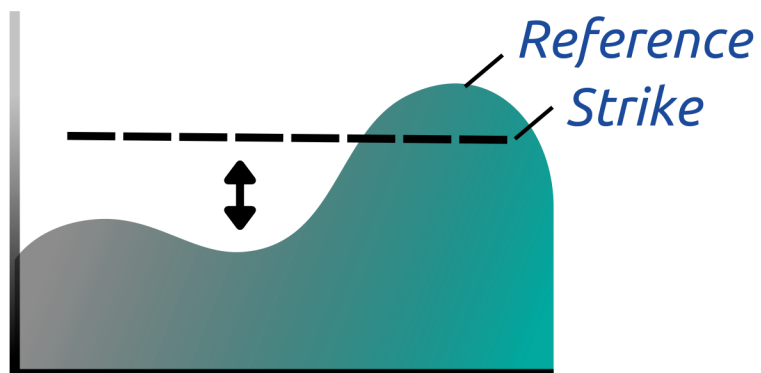


The role of Clean Hydrogen and Ammonia Co-Firing in Japan's power sector decarbonisation



and its two main incentive schemes

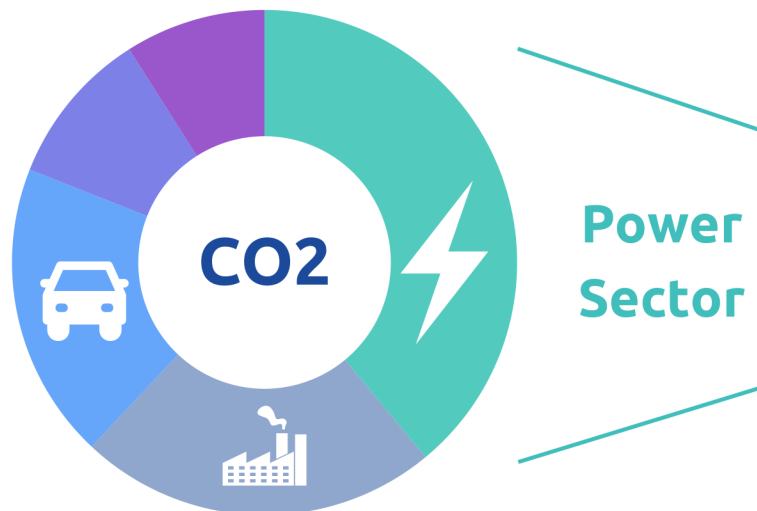
Contract for
Difference



Capacity Auction



A heavy reliance on thermal power plants ...



39%
of Japanese CO2 emissions

#1
Japan's largest source of emissions



- Up until 2011, **nuclear** represented **30%** of Japan's mix
- After the **Fukushima nuclear accident**, all nuclear power generation was temporarily stopped

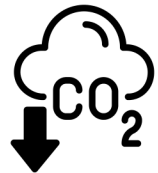


- **New coal-fired power plants** were built in the last ten years to guarantee Japan's energy security
- In 2021, **coal** (49GW) accounted for **30%** of the electricity mix
- Coal is expected to still account for **19% in 2030** as per the Sixth Strategic Energy Plan (Oct 2022)

... which can be partially resolved by clean hydrogen & ammonia



Japan has committed to



- - **46%** in domestic CO2 emissions by 2030 (vs 2013 level)
- **Net Zero** in 2050

Japan has been putting emphasis on power production from

RENEWABLES



New renewable energy capacity
*Especially **offshore wind** (10GW target for 2030, from 136MW in 2022)*

CLEAN H2 AND AMMONIA



Blending with coal/gas in existing thermal power plants (**Co-Firing**) and use in new dedicated plants

The Co-Firing strategy has been debated for prolonging the lifetime of coal assets, but has been retained by the State due to its **advantages**:

- ✓ *Limited investment required*
- ✓ *Almost imminent implementation*
- ✓ *Uninterrupted baseload and dispatchable power supply*

Co-Firing is supported by the Japanese CfD scheme ...

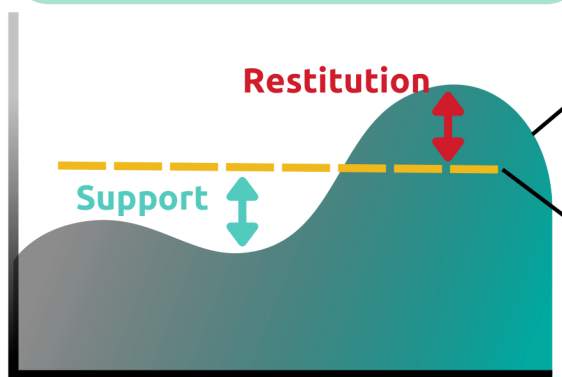


Objective

Japanese government to compensate (partially to fully) the **price gap** between **low-carbon hydrogen&derivatives** and **fossil fuel** equivalent tariff, over the long-term

USD 21bn
Budget

Mechanism



Reference Price Conventional fuel price (e.g. coal)

Strike Price

Low-carbon hydrogen and derivatives price compensating the producer for costs and profit

15 years

Eligibility

- **Full commitment from offtaker**
- **Low-carbon hydrogen** (i.e. blue or green)
- **Hard-to-abate sectors**
- Offtaker commits to continue the offtake for **>10 years after CfD support**

Status

- Draft published by H2 & NH3 Subcommittee of METI* on Dec 6, 2023
- Applications expected to be launched in the **Summer 2024**

*Ministry of Economy, Trade and Industry

... and by the recently launched Capacity Auction



Objective

Support the construction of **new clean power plants** by guaranteeing a **stable long-term fixed revenue source**

4GW
auction

Mechanism

- Pay-as-bid auction
- Bids to include a fixed **capacity payment** over 20 years in **¥ / kW / yr**

Eligibility

NEW Gas-fired with **10%+ hydrogen co-firing**

NEW Grid-connected batteries

NEW Hydro

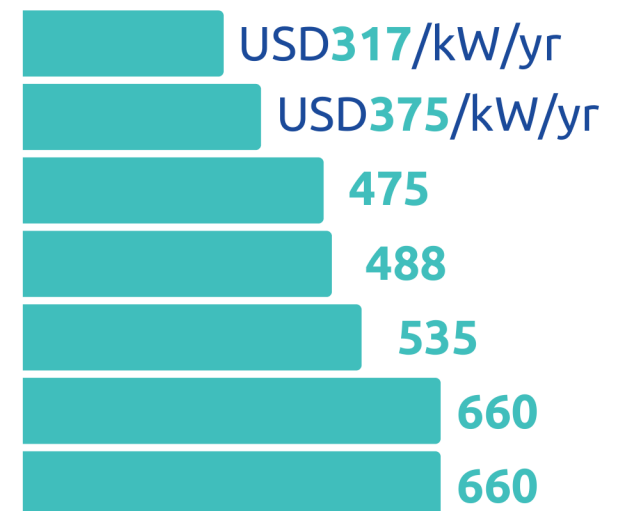
RETROFIT Coal to **20%+ ammonia co-firing**

RETROFIT Coal to biomass-only

RETROFIT Gas to **10%+ hydrogen co-firing**

NEW PV, wind, geothermal, biomass, pumped hydro

↓
Subject to a cap



Status

- Auction published by OCCTO in 2023
- Award pending for first 4 GW, with further rounds expected