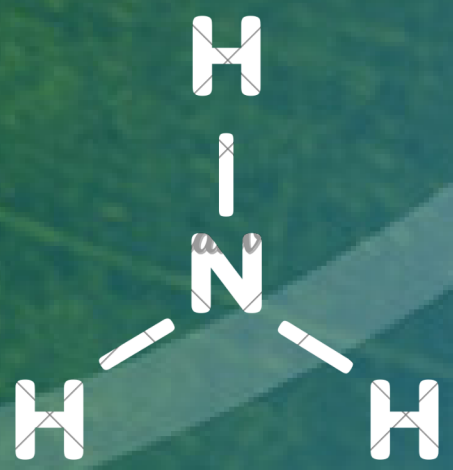
#H2OffThePress

Green Ammonia for co-firing in power plants



A promising use case to decarbonise power generation

Yamna

Green ammonia co-firing: An imminent decarbonisation option for thermal plants

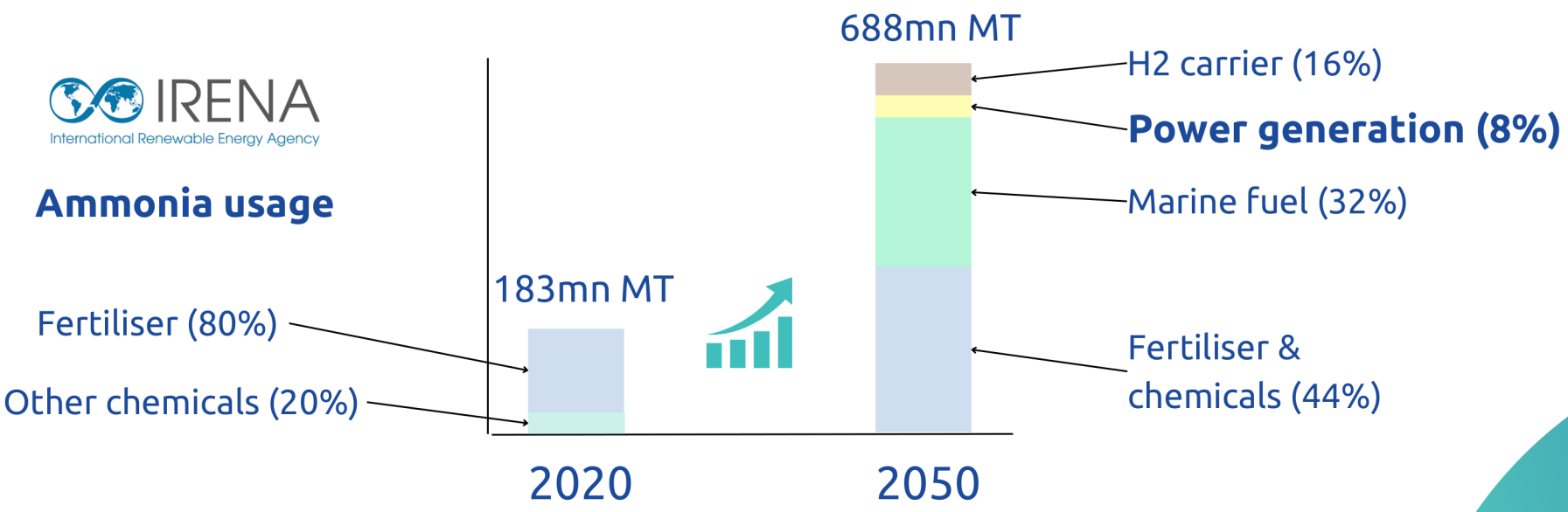
Co-firing ammonia in thermal power plants offers imminent decarbonisation for baseload power

→ Thermal generation is the largest source of power and heat today with around **60% of the energy mix dominated by fossil fuels**

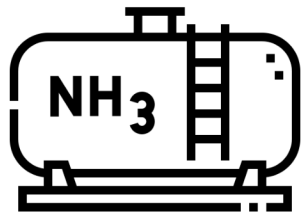
By retrofitting power plants with small modifications at low cost to burn ammonia, the fuel can be combusted alongside coal to generate power

Using green ammonia for co-firing offers complete emission reduction

While green ammonia production is scarce now, ***there are ambitious plans in place for giga projects that are capable of producing adequate quantities to serve power generation needs***

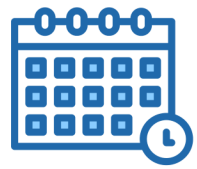


Baseload decarbonisation in fossil fuel generation dense regions



Since it is based on the use of existing baseload power plants, co-firing provides several advantages:

Limited investment required

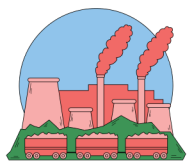


Almost imminent implementation

Uninterrupted baseload and dispatchable power supply

Safety guidelines in place
(ammonia is already used for NOx removal Selective Catalytic Reduction in thermal power plants)

→ ***Thus making a case for regions with***

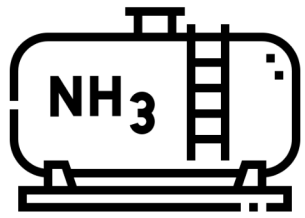


High thermal power usage

*High number of **new** thermal plants*

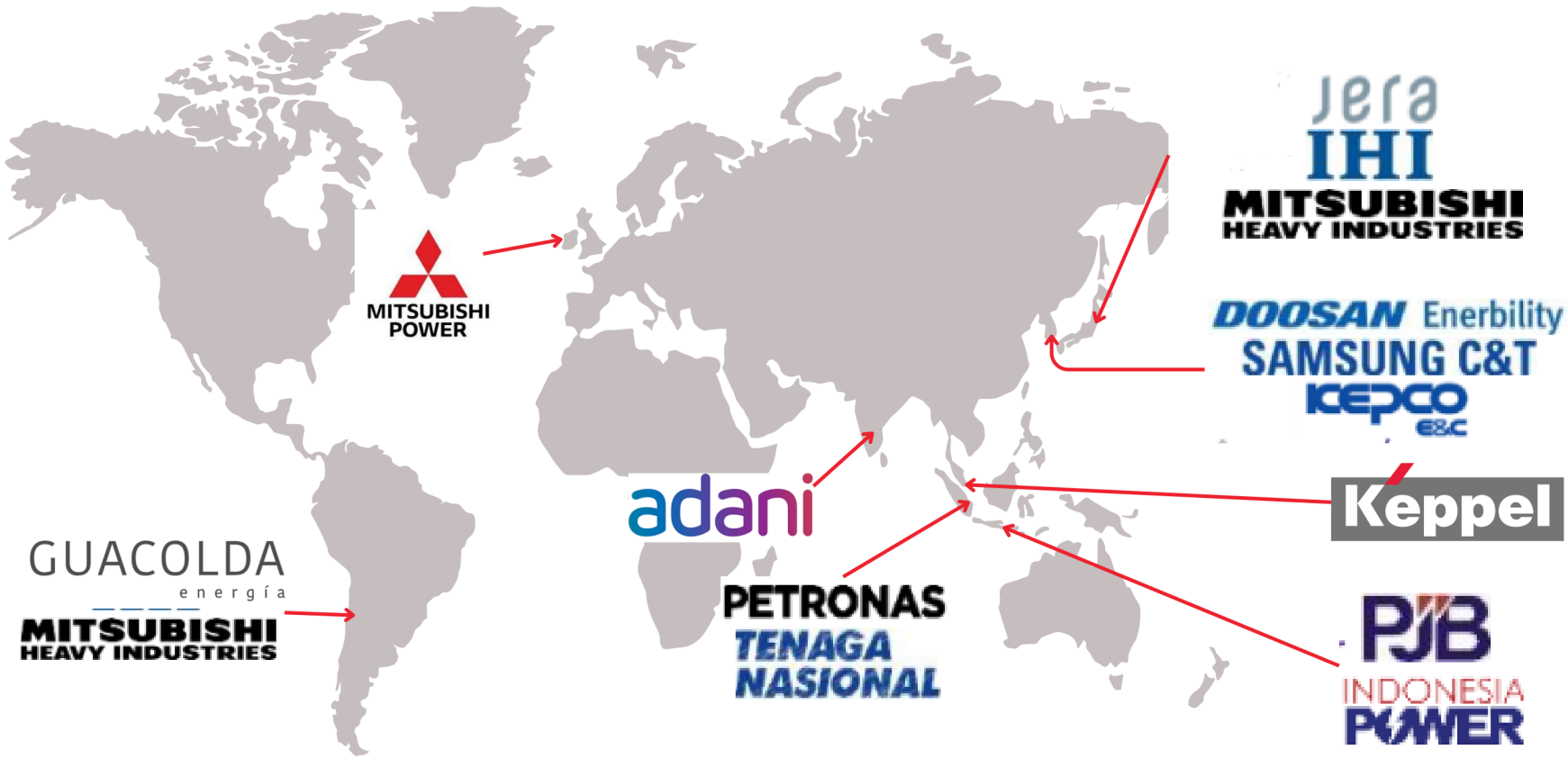
Yamna

Pilot plants to be integrated into power plants soon



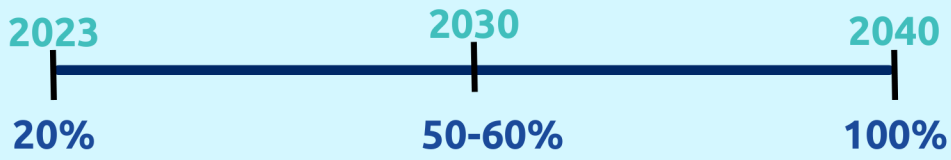
Co-firing ammonia in thermal power plants is limited to pilot projects but ambitious targets ensures a fast ramp up

→ Major players lead the way with pilot plants for co-firing



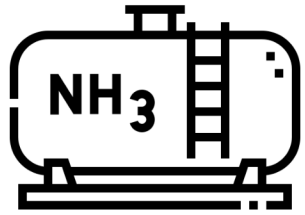
JERA is at the forefronts by aiming to co-fire 20% of ammonia with coal at a large commercial power plant (1 GW) in central Japan by 2024

Timeline of technological maturity (blending) by JERA

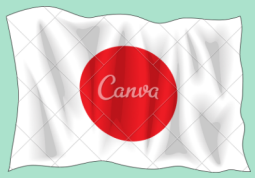


There is also technological progression apart from co-firing with,
Mitsubishi Power is also developing a 40-MW class gas turbine that can directly combust 100% ammonia and a 100% ammonia powered boiler

Governmental movements are on the rise with Japan and South Korea leading the way



There is more noise around the subject in Asia due to a high population of thermal plants



$482 million R&D budget related to burning ammonia for electricity generation

Drafting a **15-year capacity "CfD"** style auction mechanism for low- and zero-carbon technologies starting **2024**

Aiming to commercialize **20% ammonia co-firing** technology at **more than half** of the country's 43 coal-fired power plants by **2040** with a view to retire coal plants by 2050

Thermal power plants required to develop a roadmap for shifting to running on biomass or ammonia after operating for 20 years

Co-firing included in the National Energy Transition Roadmap

This strong momentum is positive for the green ammonia industry but should be pursued in parallel with plans to phase out fossil fuels and ramp up renewables and renewable fuels for power and heat production

Yamna

References

BloombergNEF, 2023 New Energy Outlook 2022

IRENA, 2023 Innovation Outlook Renewable Ammonia

BloombergNEF, 2023 Scaling Up Hydrogen: The Case for Low-Carbon Ammonia