

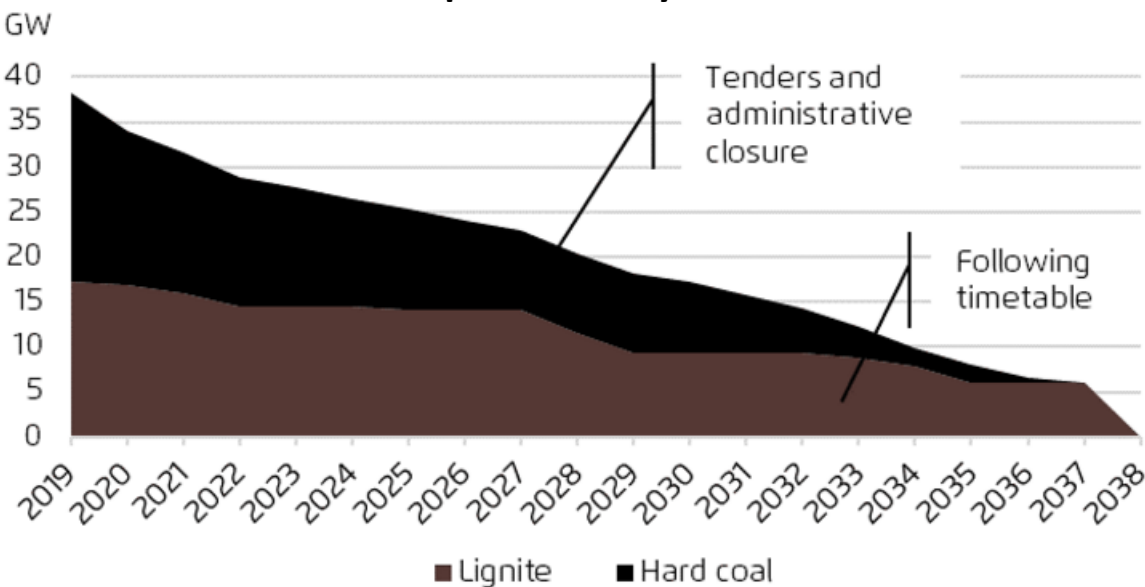
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# Japan's Coal “Fade-out” and Decarbonisation Policy

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# Japan's coal "fade-out" policy

German coal phase-out by 2038 →2030



Source: What's the timeline for Germany's coal phase out?, Agora Energiewende, 16 July 2020

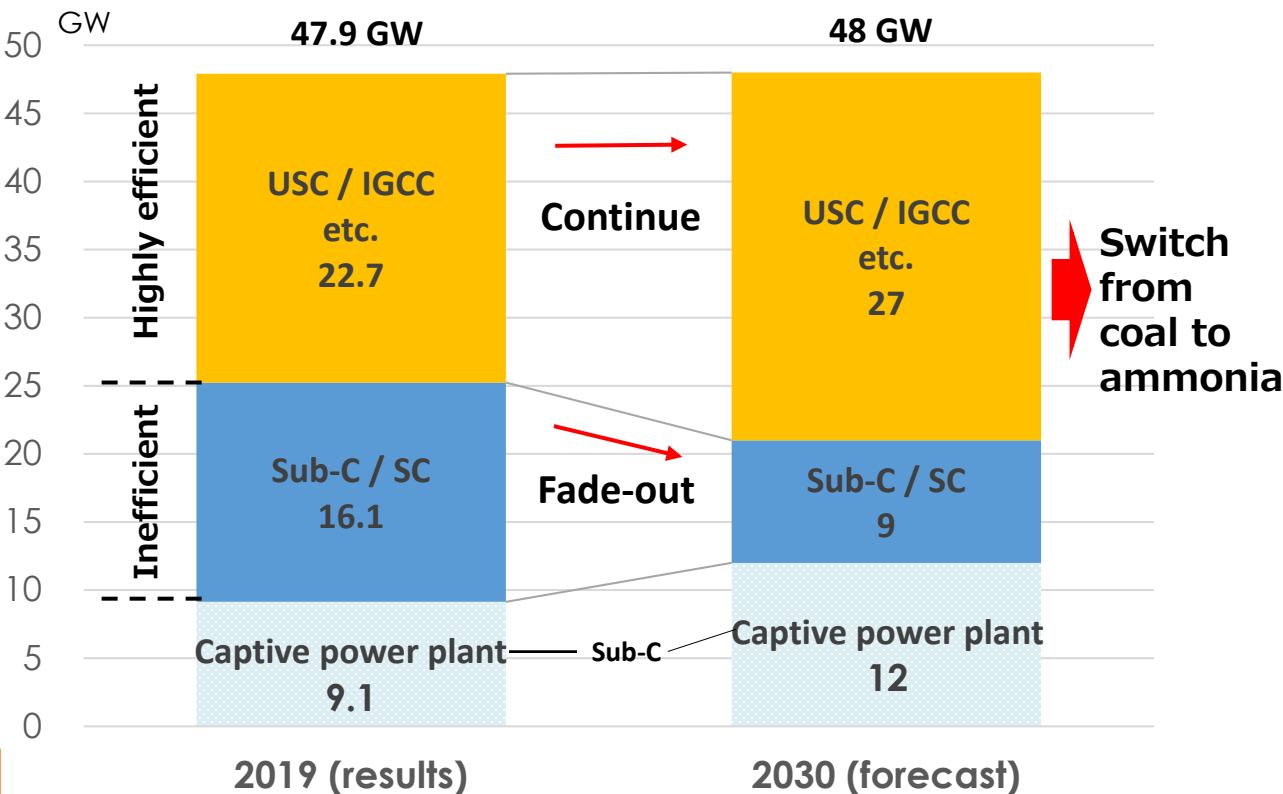
## Types of coal power plant

Inefficient ← → Highly efficient

Plant Type	Sub-C	SC	USC	IGCC
CO2 emissions	900g/kWh	850g/kWh	800g/kWh	700g/kWh
Energy efficiency	Less than 38%	38-40%	41-43%	46-50%

Source: Coal power working group, Long-term Energy Supply and Demand Subcommittee, Ministry of Economy, Trade and Industry, 7 August 2020, 30 March 2015

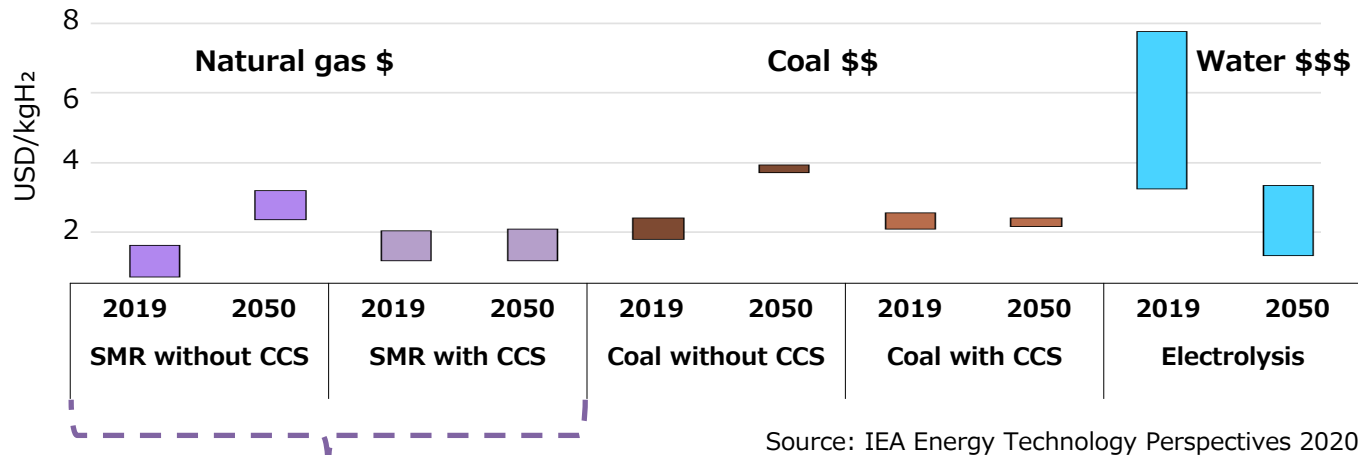
Japan's coal "fade-out" of inefficient coal power plants



Source: Prepared by Institute for Global Environmental Strategies based on "Coal power working group – interim review", Ministry of Economy, Trade and Industry, 9 April 2021

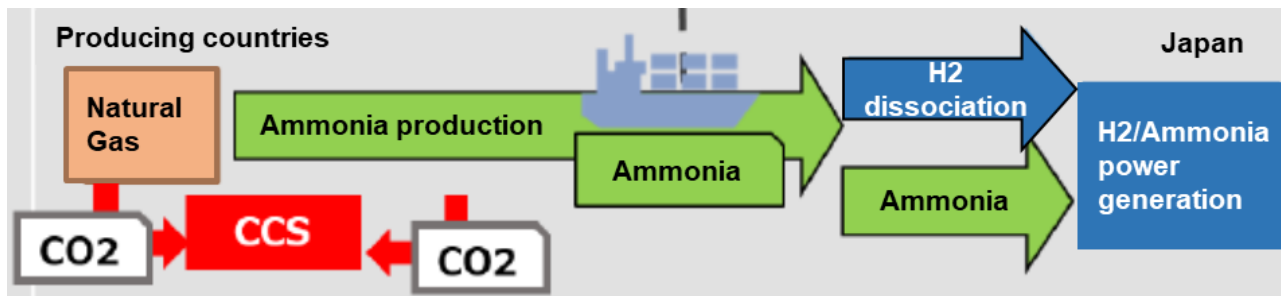
# Overview of Japan's ammonia supply chain

Hydrogen production costs by technology in the Sustainable Development Scenario, 2019 and 2050



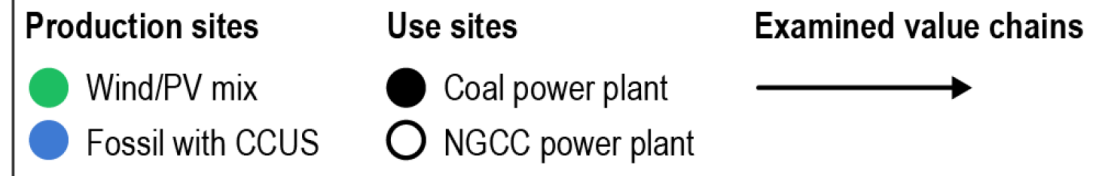
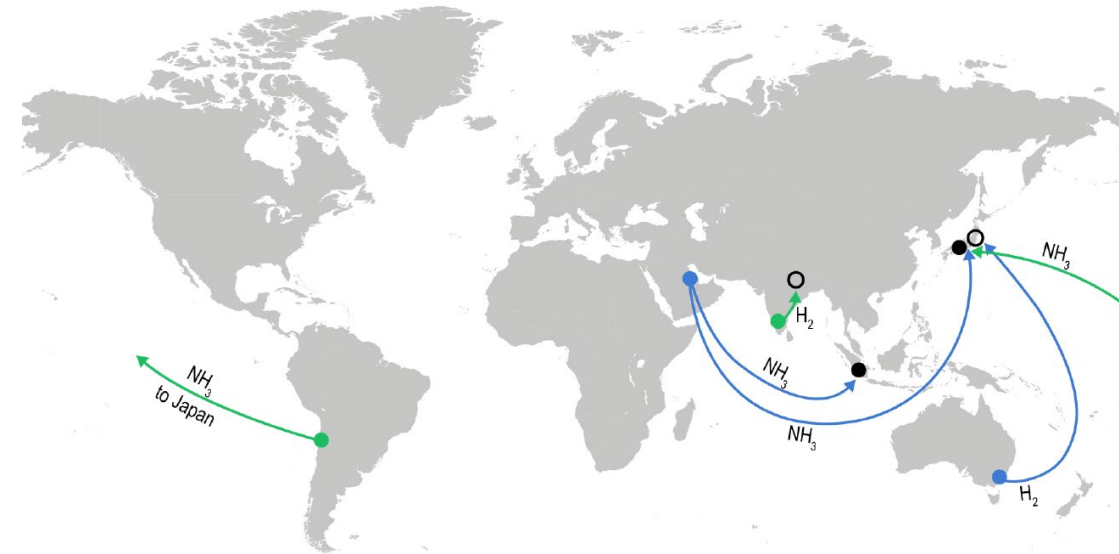
Natural gas is cost-competitive, but insufficient in Japan → import hydrogen

Prospective hydrogen ammonia supply chain



Source: Ideal energy policy towards 2030, Ministry of Economy, Trade and Industry, 11 March 2021

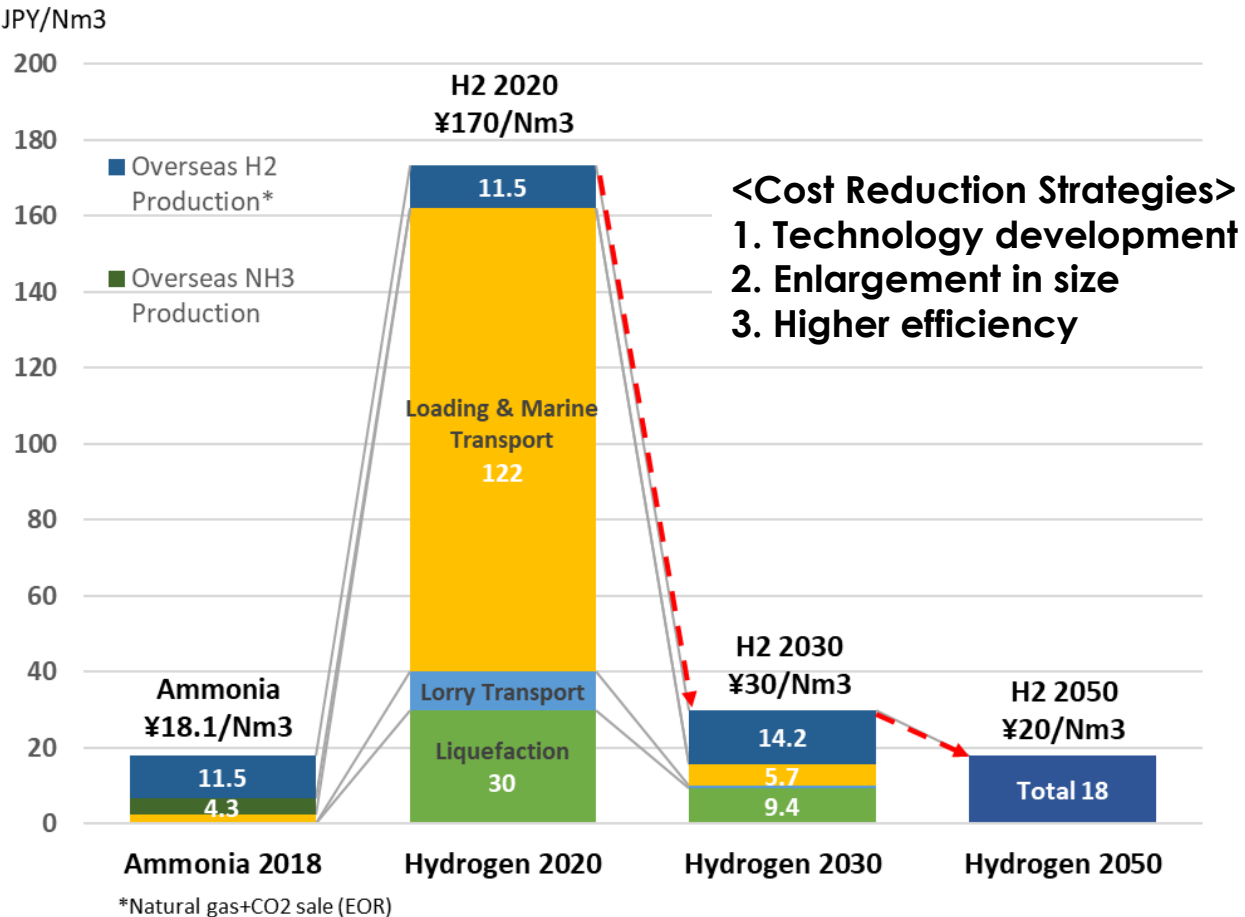
Examined value chains for the production and use of low-carbon fuels in thermal power plants



Source: The Role of Low-Carbon Fuels in the Clean Energy Transitions of the Power Sector, IEA, October 2021

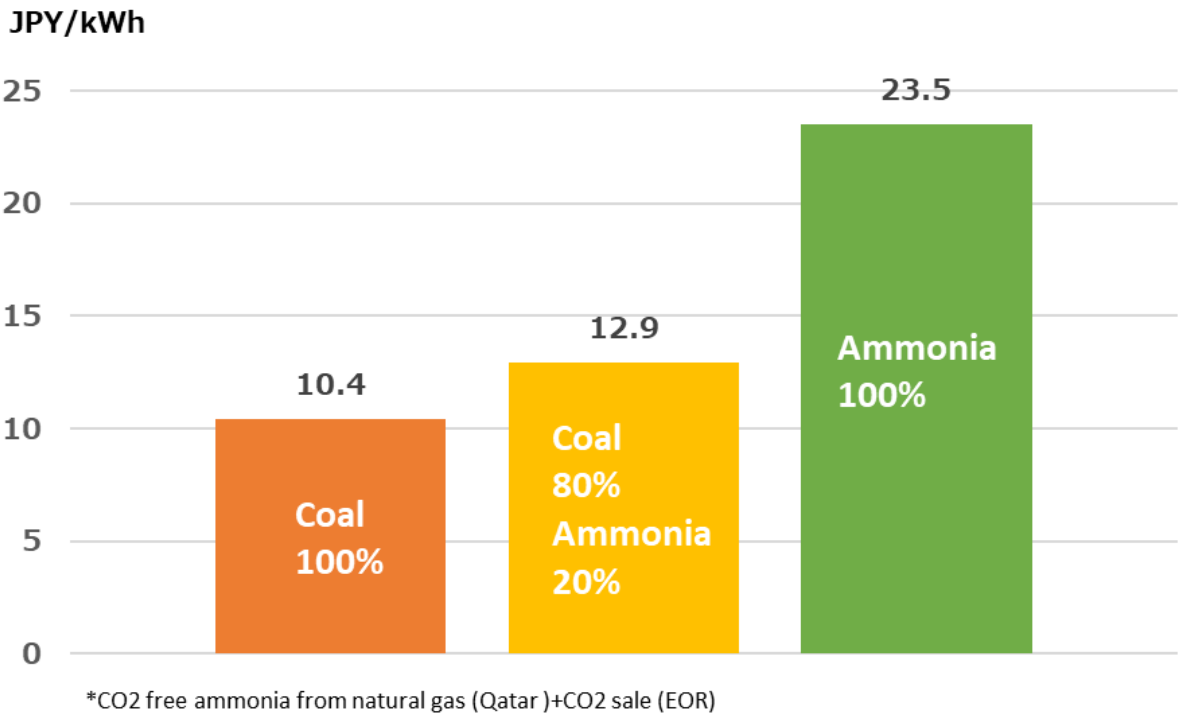
# Challenge: High Cost of Hydrogen/Ammonia

Imported hydrogen cost forecast by the Government of Japan



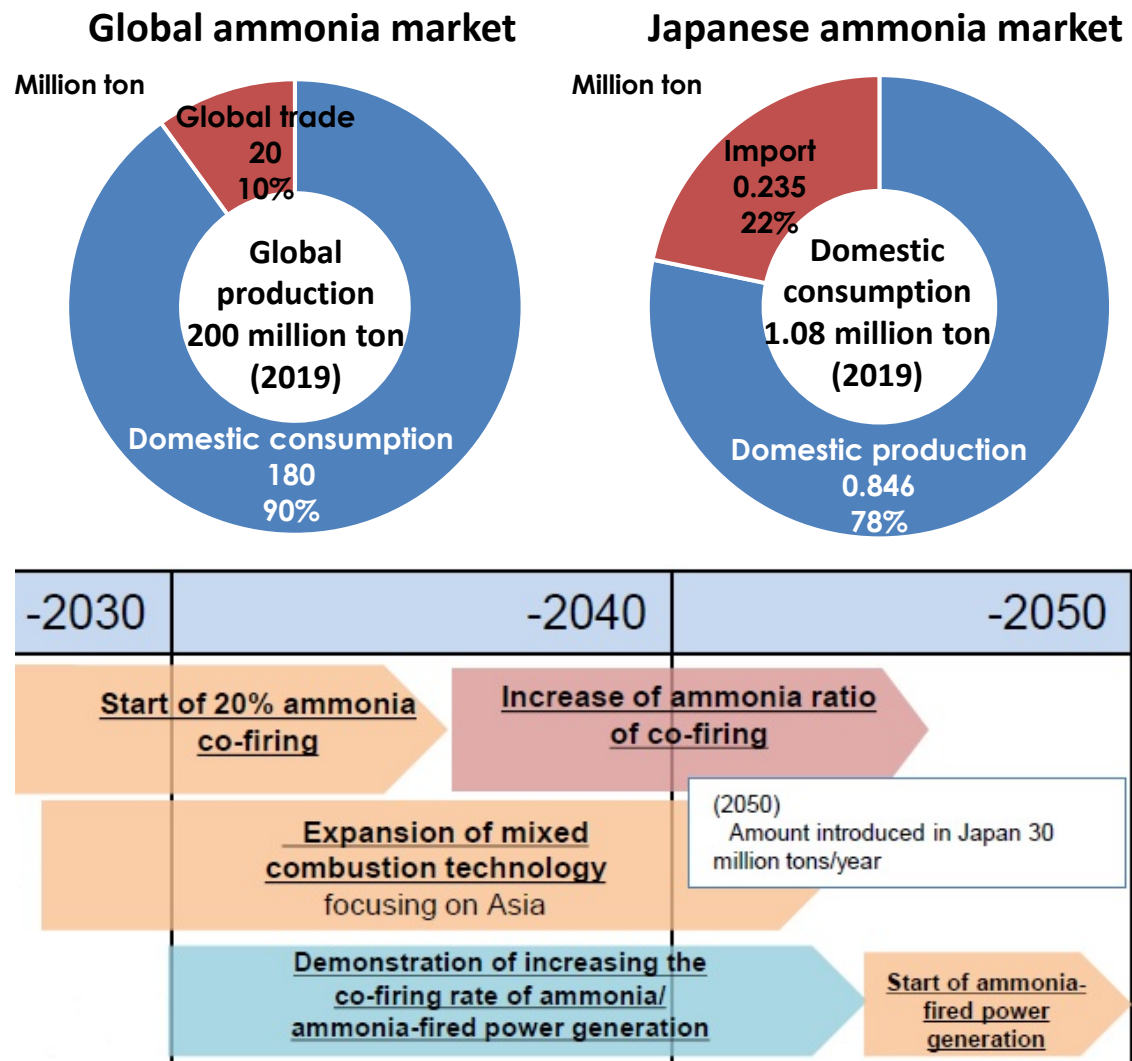
Source: Prepared by Institute for Global Environmental Strategies based on “Discussion towards realization of 2050 carbon neutral”, Ministry of Economy, Trade and Industry, 21 December 2020

Power generation cost estimate

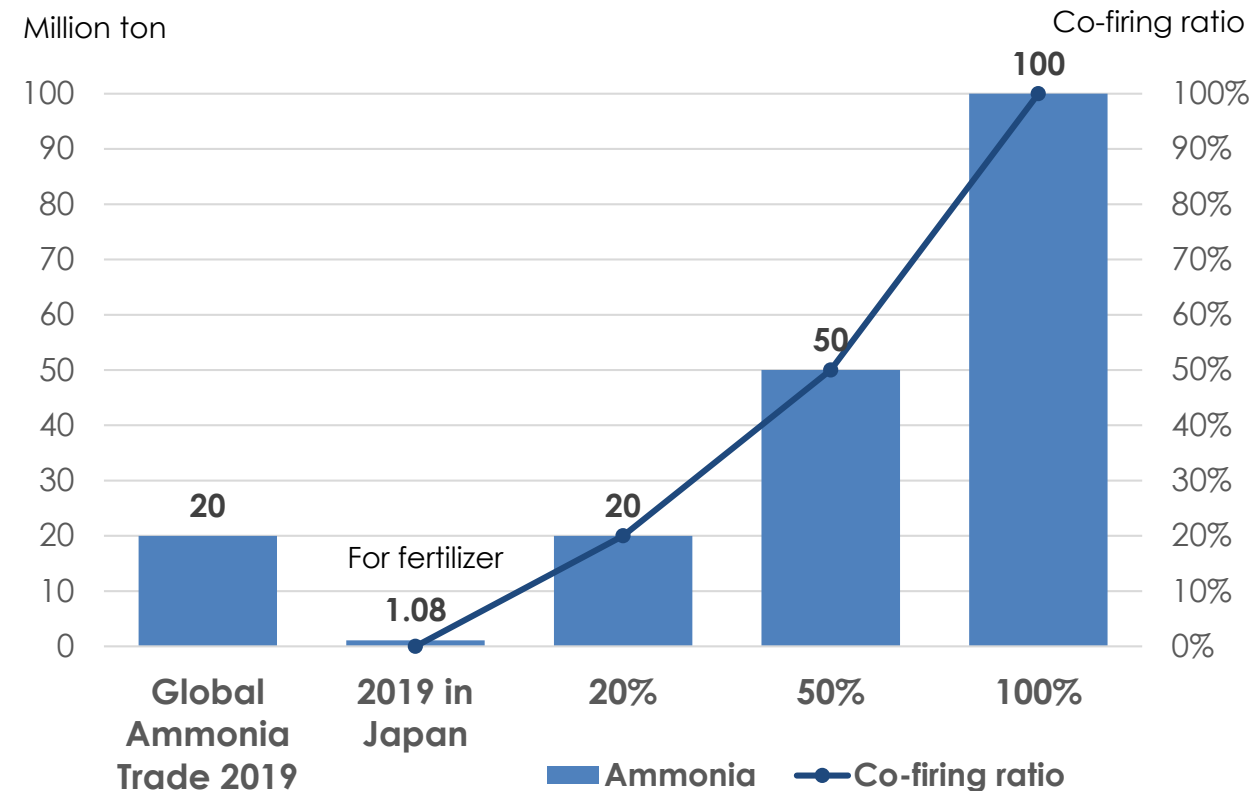


Source: Prepared by Institute for Global Environmental Strategies based on “Effort to expand fuel ammonia”, Energy White Paper 2021, Ministry of Economy, Trade and Industry

# <Case study> How much ammonia does Japan need ?



## Ammonia amount necessary for co-firing with coal in Japan

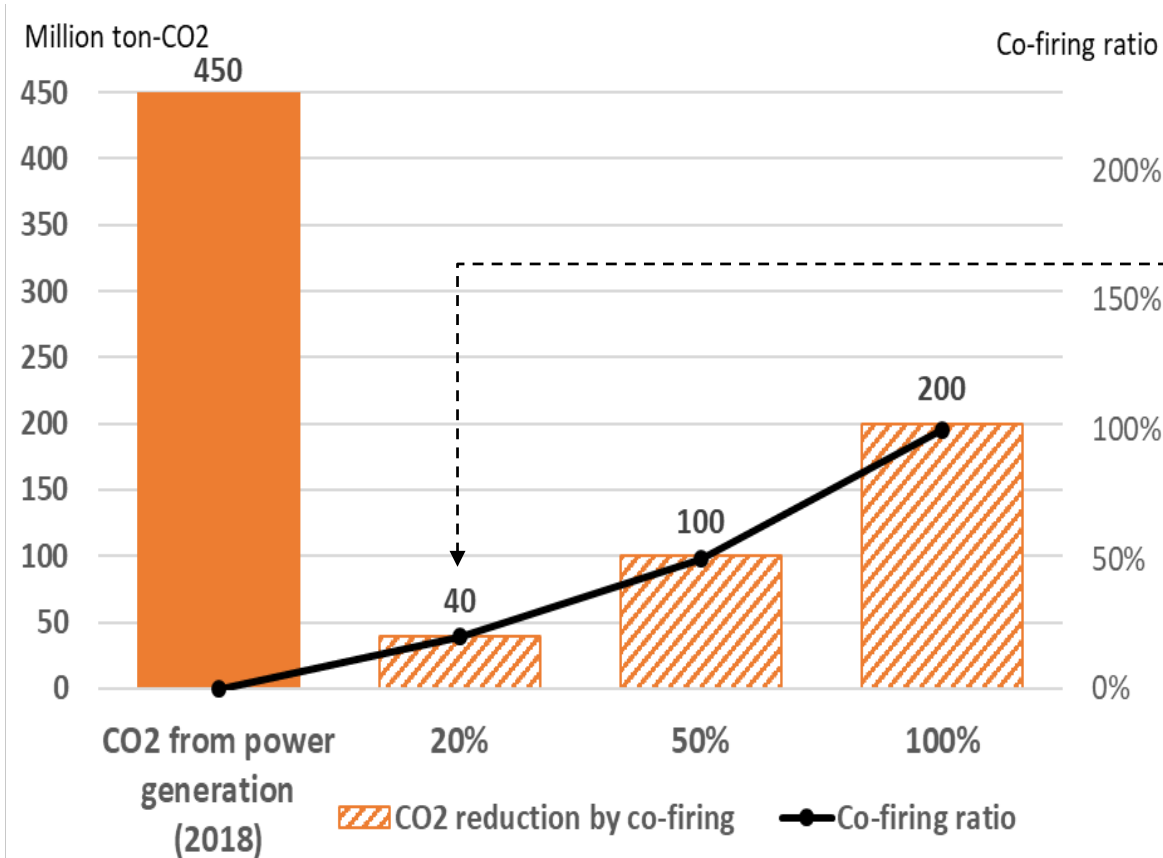


Assumption: 500,000 ton of ammonia required per GW for 20% co-firing

Source: Prepared by Institute for Global Environmental Strategies based on "Public-private council for introducing ammonia fuel-interim review", Ministry of Economy, Trade and Industry, 8 February 2021

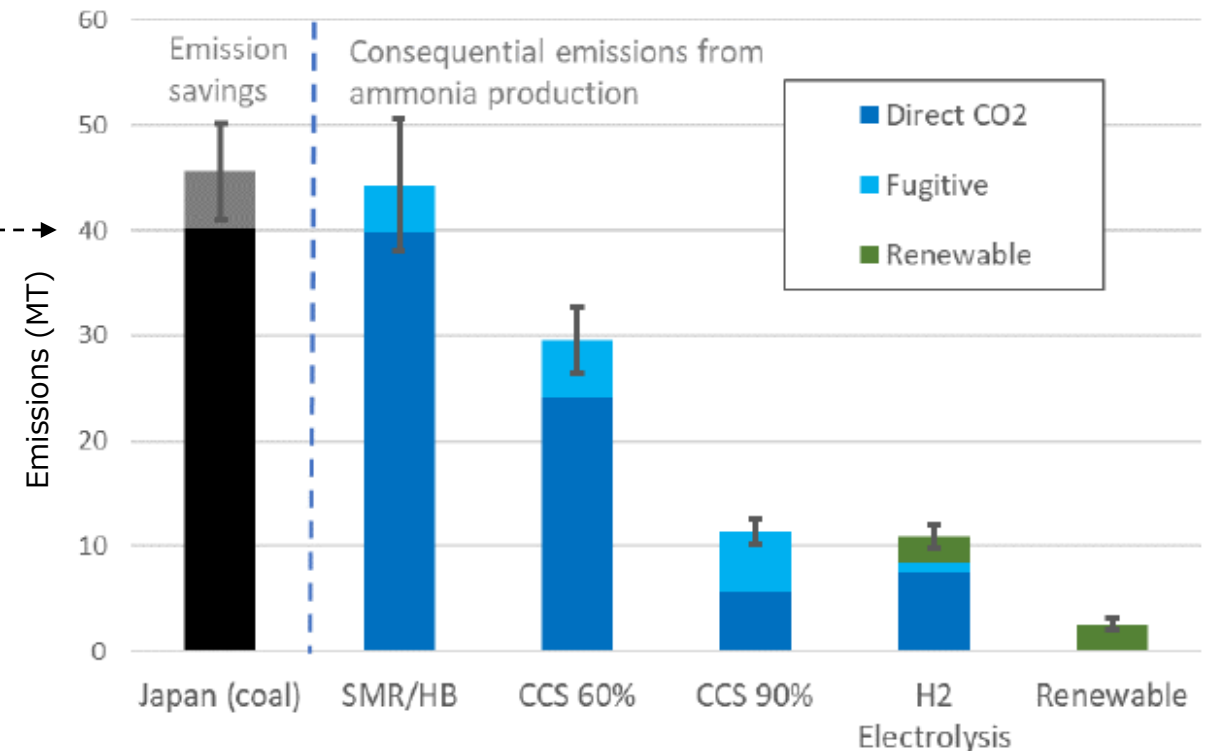
# Challenge: Ammonia's lifecycle CO2 emissions

<Case study> CO2 reduction by ammonia-coal co-firing



Source: Prepared by Institute for Global Environmental Strategies based on "Public-private council for introducing ammonia fuel-interim review", Ministry of Economy, Trade and Industry, 8 February 2021

Emissions savings due to 20% ammonia/coal co-burning in Japan's 2030 coal fleet, and consequential emissions from ammonia manufacture



**"SMR/HB process provides no net benefit for global emissions"**  
**"the direct emissions saving in Japan would be balanced by a similar increase in emissions in Australia"**

Source: Global emissions implications from co-burning ammonia in coal fired power stations: an analysis of the Japan-Australia supply chain, Matthew Stocks, Australian National University, November 2020



# Japan's coal power export policy

	Justification	Source		Current Status	
1.	“Japan’s government raised concerns that if it halted the financing, China would step in and build coal-fired power plants overseas”	The Guardian “Richest nations agree to end support for coal production overseas” 21 May 2021	➔	1.	“China will not build new coal-fired power projects abroad” President Xi Jinping, 76th UN General Assembly, 21 Sep. 2021
2.	Developing countries have no choice but to use coal power, which is continuously necessary as important energy.	Agency for Natural Resources & Energy “Why does Japan keep using coal-fired power generation?”, 6 Apr. 2018		➔	Indonesia
			Viet Nam		
			Philippines		scrapped plans to build 10 out of 18 coal-fired power plants, 28 Jun 2021, Reuters
Bangladesh					

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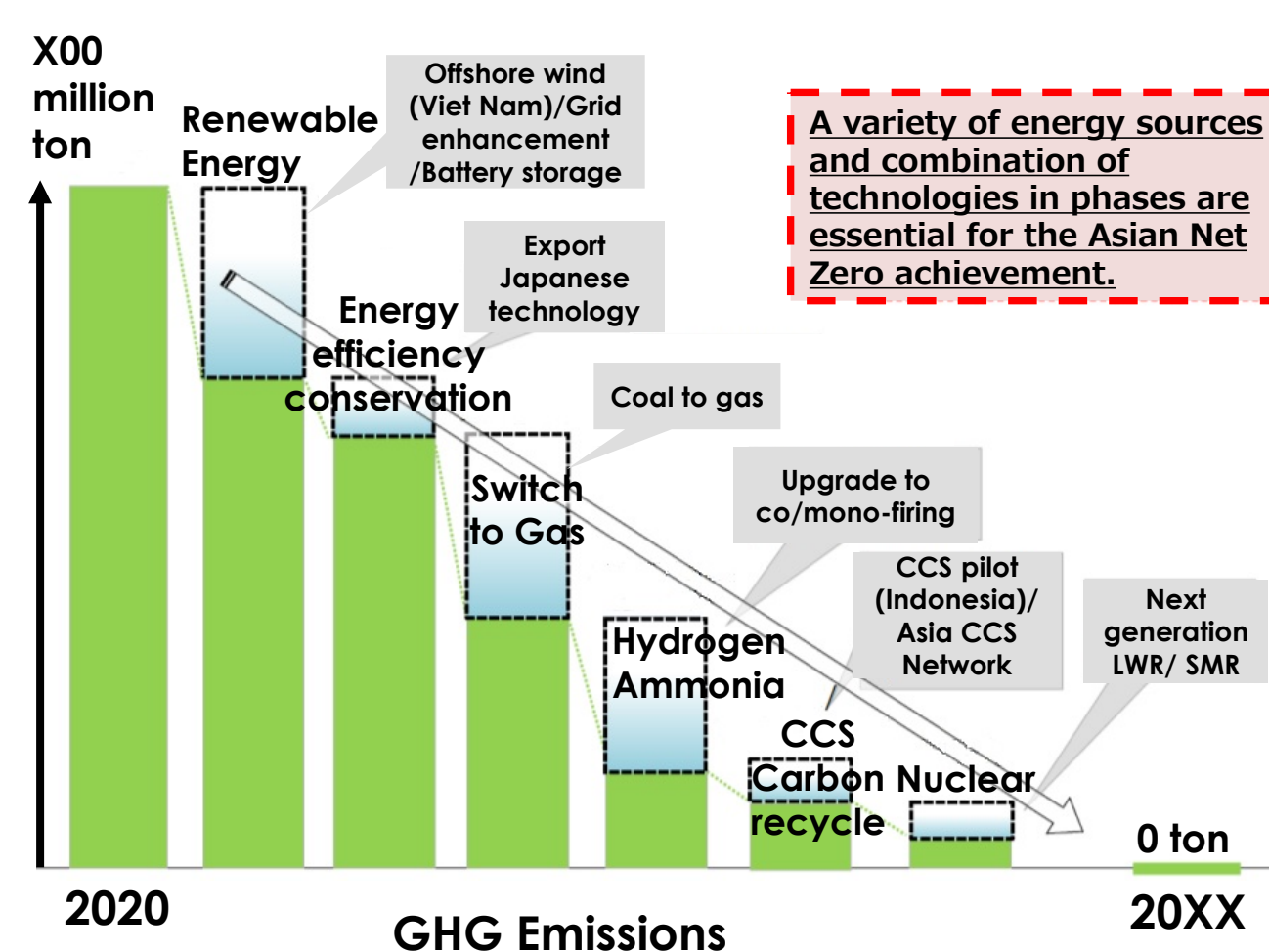
**Kishida pledges \$10 billion to support Asia's zero emission path**

Japan Bank for International Cooperation (JBIC) will provide support for exports from coal power plants if they come with emissions-cutting steps such as CCS and co-firing ammonia, JBIC Governor said, 29 Jun 2021, Reuters

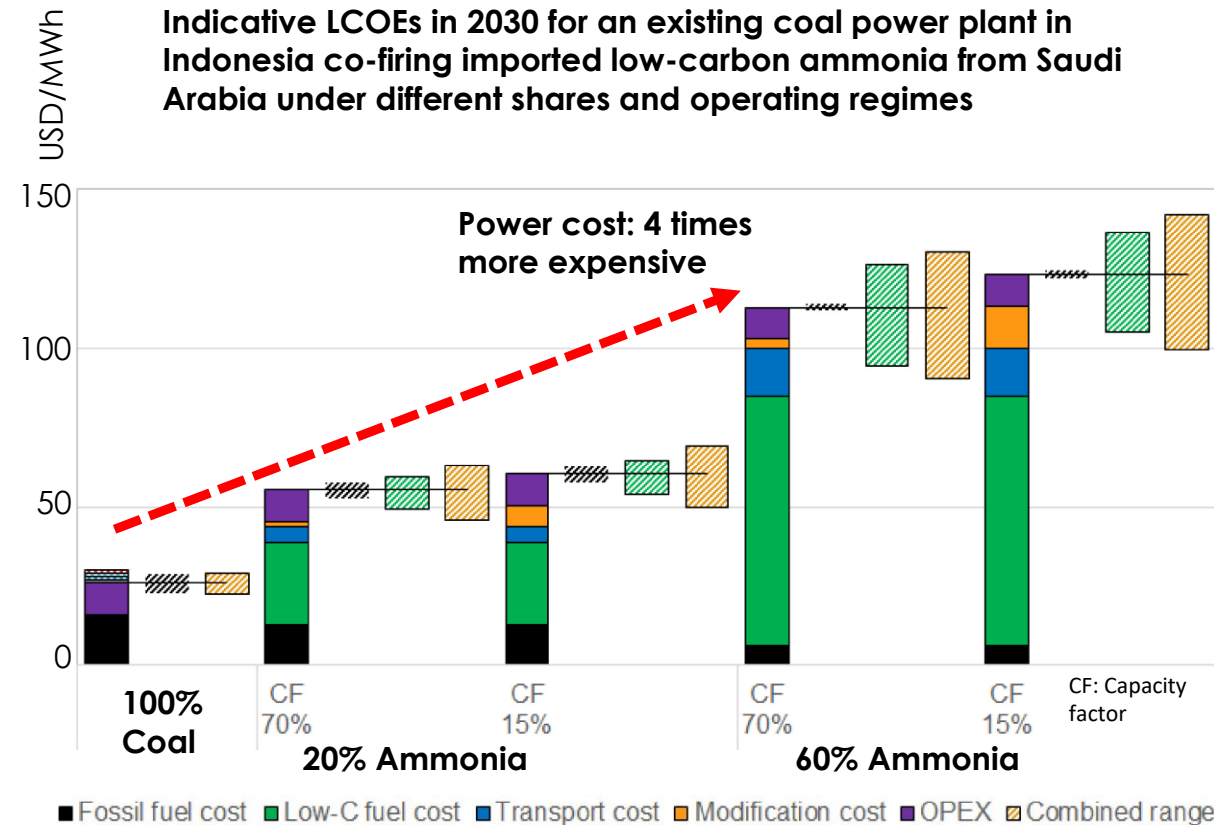


2 Nov 2021, Japan Times

# Japan's Initiative for Asian Net-Zero in Power Sector



Source: Direction of oil and gas policy towards 2030/2050, Ministry of Economy, Trade and Industry, 19 February 2021



Note: Coal USD 35-53/t, Low-carbon NH<sub>3</sub> USD 210-320/t, transport cost USD 45-60/tNH<sub>3</sub> coal plant efficiency 40%, carbon price USD 0/tCO<sub>2</sub>, ammonia produced from natural gas with CCUS in Saudi Arabia

Source: IEA The Role of Low-Carbon Fuels in the Clean Energy Transitions of the Power Sector, October 2021



# Summary

## 1. Four challenges of coal-ammonia co-firing

- ① Co-firing ratio (currently 20%)
- ② High cost of power generation
- ③ Insufficient ammonia supply
- ④ CO<sub>2</sub> emissions of unabated fossil ammonia



## 2. Japan should assist Asia to end unabated coal power

## 3. Multiple/country-tailored decarbonisation approach for Asian net-zero achievement