meaningful CO<sub>2</sub> emission reductions

When promoting ammonia co-firing (and in the future, ammonia-only mono-firing), the Japanese government considers ammonia "zero-emission thermal power" on the basis that it does not emit CO<sub>2</sub> during combustion, even categorizing ammonia derived from fossil fuels as "non-fossil energy". However, currently all ammonia is produced from fossil fuels, which emits a significant amount of CO<sub>2</sub> at the time of production, but the Japanese government has issued a policy that "CO<sub>2</sub> emissions at the time of production are not considered". When the life cycle from manufacturing to power generation is taken into account, this will lead to very little reduction in emissions. Burning fossil ammonia in coal plants is NOT a CO<sub>2</sub> emission reduction method.

Potential CO<sub>2</sub> emissions reduction when co-firing with ammonia (case study of 1 GW coal-fired power plant)

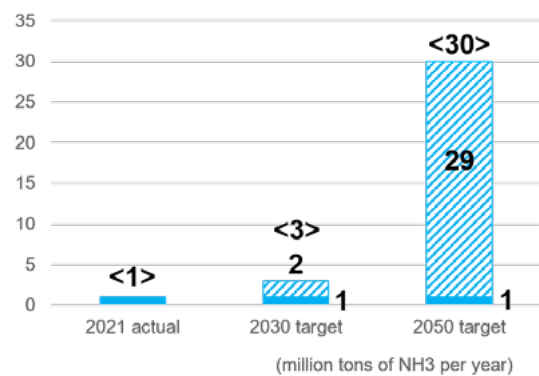


Note: Total annual power generation assumed to be 6,132 GWh. Prepared by: Kiko Network

### (2) An extraordinary amount of ammonia is needed

Domestic demand for fuel ammonia in the Japanese government's plan is expected to be 30 million tons in 2050 - 30 times the current Japanese demand for ammonia (mainly for fertilizer). This amount exceeds the total amount of ammonia presently traded worldwide (approximately 20 million tons). Note that this is only for demand in Japan, and does not include potential demand in other countries that Japan has exported ammonia co-firing technology to. Japan's attempt to secure a large amount of ammonia domestically could have a significant impact on the global supply and demand of ammonia. Its production and transportation would also consume a great deal of energy and create significant CO<sub>2</sub> emissions in the countries producing it.

Japan's current ammonia demand size and targets for 2030 and 2050



Legend:   
■ Current demand   
■ Volume needed for the targeted volume

Source: BloombergNEF (2022), Japan's Costly Ammonia Coal Co-Firing Strategy

### (3) Ammonia co-firing will extend the life of coal-fired power across the globe

Ammonia co-firing technology is still in the development stage - the 2030 target of 20% co-firing means that the remaining 80% burned is still coal, and substantial amounts of CO<sub>2</sub> will continue to be emitted. Furthermore, the government is making significant efforts to export ammonia co-firing technology to other countries through public-private partnerships. Such measures will prolong the life of coal-fired power plants around the world and jeopardize 2030 emission reduction targets. Although the Japanese government claims some of the CO<sub>2</sub> emitted may be captured through carbon capture and storage (CCS), at this stage the CO<sub>2</sub> produced is released into the atmosphere, and recent developments indicate that there is little to no prospect of being able to capture and store it in the future.

### 3. Japan's Efforts to Promote Ammonia Co-firing Worldwide

#### (1) Sale and export of co-firing technology to countries across the globe

The Japanese government is pursuing the export of ammonia co-firing technology, and has signed memorandums with various countries. Additionally, Japanese companies such as JERA, Japan's largest electric utility, and IHI and Mitsubishi Heavy Industries, which manufacture turbines and related technologies, are also promoting projects throughout Southeast Asia and working to secure and expand the use of fuel ammonia worldwide.

#### (2) Impeding the shift to renewable energy in Southeast Asian countries

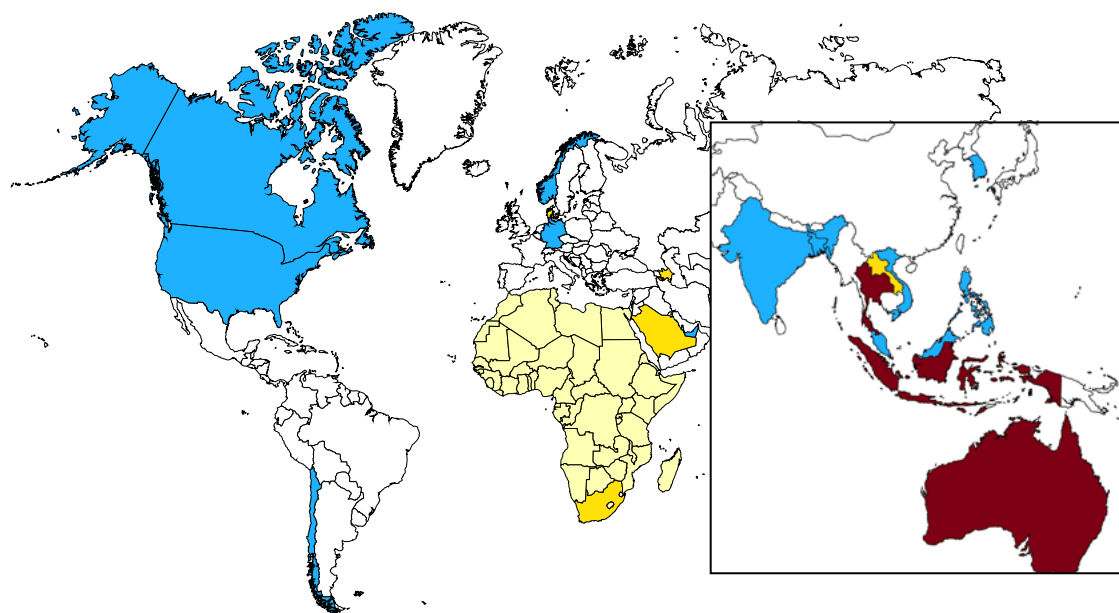
According to a report by the ASEAN Energy Center, fossil fuels accounted for about 83% of ASEAN's energy mix in 2021, while renewable energy accounted for 14.4%. Nevertheless, the cumulative installed capacity of renewables in the region more than tripled in the previous

decade, reaching 102 GW in 2022, and surpassing the cumulative installed capacity of coal-fired power (100 GW). The rapid growth of renewable energy in Southeast Asian countries is expected to continue in the future.

However, the Japanese government's concept of "transitioning to clean energy," is working with companies to develop ammonia-related technologies and establish supply chains in various countries under what it calls the "Asia Zero Emission Community" (AZEC). This could lock-in coal-fired power in Southeast Asian countries and significantly slow down their efforts to reduce emissions and transition to renewable energy.

Ammonia co-firing is not consistent with developing countries' 2040 coal phase-out targets, nor with the timeline for the Paris Agreement's 1.5°C goal, and there is concern that it will be used to maintain the use of coal-fired power in the region. Southeast Asian countries are currently revising their energy policies and transitioning to renewable energy, and Japan must support them in accelerating the exit from coal-fired power.

Countries with memorandums and contracts with Japan related to ammonia co-firing



	<b>Memorandum with Japanese government</b>	Azerbaijan, Denmark, Laos, Saudi Arabia, South Africa
		Africa region: JICA is looking for a consultant to produce a study on hydrogen and ammonia production and use in Africa, including ammonia co-firing
	<b>Contract with Japanese business/industry</b>	Bangladesh, Canada, Chile, Germany, India, Malaysia, Norway, Philippines, Singapore, South Korea, United Arab Emirates, United States, Vietnam
	<b>Government memorandum and business contract</b>	Australia, Indonesia, Thailand

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